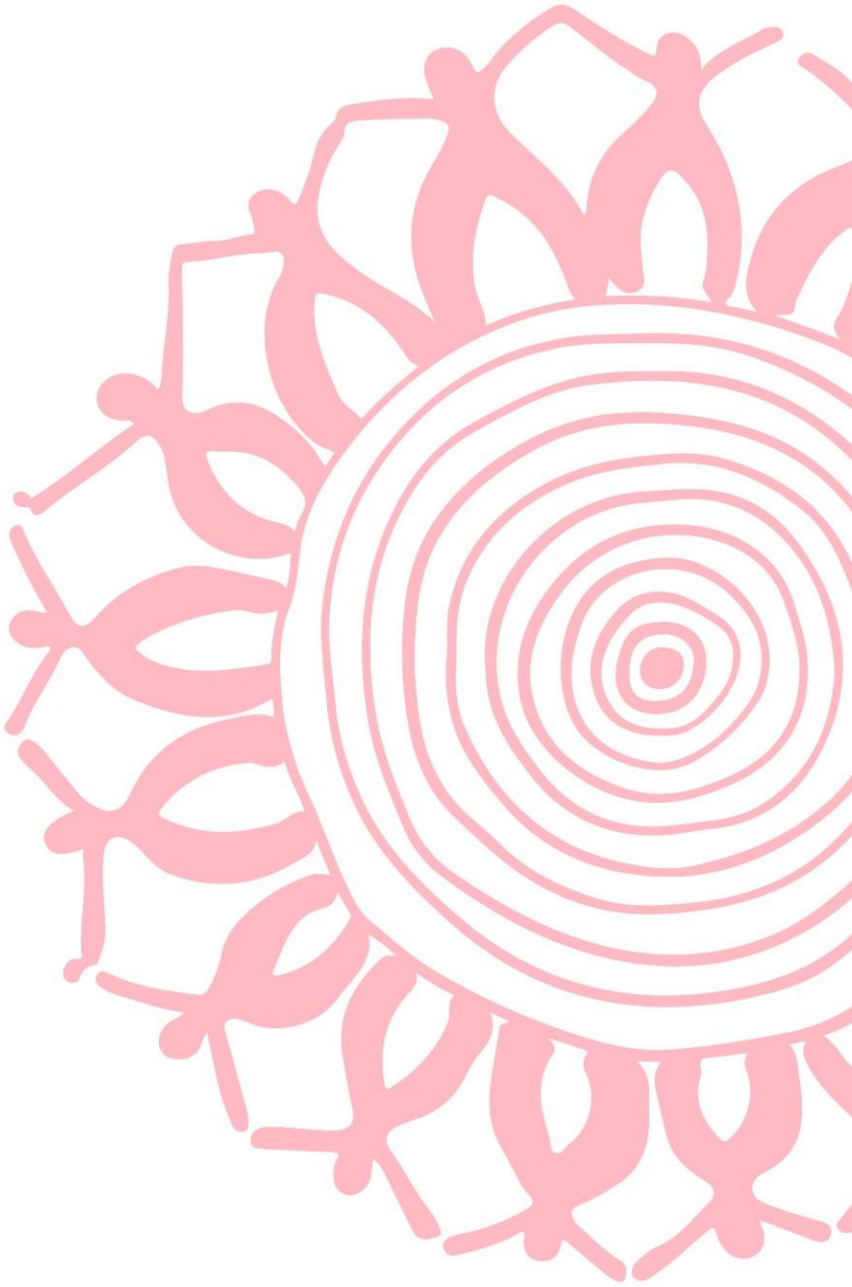
NSW Department of Education



EFSG Part D | **2026**r1

Design and technical requirements



Acknowledgement of Country

We recognise the Ongoing Custodians of the lands and waterways where we work and live. We pay respect to Elders past and present as ongoing teachers of knowledge, songlines and stories.

We strive to ensure every Aboriginal and Torres Strait Islander learner in NSW achieves their potential through education.

Artist Credit: *Suzanna, a former student from Boggabilla Central School.*
The artwork featured represents the themes of community, school, friendship and family.

Current version

The current version of the Educational Facilities Standards and Guidelines (EFSG) can be found online through the New South Wales Department of Education website.

The EFSG has been renamed, so that the name of each version includes the year it was published.

While the current version of the EFSG is generally the authoritative reference, the applicable version for any given project is determined by the date on which the project's business case was approved. It is the responsibility of the user to confirm the relevant applicable version for individual projects or work and to seek clarification where uncertainty exists.

Disclaimer

While every reasonable effort has been made to ensure this document is correct at the time of publication, the State of New South Wales Department of Education, its agents and employees, disclaim any and all liability to any person in respect of anything or the consequences of anything done or omitted to be done in reliance upon the whole or any part of this document.

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Document Control

Revision Number	Date of Publication	EFSG Version	Description	Updated by	Approved by
2025r0	01.07.2025	EFSG 2025	Issue for Publication	SS	MB
2026r0	08.09.2026	EFSG 2026	Issue for Publication	DaIS	Portfolio Steering Committee
2026r1	05.11.2026	EFSG 2026	Issue for Publication	DaIS	DaIS Director

What is the EFSG?

The Educational Facilities Standards and Guidelines

The Educational Facilities Standards and Guidelines (EFSG) contain design and construction standards for school facilities **to support positive teaching and learning outcomes for students, teachers and the community** in all schools across New South Wales.

The EFSG is required to be adhered to for the design and delivery of all new work for school facilities in New South Wales. This includes new school facilities as well as upgrades to existing school facilities and the like.

The EFSG adopts a 'live learning' model, and updates will be issued through future annual publications to reflect evolving priorities, sector feedback and lessons learned.

The requirements within the EFSG usually exceed or are in addition to the minimum requirements set out in regulation. The EFSG does not replace the requirement to comply with current applicable regulation, including but not limited to the National Construction Code and Australian Standards.

How to use the EFSG

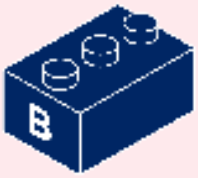
There are four Parts to the EFSG – Part A, Part B, Part C and Part D

Each Part of the EFSG has a specific purpose and is to be read in conjunction with all other Parts.



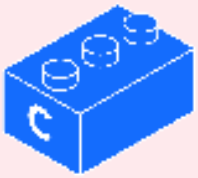
Part A – Design vision and objectives

Part A sets the intention for the design and construction of spaces for school facilities in New South Wales, through the vision and objectives of key design topic areas specific to schools.



Part B – Pattern Book: Functional design brief

Part B identifies the components and spatial requirements that apply to a school, described in site arrangement diagrams as well as schedules of accommodation and similar.



Part C – Pattern Book: Design components and data sheets

Part C includes drawings of standardised building components for schools. The design components and data sheets within Part C describe spatial layouts, building component details and standardised designs required for schools, with links to a digital library where this information can be downloaded for use.

Part D – Design and technical requirements

Part D contains the written design and technical requirements for building and maintaining school infrastructure facilities. The written requirements within Part D describe the components for school facilities that cannot be described in drawings.

Future standards

As content continues to be developed, documents in draft are shared as Future Standards for consultation and stakeholder engagement. This allows for more innovative thinking to be tested, prior to being incorporated and published in EFSG Parts A, B C and D as endorsed standards for educational facilities in New South Wales.

NOTE | If conflicting requirements are found in the content within the EFSG, or between the EFSG and current applicable regulation, the higher level of performance quantity / material / product / application / installation / similar applies.

As the requirements of the EFSG typically exceed the requirements of regulation, the requirements of the EFSG typically override conflicting requirements of referenced documents.

Related documents

This document is to be read in conjunction with:

- EFSG Part A – Design vision and objectives
- EFSG Part B – Pattern Book: Functional design brief
- EFSG Part C – Pattern Book: Design components and data sheets
- Better Placed Design for Schools GANSW
- National Construction Code
- Australian Standards

Acronyms and abbreviations

ADM	Administration Hub	AMU	Asset Management Unit
MPS	MultiPurpose Space	SI	School Infrastructure
ST	Staff / Wellbeing Hub	ALU	Additional Learning Unit
SEPP	State Environmental Planning Policy	BoH	Back of House
NQF	National Quality Framework	FoH	Front of House
BCA	Building Code of Australia	DoE	Department of Education
NCC	National Construction Code	GLS	General Learning Space
EFSG	Educational Facilities Standards and Guidelines	LC	Learning Commons
PS	Public School	OSHC	Out of School Hours Care
HS	High School	SLH	Support Learning Hub
SSP	School for Specific Purpose	SLS	Specialist Learning Space
DDA	Disability Discrimination Act	SLC	Supported Learning Classroom
COLA	Covered Outdoor Learning Area	SoA	Schedule of Accommodation
WS	Workshop	TBC	To Be Confirmed

Refer to full list of Acronyms and Abbreviations in Glossary of Terms

List of amendments

This list has been developed to assist document users to identify key changes incorporated into the EFSG since its last revision. This list provides a description of main changes only.

Location	Description of Amendment
	Revision **2026r0**
Throughout	Repeated content has been removed.
Throughout	Redundant content has been removed.
Throughout	Superseded content has been removed.
Throughout	Formatting has been updated to improve readability, searchability, and accessibility.
Throughout	Some links and references have been updated.
EFSG 2026	**EFSG 2026 Design and Technical Requirements which have been updated** from their EFSG 2025 content are contained within this document.
EFSG 2025	**EFSG 2025 Design and Technical Requirements which have not been updated** are contained within this document in their original version. They are **identified with a red strip along the right edge of each page** in the section that has not been changed.
	Revision **2026r1**
5.1.1 General	Addition of surface finish to Outdoor Games Courts.
6.5.8 Line Marking	Addition of surface finish to Outdoor Games Courts in Table 6.5.3 Paint Schedule: Line Marking. Deletion of Paint System for Outdoor Games Courts in Table 6.5.3 Paint Schedule: Line Marking and substitution with new Paint System.

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Design and technical requirements

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Introduction

1.1 Overview
1.2 Whole of Life
1.3 Warranties
1.4 Pattern Book: Digital Content and Downloads

1.1 Overview

1.1.1 General

The Educational Facility Standards and Guidelines (EFSG) Part D contains the design and technical requirements for school facilities in New South Wales.

The Design and Technical Requirements (DTRs) align with design vision and objectives in EFSG Part A as well as drawn operational requirements for schools described in EFSG Part B and EFSG Part C.

1.2 Whole of Life

1.2.1 General

Whole of Life (WoL) considerations are embedded in all Parts of the Educational Facility Standards and Guidelines (EFSG).

Where a project proposes a departure from the EFSG, the submission of the departure is to be made to the Senior Project Director or equivalent Project Lead. The submission of the departure is to explicitly address Whole of Life implications and remain aligned with the vision and objectives for each Design Topic outlined in EFSG Part A.

Heritage conditions may introduce challenges in meeting all EFSG requirements. Each instance is to be addressed with the Senior Project Director or equivalent Project Lead in consultation with the DoE Heritage Team.

To support any departure, the following must be demonstrated:

- Value for money consistent with EFSG Part A
- Undertake Life Cycle Costing to fully assess Whole of Life impacts

1.3 Warranties

1.3.1 General

The following tables set out the Department of Education's required warranties for new works in schools. They state the minimum warranty periods and are to be applied even where they exceed standard contract templates or supplier/manufacturer terms.

Refer to:

- Appendices for all Tables listing warranty items and associated period for each warranty.

1.4 Pattern Book: Digital Content and Downloads

1.4.1 General

The Pattern Book developed by the New South Wales Department of Education is part of the EFSG Part B and Part C. It provides standardised layouts for school spaces to help ensure consistency and quality in schools across New South Wales.

The Pattern Book includes standardised templates for school buildings and facilities including those for expandable Public and High Schools, COLAs, Halls, Toilet facilities and the like.

The Pattern Book digital content is available in to download in 2D PDF format as well as BIM models. Users can review layouts and download components from the EFSG Autodesk Construction Cloud.

Refer to: EFSG Part C for Digital Content and Downloads.

2

Design for Performance

2.1 Sustainability and Building Performance
2.2 Acoustics
2.3 Colour and Pattern
2.4 Inclusive Design
2.5 Safety
2.6 Hazardous Materials
2.7 Heritage
2.8 Bushfire Protection

2.1 Sustainability and Building Performance

2.1.1 General

Preamble:

Design requirements for all school refurbishment or new build projects are to support and implement the NSW Department of Education's Commitment to Sustainability and align with the Department's sustainability priorities. Refer to Our Commitment to Sustainability.

2.1.2 Benchmarking

Requirements:

All new buildings and refurbishment projects are to comply with and demonstrate adherence to the sustainability benchmarking requirements below.

- These sustainability benchmarking requirements are to be implemented across all infrastructure works, encompassing new buildings and refurbishments located in metropolitan and non-metropolitan areas.
- All project types are to meet the EFSG Minimum Ecologically Sustainable Development (ESD) Requirements contained in this DTR, subject to relevant triggers and restrictions. Any deviations from these minimum requirements are to be requested for approval in writing from the Senior Project Director or equivalent Project Lead.
- Heritage Buildings may require alternative solutions to meet benchmarking requirements.

See also NSW Net Zero Government Operations Policy, which sets out the requirements for common government operations including broader sustainability measures applicable to School Infrastructure projects.

For the detailed processes on how School Infrastructure projects are to integrate ESD principles and requirements throughout planning, design, tender, and construction, and for the guidance on the Green Star certification process for school projects, refer to ESD documents, both available from the School Infrastructure ESD Centre of Expertise (access via enquiry to sustainability.esd@det.nsw.edu.au).

Table 2.1.2: Sustainability benchmarking requirements

Project Type	Any other combination of Construction Value and Gross Floor Area		Construction Value more than $10 million dollars excluding Goods and Services Tax, AND a Gross Floor Area less than 1000m2		
	Refurbishment*	New Building	Refurbishment	New Building	
Project Location	Anywhere	Non-metropolitan areas of NSW	Sydney / Wollongong / Newcastle metropolitan areas	Non-metropolitan areas of NSW	Sydney / Wollongong / Newcastle metropolitan areas
As-Built Benchmark	Verification is required to be requested from the Senior Project Director or equivalent Project Lead.	Green Star Interior - Fitout 4 Star Certified Rating	Green Star Interior - Fitout 5 Star Certified Rating	Green Star Buildings 4 Star Certified Rating	Green Star Buildings 5 Star Certified Rating
Operational Performance Benchmark	NABERS for Schools Energy and Water Rating^				
Minimum Requirements	Minimum ESD Requirements noted in this document				

* Refurbishment: For Heritage Buildings, an outcome that is agreed suitable in consultation with the Senior Project Director or equivalent Project Lead, who will coordinate with the DoE Heritage Team in each individual instance.

Budget: For the purpose of sustainability benchmarking, the total budget value refers to the project Estimated Development Cost (EDC) as defined under the Environmental Planning and Assessment Regulation 2021 (Section 6) including contingency.

^ All eligible school sites have a requirement for annual NABERS Schools Portfolio ratings. Refer to the NABER rules to check eligibility for individual school sites.

2.1.3 Energy

Energy Source

Applicability:

Applicable to all types of work in all school types.

Heritage Buildings: Yes, if work includes new building services requiring energy – coordinate requirements with the Senior Project Director or equivalent Project Lead in consultation with the DoE Heritage Team for each individual instance.

Requirements:

- All-electric in operation.
- For projects targeting Green Star rating, 100% of the building's energy are to come from onsite or offsite renewable sources.

Refer to:

Including but not limited to the following:

- Green Star Buildings V1.0 Credit 23 Energy Source for detailed requirements
- Other applicable sections within this document.

Whole-Building Energy

Applicability:

Applicable to all types of work in all school types.

Heritage Buildings: Yes, if work includes new building services requiring energy – coordinate requirements with the Senior Project Director or equivalent Project Lead in consultation with the DoE Heritage Team for each individual instance.

Requirements:

- At least 10% reduction in energy use compared to current applicable regulation for the same building type. For refurbishment projects where their work includes only new building services requiring energy, but excludes changes to building fabric, this reduction target applies to the new service only.
- NABERS Energy rating – For all eligible schools, minimum 5 star (for all new buildings) and improve by one star above its existing rating (for refurbishments). The project specific MJ/m2 targets are to be determined by the project team using the NABERS Reverse Calculator. Refer to the NABER rules to check eligibility for individual school sites.

Refer to:

Including but not limited to the following:

- Green Star Buildings Credit 22 – Energy Use – Reference Building Pathway for detailed requirements
- NABERS for Schools

- Other applicable sections within this document.

Building Envelope Thermal Performance

Applicability:

Applicable to all types of work in all school types, with the exception of refurbishment type work that has:

— a construction value less than $10 million dollars excluding Goods and Services Tax, and

— a Gross Floor Area less than 1000m^2

Heritage Buildings: Not Required

Requirements:

- Building envelope thermal performance to be at least 5% above the NCC Section-J deemed-to-satisfy (DTS) reference U_w and R_w value requirements for wall-glazing assemblies, roofs and floors that form part of the building's thermal boundary.
- The minimum requirements of DTS + 5% are included in the table below.
- Required glazing U_w values and their indicative relationship with various window-to-wall ratios (WWR), are illustrated in the graph further below.

Table 2.1.1 Building Envelope Thermal Outcomes Tested against Facility Designs Drawn in EFSG Part C

Climate Zone	NCC 2022 (DTS + 5%)		
	Wall-glazing R_w-value	Wall R_w-value	Glazing U_w-value
Zone 1-8	2.1	1.47	In accordance with WWR

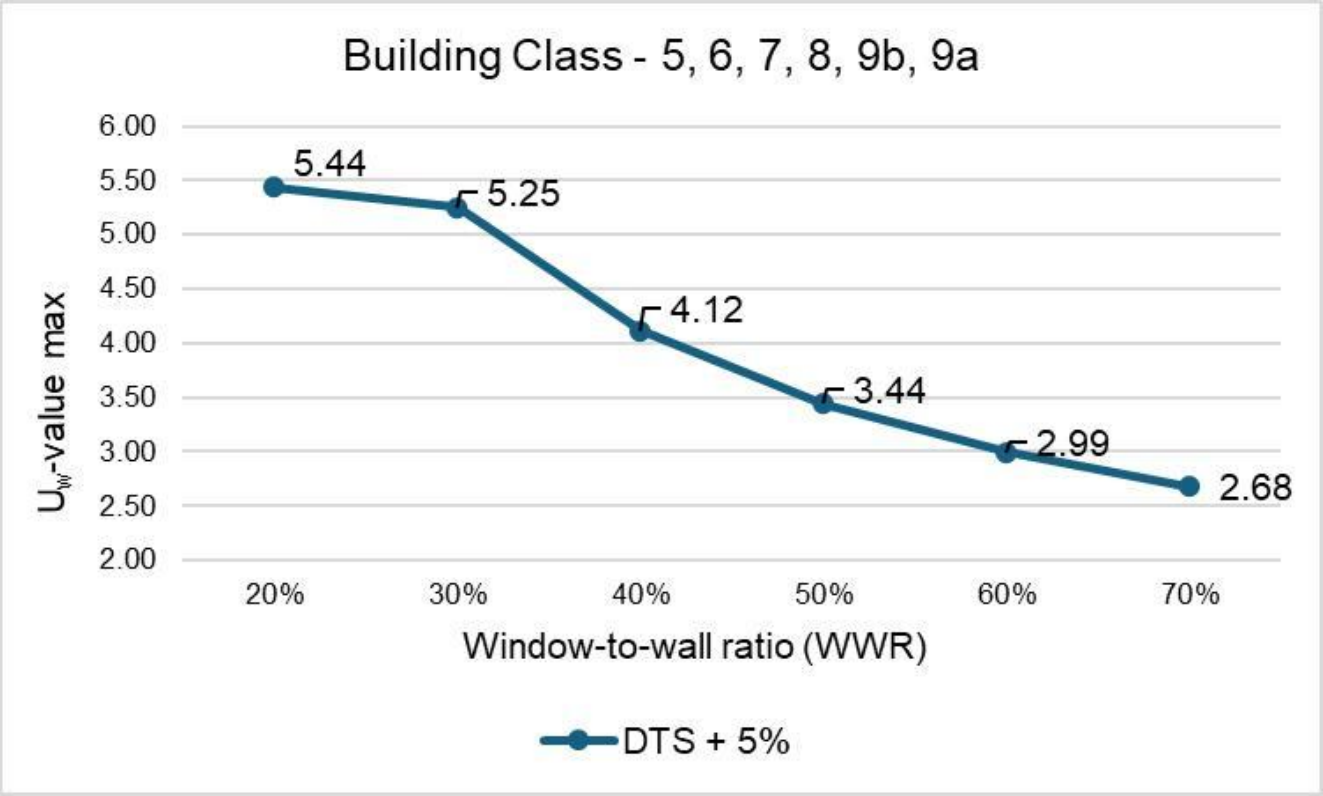


Figure 2.1.1 Building glazing Uw values against window to wall ratio (WWR)

Service Requirements

Refer to:

Including but not limited to the following:

- 7 Services
- Other applicable sections within this document.

2.1.4 Materials

Upfront Carbon Reduction

Applicability:

Applicable to all types of work in all school types, with the exception of refurbishment type work that has:

— a construction value less than $10 million dollars excluding Goods and Services Tax, and

— a Gross Floor Area less than 1000m^2

Heritage Buildings: Not Required

Requirements:

- Projects with:
  — a construction value less than $10 million dollars excluding Goods and Services Tax, and
  — a Gross Floor Area less than 1000m^2

  are to comply with the below requirements:
  — At least 20% reduction in upfront carbon emissions compared to a reference project in accordance with the GNCC's approved calculation pathways.
  — For all existing buildings less than 50 years old, calculate and offset the upfront carbon emissions for the demolished portion.
- All other projects are to meet either of the below pathways:
  — Benchmark pathway: At least 3 Star NABERS Embodied Carbon rating (formal certification is not required). Refer to the NABER rules to check eligibility for individual projects.
  — Performance pathway: At least 10% less than those of a reference design in accordance with GNCC's Green Star Buildings requirements (formal certification is not required)

Refer to:

Including but not limited to the following:

- Green Star Buildings Credit 21 - Upfront Carbon Emissions for detailed requirements
- NABERS Embodied Carbon for detailed requirements
- Other applicable sections within this document.

Finishes

Applicability:

Applicable to all types of work in all school types.

Heritage Buildings: Yes, except for the internal finishes protected by Heritage constraints – coordinate requirements with the Senior Project Director or equivalent Project Lead in consultation with the DoE Heritage Team for each individual instance.

Requirements:

- At least 40% of all new internal building finishes (by cost) are to have a Responsible Products Value of at least 7, in accordance with the GNCC's 'Responsible Products Score Checker' or the 'Responsible Products Calculator'.

Internal finishes include flooring, plasterboard, paints, ceilings, partitions, doors, internal windows or similar. Joinery used as part of a wall finish may also be counted. Sealants and Adhesives used for finishes are also included. Loose furniture is excluded.

Refer to:

Including but not limited to the following:

- Green Star Buildings Credit 9 – Responsible Finishes for detailed requirements
- Other applicable sections within this document.

PVC – Polyvinyl Chloride

Applicability:

Applicable to all types of work in all school types.

Heritage Buildings: Yes, to new PVC products only – coordinate requirements with the Senior Project Director or equivalent Project Lead in consultation with the DoE Heritage Team for each individual instance.

Requirements:

At least 20% of all new PVC products (by cost) are to have a minimum Responsible Product Value (RPV) of 7, in accordance with the Green Star Responsible Products Framework.

Refer to:

Including but not limited to the following:

- Green Star Buildings – Responsible Products Framework for detailed requirements
- Other applicable sections within this document.

Timber

Applicability:

Applicable to all types of work in all school types.

Heritage Buildings: Yes – coordinate requirements with the Senior Project Director or equivalent Project Lead in consultation with the DoE Heritage Team for each individual instance.

Requirements:

All new timber products installed within the project boundary are to meet at least one of the below requirements:

- Forest Stewardship Council (FSC) certified
- Programme for the Endorsement of Forest Certification (PEFC)
- Responsible Wood in accordance with AS-NZS 4708:2021
- A reclaimed source (verify as suitable and await confirmation in writing from the Senior Project Director or equivalent Project Lead prior to sourcing any reclaimed material)

2.1.5 Waste

Construction Waste

Applicability:

Applicable to all types of work in all school types.

Heritage Buildings: Yes – coordinate requirements with the Senior Project Director or equivalent Project Lead in consultation with the DoE Heritage Team for each individual instance.

Requirements:

- At least 90% of construction and demolition waste is to be diverted from landfill.

Refer to:

Including but not limited to the following:

- Green Star Buildings Credit 2 – Responsible Construction – Minimum Expectation for detailed requirements
- Other applicable sections within this document.

Operational Waste

Refer to:

Including but not limited to the following:

- 9.4 Waste Collection
- Other applicable sections within this document.

2.1.6 Water

Water Conservation

Applicability:

Applicable to all types of work in all school types.

Heritage Buildings: Yes, if work includes new building services requiring water supply – coordinate requirements with the Senior Project Director or equivalent Project Lead in consultation with the DoE Heritage Team for each individual instance.

Requirements:

- NABERS Water rating – For all eligible schools, minimum 5 star (for all new buildings) and improve by one star above its existing rating (for refurbishments). The project specific kL/m2 targets are to be determined by the project team using the NABERS Reverse Calculator. Refer to the NABER rules to check eligibility for individual school sites.

Refer to:

Including but not limited to the following:

- 7 Services
- 8 Fitout, Furniture and Equipment
- Other applicable sections within this document.

Rainwater Harvesting

Refer to:

Including but not limited to the following:

- 7 Services
- Other applicable sections within this document.

2.1.7 Transport

Sustainable Transport

Applicability:

Applicable to all types of work in all school types, with the exception of new building and refurbishment type work that has:

- a construction value less than $10 million dollars excluding Goods and Services Tax, and
- a Gross Floor Area less than 1000m^2

Heritage Buildings: Yes.

Requirements:

- **Bicycle Parking facilities:** Provide bike parking with signposted access to the changing space amenities, located in a safe and secure location. The amount of bicycle parking to be determined by the Sustainable Transport Plan prepared by the project Traffic Consultant.
- Sustainable Transport Plan:
  - A Sustainable Transport Plan are to be prepared by suitably qualified Transport Planner or Engineer and implemented in the project. It is to follow the School Infrastructure's School Transport Planning process outlined in the Practice Note: School Transport Planning.
  - Electric vehicle charging: Refer to section 7 Services within this document.
- Reducing **Private Vehicle Use:** The project demonstrates reduction in private vehicle use through
  - Reduced emissions from transport by at least 40%, active mode encouragement by at least 90% and Vehicle Kilometres Travelled (VKT) reduction by at least 20% in accordance with the Green Star Movement and Place Calculator. OR
  - Implementation of the requirements of the Sustainable Transport Plan prepared in accordance with the School Infrastructure's Schools Transport Assessment process.
- **Encouraging Walkability:** The project demonstrates encouragement of walkability through either
  - Any roads within the site boundary are design to low speed (10 km/hr) and pedestrians have right of way. The project is located within 400m of at least 10 amenities across at least 5 categories in accordance with the Green Star Movement and Place Calculator.

OR

  - Implementation of the requirements of the Sustainable Transport Plan prepared in accordance with the School Infrastructure's Schools Transport Assessment process.

Refer to:

Including but not limited to the following:

- Green Star Buildings Credit 27 – Movement and Place for detailed requirements
- GNCC Technical Question R-14416 for the GNCC approved approach for the School Infrastructure projects
- GNCC Technical Question R-14426 for the GNCC approved approach for the School Infrastructure projects
- GNCC Technical Question R-27324 for the GNCC approved approach for the School Infrastructure projects
- Bicycle Parking

Additional relevant references:

- School Infrastructure Practice Note: School Transport Planning
- School Travel Guide
- Other applicable sections within this document.

End of Trip Facilities

Refer to:

Including but not limited to the following:

- 9.5 End of Trip Facilities
- Other applicable sections within this document.

2.1.8 Health and Wellbeing

Daylighting

Applicability:

Applicable to all types of work in all school types, with the exception of refurbishment type work that has:

— a construction value less than $10 million dollars excluding Goods and Services Tax, and

— a Gross Floor Area less than 1000m^2

Heritage Buildings: Yes – coordinate requirements with the Senior Project Director or equivalent Project Lead in consultation with the DoE Heritage Team for each individual instance.

Requirements:

- Computational analysis is to demonstrate that at least 40% of regularly occupied areas (any space that is likely to be continuously occupied or occupied for more than 2 hours, as defined by the Green Star Buildings) per floor achieve a minimum of 160 lux of daylight during 80% of the nominated hours (9am-4pm). Modelling during design phase must be based on the below standard parameters:
  — Visual Light Transmittance (VLT) for external glazing set to be between 40% to 55%.
  — Ceiling Surface Reflectance = 50%
  — Walls Surface Reflectance = 50%
  — Floor Surface Reflectance = 30%
- Glare control and shading strategies are to be implemented to:
  — Exclude direct sunlight from all learning spaces, libraries, and administrative offices and staff studies for the period of 9.00am to 3.30pm including Eastern Daylight Saving Time between 21st September to 21st March (equinoxes).
  — Exclude direct sunlight from desk level in all learning spaces between 9am and 3:30pm.

Refer to:

Including but not limited to the following:

- 7 Services
- Green Star Buildings Credit 11 – Light Quality for detailed requirements
- Other applicable sections within this document.

Views

Applicability:

Applicable to all types of work in all school types, with the exception of refurbishment type work that has:

— a construction value less than $10 million dollars excluding Goods and Services Tax, and

— a Gross Floor Area less than 1000m^2

Heritage Buildings: Not Required.

Requirements:

At least 60% of the regularly occupied areas (any space that is likely to be continuously occupied or occupied for more than 2 hours, as defined by the Green Star Buildings) are to have a clear line of sight to high quality internal or external views. The space is to be within 8 m from the view.

High quality views include:

- External views - vegetation, body of water, sky, or frequent outdoor movement (people, vehicles, animals)
- Internal views - landscaped area, water features, atrium

Refer to:

Including but not limited to the following:

- 4 Site Arrangement
- Green Star Buildings Credit 15 – Connection to Nature for detailed submission requirements
- Other applicable sections within this document.

Low VOC Products

Applicability:

Applicable to all types of work in all school types.

Heritage Buildings: Yes – coordinate requirements with the Senior Project Director or equivalent Project Lead in consultation with the DoE Heritage Team for each individual instance.

Requirements:

At least 95% of all internally applied paints, adhesives, sealants, and carpets are required to be within the stipulated 'Total Volatile Organic Compounds (TVOC) Limits'. Pinboards, acoustic treatments, and internal blinds are to also comply with TVOC limits nominated for carpets. For TVOC limits for specific applications, refer to relevant sections as below.

Refer to:

Including but not limited to the following:

- 6 Buildings
- Green Star Buildings Credit 13 - Exposure to Toxins Minimum Expectation for detailed requirements
- Other applicable sections within this document.

Low Formaldehyde Products

Applicability:

Applicable to all types of work in all school types.

Heritage Buildings: Yes – coordinate requirements with the Senior Project Director or equivalent Project Lead in consultation with the DoE Heritage Team for each individual instance.

Requirements:

At least 95% of all engineered wood products are to be within the specified formaldehyde emission limits.

Table 2.1.2 Low formaldehyde emission limit requirements under each test protocol

Test protocol	Emissions Limit / Unit of Measurement
AS/NZS 2269:2004, testing procedure AS/NZS 2098.11:2005 method 10 for Plywood	≤1mg/L
AS/NZS 1859.1:2004 - Particle Board, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1.5 mg/L
AS/NZS 1859.2:2004 - MDF, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1mg/L
AS/NZS 4357.4 - Laminated Veneer Lumber (LVL)	≤1mg/L
Japanese Agricultural Standard MAFF Notification No.701 Appendix Clause 3 (11) - LVL	≤1mg/L
JIS A 5908:2003- Particle Board and Plywood, with use of testing procedure JIS A 1460	≤1mg/L
JIS A 5905:2003 - MDF, with use of testing procedure JIS A 1460	≤1mg/L
JIS A1901 (not applicable to Plywood, applicable to high pressure laminates and compact laminates)	≤0.1 mg/m^{2}hr*
ASTM D5116 (applicable to high pressure laminates and compact laminates)	≤0.1 mg/m^{2}hr
ISO 16000 part 9, 10 and 11 (also known as EN 13419), applicable to high pressure laminates and compact laminates	≤0.1 mg/m^{2}hr (at 3 days)
ASTM D6007	≤0.12mg/m^3**
ASTM E1333	≤0.12mg/m^3***
EN 717-1 (also known as DIN EN 717-1)	≤0.12mg/m
EN 717-2 (also known as DIN EN 717-2)	≤3.5mg/m^{2}hr

** The test report must confirm that the conditions of Table above comply for the particular wood product type, the final results must be presented in EN 717-1 equivalent (as presented in the table) using the correlation ratio of 0.98.

*** The final results must be presented in EN 717-1 equivalent (as presented in the table), using the correlation ratio of 0.98.

Refer to:

Including but not limited to the following:

- Green Star Buildings Credit 13 - Exposure to Toxins Minimum Expectation for detailed requirements
- Other applicable sections within this document.

Acoustic Quality

Refer to:

Including but not limited to the following:

- 2.2 Acoustics
- 6 Buildings
- Other applicable sections within this document.

Clean Air

Refer to:

Including but not limited to the following:

- 7.7 Ventilation
- Other applicable sections within this document.

Natural Ventilation

Refer to:

Including but not limited to the following:

- 7.7 Ventilation
- Other applicable sections within this document.

Drinking Water Promotion

Refer to:

Including but not limited to the following:

- 9.4 Drinking Water Dispensers
- Other applicable sections within this document.

2.1.9 Ecology and Biodiversity

Ecological Value

Refer to:

Including but not limited to the following:

- 7 Services
- Other applicable sections within this document.

Biodiversity Enhancement

Refer to:

Including but not limited to the following:

- 4 Site Arrangement
- 5 Outdoor Spaces
- Other applicable sections within this document.

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2.1.10 Inclusive Design

Design for Inclusion

Refer to:

Including but not limited to the following:

- 2.4 Inclusive Design
- Other applicable sections within this document.

2.1.11 Resilience

Climate Change Resilience

Applicability:

Applicable to all types of work in all school types, with the exception of refurbishment type work that has:

— a construction value less than $10 million dollars excluding Goods and Services Tax, and

— a Gross Floor Area less than 1000m^2

Heritage Buildings: Yes – coordinate requirements with the Senior Project Director or equivalent Project Lead in consultation with the DoE Heritage Team for each individual instance.

Requirements:

- Develop a project-specific climate change risk and adaptation assessment and address all extreme and high risks identified by the project team.

Refer to:

Including but not limited to the following:

- Green Star Buildings Credit 16 – Climate Change Resilience – Minimum Expectation and Credit Achievement for detailed requirements
- Other applicable sections within this document.

Heat Resilience

Applicability:

Applicable to all types of work in all school types, with the exception of refurbishment type work that does not include new roofing, hardscaping, or vegetation.

Heritage Buildings: Not Required.

Requirements:

Implement one or a combination of the below strategies to at least 75% of the whole site area:

- Vegetation
- Roofing materials, including shading structures, having the following:
- For roof pitched less than 15°– a three-year SRI of minimum 64
- For roof pitched more than 15°– a three-year SRI of minimum 34
- Hardscaping elements shaded by overhanging vegetation
- Water bodies and/or water courses
- Green roofs are only suitable for incorporation if approved suitable in writing by the Senior Project Director or equivalent Project Lead.

The area of the site that is shaded by permanent structures (e.g. part of a car park to the south of a tall building) at noon local time at the summer solstice is also deemed compliant. For large school sites, the extent of site area with significant existing vegetation or any other compliant features can be accounted for in meeting the above site-wide requirement.

For material or product specific SRI values, refer to the relevant supplier information.

Refer to:

Including but not limited to the following:

- Green Star Buildings Credit 19 – Heat Resilience – Credit Achievement for detailed requirements.
- Other applicable sections within this document.

2.1.12 Verification and Handover

Applicability:

Applicable to all types of work in all school types, with the exception of refurbishment type work that has:

— a construction value less than $10 million dollars excluding Goods and Services Tax, and

— a Gross Floor Area less than 1000m^2

Heritage Buildings: Not Required.

Requirements:

- The building is to be set up for optimum ongoing management due to its appropriate metering and monitoring systems. The metering and monitoring are to comply with both Green Star and NABERS Rules, and to allow for the future NABERS rating for the school where applicable.
- The building is to be designed, commissioned, and tuned to verify against relevant environmental performance targets including airtightness testing.
- The project team are to create and deliver operations and maintenance information to the facilities management team at the time of handover. Information is to be made available to building users on how to best use the building.

Refer to:

Including but not limited to the following:

- Green Star Buildings Credit 3 – Verification and Handover – Minimum Expectation for detailed requirements
- Applicable sections within this document.

Additional relevant references

— School Infrastructure Environmental Performance Plan

— Commissioning and Handover Procedure

— Project Governance Framework

— Technical Stakeholder Group Practice Note

2.2 Acoustics

Note: **This Section is being updated.**

Until the updated Section is published, the requirements below and on the following pages of content unchanged from EFSG 2025 are to apply.

2.2.1 General

Preamble

This Section sets the minimum acoustic performance standards for schools and explains how to control noise and reverberation (echo) so teachers and students can hear clearly and learn effectively. It applies to new buildings as well as new work to existing facilities that alter interior finishes or internal partitions, and to all teaching and learning spaces and adjacent circulation areas.

2.2.2 Greenstar

Requirements:

All new buildings, and refurbishment projects if their work includes interior finishes and changes to internal partitions, are to have an acoustic comfort strategy developed by an Acoustics Consultant in accordance with the minimum expectation on Credit 12: Acoustic Comfort from Green Star Buildings Version 1: Revision C.

Refer to:

Including but not limited to the following:

- Green Star Buildings Credit 12 - Acoustic Comfort Minimum Expectation for detailed requirements
- Applicable sections within this document.

CONTENT UNCHANGED FROM EFSG 2025

0001c Design Checklist - Acoustics

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.
Until an updated version is published, the requirements set out below are to continue to apply.

0.02 Performance parameters

The purpose of this section is to give guidance on the acoustic performance requirements of the various areas and spaces within a school so as to encourage and foster an environment conducive to learning.

Noise refers to the sounds that we would prefer not to hear.

The noise levels within a space can either assist or hamper the ability of both students and teachers to hear each other and work together in the learning environment.

The acoustic design of spaces and spaces should address the following parameters:

- Internal noise levels
- Space acoustics (principally reverberation time)
- Noise emission (to the environment)
- Space to space noise control

Generally, the design of all building components, including acoustic components should consider the 'Whole of Life 'framework and ensure that the equipment or materials used are of appropriate quality, cost efficient, without compromising the overall efficiency and effectiveness. They should provide longevity, low maintenance and overall Value for Money to the school and its users. For further details refer to the Whole of Life (WoL) section of the Design Guide.

0.03 Internal noise levels

An internal noise level assessment must be carried out for all new buildings to ensure comfortable acoustic conditions for the spaces occupied.

The internal noise levels within the space must meet the limits stipulated in Table 11.06.1 of Section 11.6 Acoustic Performance Guidelines or be within the range stipulated in Table 1 of the Australian and New Zealand Standards (AS/NZS) 2107:2016 standard. The more stringent of the two are to be met.

Noise measurements conducted for at least 10% of the spaces will be required to demonstrate compliance with the noise levels criteria. The spaces considered for onsite testing are to be the ones most susceptible to internal and external noise sources as a conservative measure.

Sound Sources Description

- Steady-state (consistent) noise intrusion from external sources:
  - Road (and in some cases, rail) traffic noise
  - Industry
  - General environmental noise including external school activity
- Intermittent (occasional) noise intrusion from external sources:
  - Individual rail pass-bys
  - Aircraft flyovers
  - Rain noise
- Steady-state (consistent) noise contribution of internal sources:
  - Mechanical equipment

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  - Air conditioning
- Intermittent (occasional) noise intrusion from internal sources:
  - Hydraulic services

The potential impact of the noise and the extent of acoustic treatment will depend upon:

- Required internal noise levels
- The sensitivity of a space or space to a particular intermittent or intrusive noise source
- The proximity of the space or space to external noise sources and the external noise level incident upon the facade (principally the glazing, ventilation openings or lightweight facade or roof construction)
- Whether mechanical ventilation or air conditioning is present
- Rainfall conditions in the region

Benefits of Control

Control of steady-state internal noise levels is most important in spaces and spaces used for spoken word teaching. It is imperative that noise levels are maintained at a low level in order:

- For a teacher's voice or student's voice to be clearly audible and intelligible at all locations in the teaching space;
- For the teacher to not have to use an unacceptably high vocal effort; and
- To limit the 'Lombard effect' occurring, (being the involuntary use of greater vocal effort to project one's voice over high ambient noise levels, which can result in ever-increasing noise levels within the space whilst in use).

The Public design and assessment parameters are the overall steady-state energy average (LAeq) noise level in the space or space (being the combination of contributions from all steady-state noise sources).

To maintain low noise levels, it is also necessary to control intermittent noise sources so that they are not unacceptably intrusive.

Internal Noise Level Assessment

Road Noise for general learning areas, music, drama, movement studios and halls are to be assessed consistent with the requirements of State Environmental Planning Policy (SEPP - Infrastructure) 2007 - regulation 102. An assessment are to be undertaken where directed for any site impacted by traffic noise. Generally, it is recommended for all sites impacted by noise from roads with greater than 20,000 vehicles AADT and required for all sites impacted by noise from roads with greater than 40,000 vehicles AADT. The guideline internal noise levels presented in Acoustic Performance Guidelines (section11.06) is to be used in the assessment.

Rail Noise for general learning areas are to be assessed consistent with the requirements of SEPP (Infrastructure) 2007 - regulation 87, The internal noise level requirements for school learning spaces presented in NSW DoE Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects ('IGANRIP') is to be used in the assessment.

Aircraft Noise for general learning areas, music, drama, movement studios and halls are to be assessed where the school site lies within Australian Noise Exposure Forecast (ANEF) 25 (or higher) as shown on airport planning instruments. The procedures in AS 2021 are to be followed in the assessment.

Industrial Noise for general learning areas, music, drama, movement studios and halls are to be assessed consistent with the requirements of the NSW Industrial Noise Policy (School learning spaces, internal). The guideline internal noise levels presented in Acoustic Performance Guidelines (Section11.06) is to be used in the assessment.

Rain noise is to be assessed only for general learning areas, music, drama, movement studios and halls or as otherwise directed. Rain is to be assessed using the one-year annual recurrence, one-hour event for the region as reported by the Bureau of Meteorology. A recognized rain noise calculation procedure (such as Dubout, 1969 or Griffin, Ballagh, 2012) are to be used.

0.04 Space Acoustics

Space acoustic design considerations include:

- Reverberation time
- Reverberant noise control
- Speech intelligibility using Speech Transmission Index (STI)
- Late acoustic reflections

The extent to which space acoustics parameters will have to be considered and the extent of acoustic treatment required will depend upon:

- The use of the space or space and therefore an appropriate reverberation time for the use
- Whether or not noisy activities are expected in the space
- Whether or not speech intelligibility is fundamental to the use of the space, e.g.: general learning areas
- Whether the space or space is a specialist performance space with large dimensions and where late acoustic reflections are considered a risk.

The reverberation time within a space must be within the range stipulated in Table 1 of Section 11.6 Acoustic Performance Guidelines or Table 1 of the AS/NZS 2107:2016 standard. The more stringent of the two are to be met.

Reverberation Time

In the context of educational spaces and spaces, the principle space acoustic consideration is reverberation time. Reverberation time is defined as the time taken (in seconds) for sound to reduce by 60 dB in a space or space and is hence given the notation RT60. Reverberation time is fundamental to describing the 'acoustical liveliness' of a space.

Reverberation time within a space or space is a function of the space volume and the acoustic absorption coefficients of space internal surface finishes. Where a space volume is defined (elsewhere in the guidelines), the area and absorption coefficient of space internal surface finishes can be selected to provide an appropriate reverberation time and therefore appropriate space acoustics for educational spaces.

For most educational spaces, the performance guideline reverberation time is the average of the predicted or measured octave band values at 500 Hz and 1000 Hz.

In acoustically critical environments (such as teaching spaces for students who are deaf or hard to hearing), it is desirable to define and design for the required reverberation time at all octave band centre frequencies between 63 Hz and 8000 Hz. This is a more onerous requirement and advice are to be sought from an acoustic engineer for individual cases.

Controlling reverberation time provides the following main benefits:

- It serves to improve speech intelligibility, and
- It controls the build-up of reverberant noise (i.e. sound levels being sustained by reflecting off multiple surfaces with minimal energy loss)
- To limit the 'Lombard effect', as described in 'Internal Noise levels'.

Speech intelligibility is an important acoustic consideration in teaching spaces and spaces. Control of reverberant noise is important in teaching spaces and other spaces where a build-up of noise is undesirable (e.g. practical activity areas, gymnasiums and halls).

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0.05 Noise Emission (to the environment)

Noise emission considerations include:

- Noise emission from school activity (e.g.: music performance, sporting activity)
- Noise emission from a mechanical service (such as air conditioning unit or fan)

The extent to which noise emission will have to be considered and the extent of acoustic treatment required will depend upon:

- Whether noisy activities take place in a space or space
- Whether the space or space is naturally ventilated and therefore windows and/or doors are expected to be open when noisy activities are taking place
- Space facade construction and orientation of 'acoustically weak' facades relative to noise-sensitive receivers
- Distance to noise-sensitive receivers
- Whether mandatory noise emission criteria are required to be satisfied at nearby boundaries and land uses.

Assessment of Noise Emission

Generally, noise emission to the environment from mechanical services noise sources (such as air conditioners) are the subject of a development consent condition. In NSW the development consent conditions will refer to the Industrial Noise Policy (INP) or Local Council requirement.

Where no condition regarding noise sources exists for a school development, noise emission from such sources are to be designed, in-principle, to satisfy the requirements of the Industrial Noise Policy.

Noise associated with school activity (such as music or sport within a hall) are not a stationary noise source and is not subject to the INP requirements. Where a condition of consent exists for the control of activity related noise, an acoustic engineer is to assess the noise emission. The acoustic engineer should define and state the activity, internal reverberant sound pressure level in the space or space and criteria (including sound pressure level and assessment location) in a report.

Note that an acoustically designed variation on the standard Kit of Parts (KoP) School Hall exists. This incorporates acoustically lined intakes and exhausts on all-natural ventilation openings including rooftop mounted ventilators ('Whirlybirds').

0.06 Space to Space Noise Control

Considerations include:

- Ascertain a space or space noise level and determine constructions (both walls and ceilings) required to control noise emission to an adjacent space
- Ascertain a space or space sensitivity as a noise receiver and determine constructions (both walls and ceilings) required to control noise intrusion from adjacent spaces.
- Consider airborne noise and impact (footfall) noise

The extent to which space to space noise control will have to be considered and the required acoustic rating of constructions between adjacent spaces will depend upon:

- Whether noisy activities take place in the space or space
- Whether a space on an upper floor has a hard floor surface (when considering footfall/impact noise)
- Whether a space is sensitive to noise intrusion
- The ambient noise level in the receiver space

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- Whether the construction between adjacent spaces includes an operable wall, a door, a glazed section or other potentially 'acoustically weak' construction.

Airborne Noise

For the School Facilities Guidelines, the weighted sound reduction index (notated Rw) is the airborne noise assessment parameter.

When a Post Occupancy Evaluation is conducted for space-to-space noise, the parameter is the apparent weighted sound reduction index (notated Rw).

The required design value of construction between adjacent spaces can only be defined when the use of both spaces is known.

Impact (Footfall) Noise

Refer to the guideline standardised impact sound pressure levels LnTw values presented in Table.

Design advice are to be sought from an acoustic engineer for multi-storey buildings with noise-sensitive spaces below hard-surfaced floor areas

Prescriptive Constructions

The following elements have prescriptive acoustic performance or construction requirements:

- Operable walls (between general learning areas, all schools): **Rw 45**
- Entry doors to occupied teaching, music, drama and sports spaces: **Solid core, minimum 35 mm thick** with acoustic weather (where external) seals on all rebated closing faces. Gap at floor to be minimized.
- Internal glazed sections in walls and vision panels in or adjacent to internal doors: minimum
- **10.38 mm laminated glass**. In some situations, acoustic windows may be needed for satisfactory noise separation.
- Construction separating wastewater pipework from occupied spaces: **Rw 40**
- Where adjacent to an occupied space (and not serving that space), hydraulic supply pipework and wastewater pipework are to be separated from the adjacent occupied space. Construction between the adjacent spaces in this instance are to be a 'staggered stud' arrangement or otherwise discontinuous.

Ventilation requirements need consideration when applying acoustic performance requirements. .

0.07 Acoustic Performance Standards

Table 2.2.1 Internal noise levels and reverberation times

Space	Internal noise level (dB LAeq)	Reverberation time, sRT60 (Av 500Hz and 1000Hz)
Art/craft studios	40	<0.8
Assembly halls up to 250 seats	35	see Note 1
Assembly halls over 250 seats	35	see Note 1
Audio-visual areas	35	<0.8
Computer spaces - Teaching	40	<0.6
Computer spaces - Laboratories	45	<0.6

Space	Internal noise level (dB LAeq)	Reverberation time, sRT60 (Av 500Hz and 1000Hz)
Conference space	35	<0.7
Corridors and lobbies	45	Minimise
Dance Studios	40	<1.2
Dining spaces	45	<1
Drama Studios	30	<1
Duplicating spaces/stores	50	
Engineering workshops	45	Minimise
Gymnasiums	40	<1.5
Interview/counselling spaces	35	<0.6
Kitchens	50	
Laboratories - Teaching	40	<0.7
Laboratories - Working	45	<0.8
Lecture spaces - up to 50 seats	35	see Note 1
Lecture theatres – without speech reinforcement and >50 seats	30	see Note 1
Lecture theatres - with speech reinforcement	35	see Note 1
Libraries - General areas	40	<0.6
Libraries - Reading areas	35	<0.6
Libraries - Stack areas	45	<0.6
Manual arts workshops	40	Minimise
Medical spaces (First aid)	40	<0.8
Music practice spaces	35	see Note 1
Music studios	30	see Note 1
Office areas	40	<0.7
Open plan teaching areas	40	<0.8
Professional and Administrative offices	35	<0.8

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Space	Internal noise level (dB LAeq)	Reverberation time, sRT60 (Av 500Hz and 1000Hz)
Staff common spaces	40	<0.6
Study Spaces	35	<0.6
Teaching spaces – students who are deaf or hard of hearing	30	<0.4
Teaching spaces – Public Schools	35	<0.5
Teaching spaces – High Schools	35	<0.6
Toilet/change/showers	50	

Table 2.2.2 Impact sound insulation rating based on source and receiving space activity noise

Space	Source space activity noise	Receiving space noise tolerance	Impact sound insulation rating (L'nTw)
Art/craft studios	Average	Medium	60
Assembly halls up to 250 seats	High	Low	60
Assembly halls over 250 seats	High	Low	60
Audio-visual areas	High	Low	60
Computer spaces - Teaching	Average	Low	60
Computer spaces - Laboratories	Average	Medium	60
Conference space	Average	Low	55
Corridors and lobbies	Average	High	65
Dance Studios	High	Very low	55
Dining spaces	High	Medium	65
Drama Studios	High	Very low	55
Duplicating spaces/stores	High	High	65
Engineering workshops	High	High	65
Gymnasiums	High	Medium	65
Interview/counselling spaces	Average	Low	55
Kitchens	High	High	-

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Space	Source space activity noise	Receiving space noise tolerance	Impact sound insulation rating (L'nTw)
Laboratories - Teaching	Average	Low	60
Laboratories - Working	Average	Medium	65
Lecture spaces - up to 50 seats	Average	Low	55
Lecture theatres – without speech reinforcement and >50 seats	Average	Very low	50
Lecture theatres - with speech reinforcement	Average	Low	50
Libraries - General areas	Low	Low	55
Libraries - Reading areas	Low	Low	55
Libraries - Stack areas	Average	Medium	55
Manual arts workshops	Average	Medium	65
Medical spaces (First aid)	Average	Low	60
Music practice spaces	Very high	Low	55
Music studios	Very high	Very low	50
Office areas	Low	Low	55
Open plan teaching areas	Average	Medium	55
Plant Space	High	High	
Professional and administrative offices	Low	Low	60
Staff common spaces	Average	Medium	60
Study Spaces	Low	Low	55
Teaching spaces – Hearing impaired	Average	Very low	50
Teaching spaces – Public Schools	Average	Low	55
Teaching spaces – High Schools	Average	Low	55
Toilet/change/showers	Average	High	

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Note: The appropriate reverberation time are to be influenced by the internal volume and intended use of the space. Guidance from an acoustical engineer are to be sought. Also refer to AS/NZS 2107:2000 Figure A1 for guidance values.

Table 2.2.3 Airborne and impact sound insulation requirements

Space	Source space activity noise	Receiving space noise tolerance	Impact sound insulation rating (L'nTw)
Art/craft studios	Average	Medium	60
Assembly halls up to 250 seats	High	Low	60
Assembly halls over 250 seats	High	Low	60
Audio-visual areas	High	Low	60
Computer spaces - Teaching	Average	Low	60
Computer spaces - Laboratories	Average	Medium	60
Conference space	Average	Low	55
Corridors and lobbies	Average	High	65
Dance Studios	High	Very low	55
Dining spaces	High	Medium	65
Drama Studios	High	Very low	55
Duplicating spaces/stores	High	High	65
Engineering workshops	High	High	65
Gymnasiums	High	Medium	65
Interview/counselling spaces	Average	Low	55

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Kitchens	High	High	-
Laboratories - Teaching	Average	Low	60
Laboratories - Working	Average	Medium	65
Lecture spaces - up to 50 seats	Average	Low	55
Lecture theatres – without speech reinforcement and >50 seats	Average	Very low	50
Lecture theatres - with speech reinforcement	Average	Low	50
Libraries - General areas	Low	Low	55
Libraries - Reading areas	Low	Low	55
Libraries - Stack areas	Average	Medium	55
Manual arts workshops	Average	Medium	65
Medical spaces (First aid)	Average	Low	60
Music practice spaces	Very high	Low	55
Music studios	Very high	Very low	50
Office areas	Low	Low	55
Open plan teaching areas	Average	Medium	55
Plant Space	High	High	
Professional and administrative offices	Low	Low	60
Staff common spaces	Average	Medium	60
Study Spaces	Low	Low	55

Teaching spaces – Hearing impaired	Average	Very low	50
Teaching spaces – Public Schools	Average	Low	55
Teaching spaces – High Schools	Average	Low	55
Toilet/change/showers	Average	High	

Table 2.2.4 Sound insulation requirements (minimum design Rw) for adjacent spaces without operable walls, entry doors or glazed panels.

Activity noise in	source space			
	Low	Average	High	Very high
High	30	35	45	55
Medium	35	40	50	55
Low	40	45	55	55
Very low	45	50	55	60

Table 2.2.5 Minimum Speech Transmission Index (Informative)

Space type	Speech Transmission	Index (STI)
Teaching and study spaces		> 0.60
Assembly Halls up to 250 Seats	35	see Note 1
Assembly Halls over 250 seats	35	see Note 1
Audio-visual Areas	35	<0.8
Computer spaces- Teaching	40	<0.6
Computer spaces- Laboratories	45	<0.6
Conference space	35	<0.7
Corridors and lobbies	45	Minimise
Dance Studios	40	<1.2
Dining spaces	45	<1
Drama Studios	30	<1
Duplicating spaces/stores	50	
Engineering workshops	50	Minimise

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Gymnasiums	40	<1.5
Interview/counselling spaces	35	<0.6
Kitchens	50	
Laboratories- Teaching	40	<0.7
Laboratories- Working	45	<0.8
Lecture spaces-up to 50 seats	35	see Note 1
Lecture theatres- without speech reinforcement and >50 seats	30	see Note 1
Lecture theatres- with speech reinforcement	35	see Note 1
Libraries- General areas	40	<0.6
Libraries- Reading areas	35	<0.6
Libraries- Stack areas	45	<0.6
Manual arts workshops	40	<0.8
Medical spaces (First aid)	40	<0.8
Music practice spaces	35	see Note 1
Music studios	30	see Note 1
Office areas	40	<0.8
Open plan teaching areas	40	<0.8
Professional and Administrative offices	35	<0.8
Staff common spaces	40	<0.6
Study Spaces	35	<0.8
Teaching spaces- Hearing impaired	30	<0.4
Teaching spaces- Public Schools	35	<0.5
Teaching spaces- High Schools	35	<0.6
Toilet/change/showers	50	-

0.08 Acoustic Post Occupancy Evaluation (POE)

Post Occupancy Evaluations are often undertaken to assess the performance of recently completed or existing facilities. Where a Post Occupancy Evaluation is to be undertaken it are to be conducted by the project team or acoustic engineer and are to be undertaken of selected acoustic parameters only. The following provides a guidance on the extent of work to be undertaken:

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Internal Noise Levels

Generally, post occupancy evaluation of noise levels would involve short-term (typically 15 minutes to one hour) attended measurements of steady state LAeq noise levels in the centre of a space or space. Longer, or more detailed measurements of specific sources (e.g.: rail noise) would only generally be required;

- if the subject noise source has been identified as an issue once the building is occupied;
- if assessment and certification of a particular source (with a defined measurement procedure and duration) has been mandated for a particular project, or
- if certification is required in relation to State Environmental Planning Policies.

Measurements would take place in a space that is furnished and ready for occupation, but without people present (unoccupied).

Space Acoustics Post-Occupancy Evaluation

Generally, post occupancy evaluation of space acoustics would only take place in spaces with a specified reverberation time. Reverberation time would be reported as the arithmetic average of the measured values at 500 Hz and 1000 Hz, rounded to the nearest 0.1 of a second.

More detailed measurements and reporting (e.g. stating the reverberation time at all octave bands between 63 Hz and 8000 Hz) would only generally be required;

- if reverberation time has been identified as an issue once the building is occupied, or
- if the space or space has more detailed reverberation time requirements (e.g. teaching spaces for hearing-impaired students).

Measurements would take place in a space that is furnished and ready for occupation, but without people present (unoccupied).

Noise Emission Post-Occupancy Evaluation

Generally, post-occupancy evaluation of noise emission would only occur if required by a condition of development consent or where noise emission (from either a stationary noise source or school activity- related noise) is identified as an issue after the space or space is occupied.

Space-to-Space Post-Occupancy Evaluation

Generally, post occupancy evaluation of space-to-space acoustic performance would take place only for airborne noise between occupied teaching spaces such as general learning areas and occupied spaces adjacent to noise producing spaces such as halls, or as directed for a particular project.

Airborne noise tests performed according to ISO 140:1998 Part 4 would be performed both ways in the case of two adjacent spaces, and the lowest Rw value reported according to ISO 717:2013 Part 1 would be reported as the result. The measured value is considered acceptable if it is within 5 points of the guideline design value, Rw.

Measurements would take place in a space that is ready for occupation but is not occupied.

0.09 Acoustic References

Noise Level References and Guidelines

- Australian/New Zealand Standard AS/NZS 2107:2000 Acoustics – recommended design sound levels and reverberation times for building interiors (AS 2107).
- Association of Australian Acoustical Consultants (AAAC) Guideline for Educational Facilities Acoustics
- NSW Road Noise Policy (RNP, 2011)
- NSW Industrial Noise Policy (INP, 2000)

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- Australian Standard AS/NZS 2021:2000 Acoustics – aircraft noise intrusion – Building siting and construction.
- NSW DoEC Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects ('IGANRIP')
- Bureau of Meteorology Rainfall Intensity-Frequency-Duration design rainfalls
- NSW RMS Traffic Volume Maps for Noise Assessment for Building on Land Adjacent to Busy Roads.
- State Environmental Planning Policy (Infrastructure) 2007 - regulation 102
- State Environmental Planning Policy (Infrastructure) 2007 - regulation 87

Space Acoustics References and Guidelines

- Australian/New Zealand Standard AS/NZS 2107:2000 Acoustics – recommended design sound levels and reverberation times for building interiors ('AS 2107').
- Association of Australian Acoustical Consultants (AAAC) Guideline for Educational Facilities Acoustics

Noise Emission References and Guidelines

- NSW Industrial Noise Policy (INP, 2000)
- Local Council/Authority noise emission requirements

Space to Space References and Guidelines

- Association of Australian Acoustical Consultants (AAAC) Guideline for Educational Facilities Acoustics
- ISO 140:1998 Measurement of sound insulation in buildings and of building elements (Part 4 – Field measurements of airborne sound insulation between spaces; Part 7 Field measurements of impact sound insulation of floors).
- ISO 717:2013 – Rating of sound insulation in buildings and of building elements (Part 1 – Airborne sound insulation; part 2, Impact sound insulation)

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2.3 Colour and Pattern

2.3.1 General

Preamble:

Selecting the right colours and patterns for the design of school learning environments is important to creating calm, functional and inclusive spaces that support wellbeing, focus and learning. More than an aesthetic decision, colour and pattern selection can influence behaviour, mood, emotional regulation, sensory comfort and wayfinding. This is particularly important in Supported Learning Spaces (SLS) and Schools for Specific Purposes (SSPs), where colour and pattern should help promote calm, focus and reduced sensory stress. Colour selection should also support wellbeing and biophilic design outcomes, with blues, greens, neutrals and other muted tones generally preferred where a calming atmosphere is required.

High contrast, vivid colours within patterned surfaces can increase the level of visual discomfort some people experience and may cause sensory overload. This is particularly critical where pattern is applied to large surfaces such as floors and walls.

Refer to:

Including but not limited to the following:

- Public standard: PAS 6463:2022 – Design for the mind: neurodiversity and the built environment (The Built Environment – PAS 6463). Note: Where PAS 6463 guidance and EFSG differ, the EFSG shall prevail for NSW Department of Education projects. Use PAS 6463 as interpretive best-practice to inform detailed selections within EFSG parameters.
- EFSG Part C
- Section 6.5.12 Paint Finishes to Heritage Buildings
- Applicable sections within this document.

2.3.2 Use of Colour

Requirements:

- A neutral colour palette is to be used for school interiors. Colour palette can be drawn from natural surroundings or local contexts.
- Colour selections in a space are to reduce over stimulation and sensory overload and promote a calm learning environment.
- White finishes must have neutral undertones (i.e. must be warm white to avoid the use of stark white).
- Light colours are to generally be selected for internal walls to increase natural light.
- Balance colour / extraneous distractions with teaching wall and learning material displays; neutral backgrounds allow for student projects and artworks, learning materials and seasonal decoration to stand out.
- **Drama and Performance** - Black coloured wall finishes are typically required for Drama and Performance. This includes Movement Studios and Stages.
- **Luminance Contrast** - Colour selection for door finishes must align with the Disability Discrimination Act and Australian Standards requirements for 30% luminance contrast. This contrast can be achieved via either frame to wall or frame to door leaf.
- Vivid and bright colours are not to be used on large surfaces or on surfaces which may be in view for longer periods of time. Except for: Vivid colours and strong visual contrasts are essential for features like signage or doors but are to be used with intent to maintain their effectiveness.

- Bright red and bright yellow are not to be used on flooring, wall finishes, ceilings, or table surfaces.
- Stark white is not to be used for large surface areas. Except for: Stark white may be used on ceilings where it is a finish of a proprietary ceiling product.
- High gloss or mirrored surface finishes that reflect light harshly are not to be used.
- Colour requirements do not apply to external facades, unless facade elements are applied to windows and can be seen from internal spaces.

2.3.3 Use of Pattern

Requirements:

- Patterns featuring organic shapes with low contrast between colours are preferred. If geometric, striped, and/or repetitive patterns are specified, these are to have low contrast between colours (i.e. a luminance contrast of nominally 10 LRV points or less).
- Patterned or heavily textured materials must be set out to give consistency in direction of pattern or texture to avoid sensory overload.
- Busy patterns, geometric patterns, and repetitive patterns with high luminant contrast must not be used (i.e. black and white stripes).
- Busy patterns, geometric patterns, and repetitive patterns with high chromatic contrast must not be used (i.e. use of patterns featuring vivid or fluorescent colours on the opposite side of the colour wheel).
- Unintentional patterns and symbols may be created by the layout and orientation of tile systems. Such layouts must not result in symbols or text that may cause offense.

2.4 Inclusive Design

Note: **This Section is being updated.**

Until the updated Section is published, the requirements below and on the following pages of content unchanged from EFSG 2025 are to apply.

2.4.1 General

Preamble:

This section sets the minimum design and performance standards to ensure schools are usable, safe and dignified for all users. It complements (and may exceed) regulation where required for education facilities.

2.4.2 Design for Inclusion Green Star Requirements

Requirements:

All new buildings and refurbishment projects are to meet the below requirements:

- **Equal access to the building**: Provide equitable, appealing, safe and secure access in a manner that does not segregate or stigmatise users through all principal entrance points and main thoroughfares inside and outside the building.
- **Diverse wayfinding:** Introduce visual, physical, olfactory and auditory solutions to help individuals navigate the site in a safe and enjoyable manner.
- **Inclusive spaces:** Introduce internal and external spaces for a diverse range of users. These spaces are to be accessible to all users.

- **Conduct a needs analysis:** For all projects targeting formal Green Star 5 Star rating, the project team are to consult with distinct community types to develop a needs analysis that will influence the project during the design phase. The consultation process is to generate a report that is then used in the design of the project.
- **Community use of school facilities –** Enable Out of school hour use of school facilities e.g. Halls, OOSH, playing fields etc.

Refer to:

Including but not limited to the following:

- Green Star Buildings Credit 34 – Design for Inclusion – Exceptional Performance for detailed requirements
- Other applicable sections within this document.

2.4.3 Accessibility Integrations into Heritage Buildings and Heritage Items

Requirements:

- Seek coordination in accordance with the Senior Project Director or equivalent Project Lead to consult with the DoE the Heritage Team at the earliest planning stage for any work including accessibility integrations for Heritage Items and Heritage Buildings
- Supporting documentation outlining the work for specific integration requirements must be provided for consultation in accordance with the Senior Project Director or equivalent Project Lead who will coordinate with the DoE Heritage Team.
- New integration measures including accessible Toilets are to be designed to be removable in the future without impacting the heritage materials of the building.
- New ramps are to be reversible materials that don't impact surrounding significant fabric.
- Concrete ramps must not be used immediately adjacent to Heritage Buildings.
- Use existing openings and avoid new entrances, doorways and openings through significant building material fabric.
- Adhere to the principle of doing 'as much as necessary' to create an accessible path, but do 'as little as possible' to achieve that accessible path to minimise impacts.

0001c Design Checklist – Accessibility

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.
Until an updated version is published, the requirements set out below are to continue to apply.

0.02 Access for people with disabilities

All new facilities must meet current Deemed-to-Satisfy provisions of the National Construction Code (NCC) and referenced standards.

Upgrades of existing facilities are required to comply with the Disability (Access to Premises – Buildings) Standards 2010.

In addition to the above minimum requirements, it is DoE's policy that any enhanced and additional requirements from AS 1428.2-1992 be incorporated in any new design.

Where a requirement of AS 1428.2 is superseded by the NCC or a referenced standard, NCC compliance is to take precedence.

0.03 Site and paths of travel

In addition to the requirements of NCC clause D3.2(a), accessible paths of travel are to be provided within the site boundary from transportation stops and accessible passenger loading zones.

The accessible elements of buildings and facilities are to be arranged so as to minimize distances to be travelled between them. Where there are unavoidable distances between facilities, frequent resting points with seats, handrails, and Drinking Water Dispenser or similar outlets must be provided.

0.04 Circulation

Refer to section 3.2 Circulation.

Unobstructed widths

The unobstructed width of a walkway, corridors and ramps must not be less than **1350mm**, except a ramp providing access to the raised platform or stage within a hall to which is required an unobstructed clear width of **1000mm** in accordance with AS 1428.1-2009.

NOTE: Essential fixtures and fittings, such as fire hose reels, fire extinguishers and telephones are not to protrude into these circulation space requirements.

Walkways, Corridors and Ramps

Passing spaces at intervals of not more than **6m** are to be provided as follows:

- One side of the path of travel - the path of travel are not to be less than **1600mm** long and **1800mm** wide.
- With the space distributed equally on both sides of the path of travel - the path of travel are not to be less than **2000mm** long and **1800mm** wide.

1800 x **1300mm** circulation space for a stationary wheelchair to be provided for forward or parallel approaches to objects.

2270 x 1740mm circulation space to be provided for a wheelchair user to make a **90-180** degree turn.

Ramp landings

All ramps are to provide landings at intervals as follows:

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Table 2.4.1 Ramp landing intervals

Ramp Gradient	Landing Interval
1:14	6m
1:15	7.6m
1:16	9.m in accordance with AS 1428.1
1:17	9.m in accordance with AS 1428.1
1:18	9.m in accordance with AS 1428.1
1:19	9.m in accordance with AS 1428.1

Podiums and stages

Podiums and stage areas are to comply with the following:

- Ramped access in accordance with AS 1428.2 are to be provided to form a continuous accessible path of travel to the podium or stage, except that the width may be in accordance with AS 1428.1 (1000mm)
- The stage area shall allow for wheelchair turning circulation of 2250 x 2250mm.
- All facilities on the podium are to be usable by a seated person.
- The boundaries of a podium or stage area are required to be defined by barriers or contrast in floor surface and texture.

0.05 Ground floor surfaces

Refer to section 3.2 Circulation and section 6.14 Flooring.

If gratings are located in a walking surface, they are to have spaces not more than 13mm wide and not more than 150mm long.

Where carpet is used on a ground or floor surface the following requirements apply:

- The carpet shall be securely attached
- Any pad, backing or cushioning are to provide a firm surface
- The carpet shall have a level loop, a textured loop, a level cut pile or a level cut or uncut pile texture
- The pile height shall be not more than 6mm
- Exposed edges of carpet are to be fastened to the floor surface and are to have a trim along the entire length of any carpet edge

Carpet edge trim shall create no ridge on the floor surface higher than 3mm.

The boundaries of a podium or stage area are required to be defined by barriers or contrast in floor surface and texture.

0.06 Handrails

Refer to section 3.2 Circulation.

Wherever practicable the outside handrail at stairways must be continuous throughout the stair flights and around landings.

At ramps and stairways a second handrail must be provided at a height between 665-700mm.

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Where there is a background wall, stairway handrails must have a luminance contrast factor with the wall of not less than 30%.

0.07 Doorways and Doors

Refer to section 3.2 Circulation. and 6.10 .

If an entrance is located in an external wall, consideration must be given to protecting it from wind forces (e.g. by a lobby, screen wall or sliding door).

Glazing in doors in useful to people with disabilities as it provides a view of a user approaching the door from the other side. The lower perimeters of glazing are set to avoid the footrest of a wheelchair contacting the glass. Glazing in joinery or flush doors are to be as follows:

- the lower edge of the glazing shall be not less than 300mm on not more than 1000mm above the bottom edge of the door.
- The upper edge of the glazing shall be not less than 1600mm above the bottom edge of the door.
- In width, the glazing shall extend not more than 200mm from the latch edge of the door and are to be not less than 150mm wide.

Door handles are to be clearly identified by colour with luminance contrast to their background of not less than 30%.

0.08 Sanitary Facilities

Refer to 8.2 Fixtures .

At least one emergency call button which complies with AS 2999 must be installed in accordance with AS 1428.2 Clause 23 in each accessible sanitary facility. Separate call buttons must be placed near the Toilet pan and shower recess.

Sensor-operated air hand dryers are to be provided.

Provide mechanical ventilation to all accessible sanitary facilities.

Doors to ambulant water closets are to comply with the following:

- Outward opening doors are to have a hinge mechanism that holds the door in a closed position without the use of a latch
- Inward-opening doors must be fitted with a retractable stop or similar device to allow, in an emergency, the latch to be released and the door to swing outward, or the door to be removed.

Urinals

Urinals must be constructed without a step or hob.

At urinals A serrated, slip-resistant, hinged grate with apertures not more than 25mm wide are to be provided.

At urinals a clear circulation space not less than 1540mm wide are to be provided for the full length of the urinal

At urinals a sensor flush is preferred.

0.09 Emergency warning systems

Refer to section 7 Services.

0.10 Lighting

Refer to section 7 Services.

Illumination levels must be uniform and comply with the requirements for maintenance illumination set out in AS 1680.2.

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The following minimum levels of maintenance illumination are recommended:

Table 02: Minimum illumination levels for accessibility

Area	Lux Level (lx)
Entrances	150
Passageways and walkway	150
Stairs	150
Ramps	150
Lifts	see AS 1735.12
Toilets and Change Spaces	200
Counter tops	250
General Displays	200-300
Telephones	200

Lighting of the podium or stage must be at least the recommended service illuminance for assembly and concert hall platforms in AS 1680.1.

0.11 Electrical

Refer to 7.1 .

General use socket, positioned on the wall generally 300mm above floor level for general use of the occupants. At least 20% of these sockets and at least one per learning space, are to be positioned to enable access for disabled persons in accordance with the requirements of AS1428. This will require sockets to be positioned at least 500mm from internal corners and between 600mm and 1100mm above the floor.

0.12 Furniture and fittings

Refer to section Fitout, Furniture and Equipment.

If the clear floor space allows only for a forward approach to an object by a person in a wheelchair, objects are to be in the reach range shown in AS 1428.2 Figure 20(a). If the high forward reach is over an obstruction, objects are to be within the reach range shown in AS 1428.2 Figure 20(b).

If the clear floor space allows parallel approach to an object by a person in a wheelchair, objects are to be in the reach range shown in AS 1428.2 Figure 21(a). If the side reach is over an obstruction, objects are to be within the reach range shown in AS 1428.2 Figure 21(b).

The points at which comfortable reach is achieved by most ambulant people with disabilities are shown in AS 1428.2 Figure 22.

The intention is that all critical controls, areas of operation and storage of equipment commonly used by most members of the community and people in a household will be placed within this zone of common reach.

The zone for reach to objects which will be suitable for both ambulant people with disabilities and wheelchair users is shown in Figure 23.

All water taps shall :

have levers, capstan handles or sensor plate controls or the like. Where hot water is provided the water are to be delivered through a mixing spout;

- Where separate taps are provided for hot and cold water, the hot tap are to be placed to the left of the cold water tap;
- Taps with capstan handles are to be not less than 50mm from an adjacent surface that could restrict hand movement.
- Although sensor taps can cost significantly more than other types of tap, their use is recommended where possible

No individual counter or worktop height and clearance beneath will suit all users with disabilities. A bench with easily adjustable height within the range of **700-850mm** from Finished Floor Level is preferred.

Height of unit where a single table, counter or worktop only can be provided are to be as follows:

- Height from Finished Floor Level to top of unit - **850mm +/- 20mm**
- Height clearance beneath the unit from Finished Floor Level **820mm +/- 20mm**

Height of unit where two tables, counters or worktops can be provided are to be as follows:

- Height from Finished Floor Level to the top of unit
  - 1st unit 750mm +/- 20mm
  - 2nd unit 850mm +/- 20mm
- Height of clearance beneath unit from Finished Floor Level:
  - 1st unit 730mm +/- 20mm
  - 2nd unit 820mm +/- 20mm

In order to provide a wheelchair seating space, the minimum clearance width between the legs or other fixtures beneath a table, counter or worktop on at least one accessible face of the unit are to be **800mm.**

A minimum clearance beneath the table, counter or worktop at wheelchair seating spaces are to be maintained as shown in AS 1428.2 Figure 25.

Pedestal tables and tables with splayed legs are not recommended. Tables with corner legs are preferred.

Where a counter is provided for general use, a length of the counter of not less than **900mm** are to be provided. A clear floor space of **2250 x 2250mm** are to be provided in front of the counter.

Dimensions for length and depth of worktops are to be calculated on the maximum horizontal reach shown in AS 1428.2, Figure 26.

The distance between tables shall be as shown in AS 1428.2, Figure 27.

Accessible storage facilities such as cabinets, shelves, cupboards and drawers are to comply with the following:

- Clear floor space - A clear floor space of not less than **800 x 1300mm** that allows either a forward or parallel approach by a person using a wheelchair are to be provided at accessible storage facilities.
- Height - accessible storage spaces are to be within one of the reach ranges specified by clause 22. Clothes-hanging rods or hooks are to be a maximum **1350mm** Above Finished Floor Level
- Hardware - Hardware for accessible storage facilities are to comply with clause 23. Tough latches and D-shaped pulls are acceptable.
- Sliding doors on cupboards are preferred. These allow manoeuvring space for wheelchairs and reduce the risk of injury to visually impaired people.

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- Lightweight gliders are to be installed for drawers.

Beds are to comply with the following:

- The height of the space between the base of a bed and the Finished Floor Level are to be not less than **150mm**. This clearance is necessary for the use of a hoisting device.
- The height of the mattress top are to be not less than **480mm** and not more than **500mm** Above Finished Floor Level when compressed by a weight of **90kg.**
- Where appropriate, a telephone, and controls for operating radio, TV, air-conditioning, lights and signals are to be accessible from the bed.
- The clear circulation space around beds shall be not less than shown in AS 1428.2 Figure 29.

The height zone for comfortable viewing is shown in AS 1428.2 Figure 30.

External furniture

Refer to section 8 Fitout, Furniture and Equipment

Drinking Water Promotion.

Street furniture, which includes objects such as seats, tables, Drinking Water Dispensers, planter boxes, rubbish bins and the like are to comply with the following:

- Seats are to be a minimum of **500mm** away from the path of travel.
- Objects are to be of a colour which provides contrast with their background and have a luminance factor of not less than **30%.**

Where possible, all street furniture shall be positioned on one side only of the accessible path of travel.

The design and installation of any external seating is required to be as follows:

- The front of the seat must have a clear space between any legs at ground level to within **150mm** of the front edge of the seat, and to within **100mm** of the seat height to allow for rearward adjustment of feet when rising (see Figure 32(b).
- Where armrests are provided, the top surface of the armrests must be at a height of **260 +/- 40mm** above the seat.
- The front edge of the seat shall have a minimum radius of **30mm.**
- No edge or projection are to have a radius of less than **5mm** unless protected from contact with the user.
- The seat must be drain free of water.

Seats should generally be **450mm** high. Children and smaller people may prefer seats as low as **350mm** high. Where possible, a range of seat heights are to be provided.

At each location where Drinking Water Dispensers and water coolers are provided, at least one are to be in accordance with AS 1428.2 Figure 33.

Drinking Water Dispenser outlets are to be as close as possible to the front of the unit. It are to direct water flow to a height of **80-100mm** in a trajectory that is parallel to the front of the unit (see AS 1428.2 Figure 33).

Drinking Water Dispenser controls are to either be centrally positioned at the front of the unit or if positioned at the side, be on both sides and not more than **180mm** from the front of the unit. Controls operable by one hand are to require an operating force of not more than **19.5N.**

A foot-operated control is acceptable if installed in addition to, but not instead of hand operated controls.

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Where a Drinking Water Dispenser is recessed, in addition to complying with the clearance requirements of AS 1428.2 Figure 33, a clear width of space underneath the unit of not less than **800mm** are to be provided.

The height of the operative components of water cooler cup dispensers shall not to be more than **1100mm** above the trafficable surface.

0.13 Kitchens and laundries

Refer to section 3.2 Circulation.

Shelves and Cupboards must be designed in accordance with the following:

- Clear floor space - A clear floor space of not less than **800 x 1300mm** that allows either a forward or parallel approach by a person using a wheelchair are to be provided at accessible storage facilities.
- Height - accessible storage spaces are to be within one of the reach ranges specified by clause 22. Clothes-hanging rods or hooks are to be a maximum **1350mm** Above Finished Floor Level
- Hardware for accessible storage facilities are to comply with the following. Tough latches and D-shaped pulls are acceptable:
- The shape of the door handle shall be such that the hand of a person who cannot grip will not slip from the handle during the operation of the latch. D-shaped handles will meet this requirement. Knobs on bolts and snibs are to be designed so that they provide an easy grip.
- Handles are to be clearly identified by colour with luminance contrast to their background of not less than **30%.**

Design requirements

Kitchen and Laundry to be detailed as follows:

- Drawers or slide-out baskets are preferred, rather than large open cupboards.
- Rotating shelves, which have a lip of not less than **50mm** are preferred for corners
- Corners of benches are to be rounded to reduce the risk of injury
- Toe recesses are to be provided along the front of benches
- The height and shape of cupboard and drawer handles should comply with reach ranges as specified in AS 1428.2
- Sliding doors are to be fitted with stops so that the doors stop a minimum of **50mm** from the door handle.
- At least one work surface should provide a clear width opening beneath the surface of not less than **820mm** to allow for a front approach by a wheelchair.
- A clear 'set down' space next to oven cooktop, refrigerator and dishwasher are to be provided on the bench top
- Where it is necessary to slide hot utensils along work surfaces, the surface material are to be heat-resistant
- Bench surfaces are to be smooth for easy cleaning and of a non-glare finish
- For vision-impaired users, horizontal surfaces are to be a lighter colour than that of the vertical surfaces. The luminance factor of the vertical surface should not be less than **30%** different from surrounding horizontal surface
- The height of work surfaces shall be in accordance with AS 1428.2
- Some ambulant people with disabilities prefer to work while seated on a stool. Consideration should therefore be given to this when determining bench height

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- Where pull-out surfaces are provided e.g. as a set down beside a stove, they are to be fitted with handles and heat-resistant surfaces. A stop are to be incorporated to ensure that shelves cannot be accidentally pulled right out.
- For users in wheelchairs a are to ow sink is essential, hence the preferred maximum bowl depth is **150mm**. The clearance underneath should comply with the requirements for washbasins in AS 1428.1.
- The underside of the sink bowl, exposed pipes, taps and fittings are to be installed to avoid burns
- For people with limited hand movement, lever action fittings are to be used. Taps should comply with AS 1428.2
- Wherever practicable, tap washers operating on the principle of a ball valve in synthetic rubber washers, or ceramic or hydra seal types are to be used because of the ease of turning on and off and their maintenance-free life and ease of replacement
- Wall ovens are to be installed so that the bottom shelf is on approximately the same level as the adjacent work surface
- The drop-down type of oven door which does not slide away is not recommended as it limits reach for wheelchair users
- Where a pull-out work surface is not provided, there are to be a clear worktop at one side of the oven to allow for set down. If a side-hinged oven door is used, the clear worktop are to be on the opposite side.
- Controls are to be within the zone of common reach shown in AS 1428.2. They are to be easy to operate by the intended user and clearly marked. For people with vision impairment, tactile indicators are to be provided on all controls.
- Ovens with a light and timer are preferred.
- Cooktops are to be flush or as close to flush as possible with the adjacent benchtops and they should have adequate heat-resistant work surfaces.
- Cooktops should have countertop controls. For people with vision impairment, tactile markings are to be provided on all controls.
- For people with vision impairment, gas stoves are preferred as they provide an instant heat that gives immediate indicator that a burner is operational.
- Gas burners should have automatic ignition.
- If an electric hot plate is used, coil elements are preferred as they do not transmit as much heat as solid elements to the surrounding areas.
- Hotplates and burners are to be positioned away from trafficable areas within the kitchen.
- For general use by people with disabilities and older people an electric cooking unit is preferred for reasons of safety, especially when there is a loss of sense of smell.
- A refrigerator installed within the zone of common reach as specified in AS 1428.2.
- A clear worktop space alongside a refrigerator is recommended for set-down. This are to be on the side opposite to the hinge of the door.
- The dishwasher will be best located close to the sink and crockery and cutlery storage areas.
- Worktop surface shall be provided on each side of the dishwasher unit to allow for ease of loading and unloading.
- A range hood with an external exhaust is preferred to a recirculating type which requires regular filter changes.
- Floor surfaces are to be easy to maintain and slip-resistant when wet or dry.
- Floor coverings with coved skirtings are preferred.
- Switches and general-purpose outlets should comply with the AS 1428.2 zone of reach.

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0.14 Hearing Augmentation

It is necessary to provide hearing augmentation systems to assist building occupants who have mild, moderate and severe hearing loss to hear music and speech within the hall, library, movement studios, public reception, one interview space in Administration and areas that have a sound amplification system.

Students and adults use hearing devices which utilise different technology and are supported by different hearing augmentation systems. These are:

- An induction loop system to support devices used by adults including teachers, other staff, parents, family and other adult community user groups, and
- A Bluetooth frequency modulated soundfield system that has optimum compatibility with the Roger Phonak hearing devices issued to students.

System requirements

The induction loop system shall:

- Consist of a suitable cable, amplifiers and any necessary transducers.
- Be interfaced to the main sound reinforcing system.
- The cable is to be laid in conduit, either in the ground floor slab if the reinforcing permits, or else saddled on top of the slab.
- Provide labels warning against nailing, drilling, etc.
- Do not install cable below the reinforcing.
- Is to be equitably distributed to ensure uniform reception and to not less than 80% of the floor area.

The wireless soundfield system shall:

- Consist of soundfield speakers, wall pilot, and the range of portable devices including touch screen microphone, multimedia hub, charging rack and portable speaker
- Provide wall mounted soundfield speakers and supporting system devices in the Hall, Library and other large spaces. This system can be interfaced to the main sound amplification system.
- In General Learning Spaces (GLS) provide additional power outlets (min 2 additional double GPO's per GLS) to enable the range of portable soundfield devices to be located in that GLS when occupied by a student who is deaf or hard of hearing.
- Provide minimum one (1) set of soundfield portable devices to support a student who is deaf or hard of hearing. Advice shall be sought from the school to confirm need for additional sets of soundfield portable devices.

Refer NCC Part D, Clause D3.7

Signage

- Signage is to comply with NCC clause D3.6
- Hearing augmentation signage must be located at the main entrance doors or doors of the enclosed space that offers the facility.

2.5 Safety

2.5.1 General

Preamble

The Work Health and Safety Act and the Department's commitment to student safety and wellbeing require that risks are eliminated or minimised through deliberate design of school facilities. Safety in design principles are embedded in design technical requirements to support implementation of the Department's WHS Policy.

Note that references to lifecycle stages (design, use, maintenance and demolition) are provided only to inform Safety in Design decisions; they do not prescribe project processes, governance, scheduling or phase approvals.

Refer to:

Including but not limited to the following:

- 4 Site Arrangement
- 9 Specialist Spaces
- Other applicable sections within this document.

Additional relevant references:

- https://education.nsw.gov.au/about-us/efsg/design-framework/safety-in-design
- NSW Code of Practice: Safe Design of Structure 2019
- Work Health and Safety Framework link

2.5.2 Safe Design

Safety in Design (SiD)

Preamble:

Work Health and Safety legislation places duties on all those connected with the design, including during construction, end use, maintenance, and demolition or de-commission. To prevent incidents through good design features and systematic hazard identification and risk assessment.

Requirements:

- The safety in design process must involve all consultants, and stakeholders from both School Infrastructure and the Project Reference Group to ensure a comprehensive risk assessment and effective implementation of safety measures.
- Heritage protected places must also include review with the Senior Project Director or equivalent Project Lead in consultation with the DoE Heritage Team as part of the Safety in Design process and explore performance-based solutions where necessary.
- Safety in Design activities are to be carried out by the project team at all project phases. Projects teams must undertake the activities nominated within School Infrastructure's.

Crime Prevention through Environmental Design (CPTED)

Preamble:

Crime Prevention Through Environmental Design (CPTED) is a proactive approach to enhancing safety and reducing crime by strategically designing and managing the built environment across the building lifecycle. Specifically, the CPTED principles improves internal and external passive surveillance, sightlines, spatial arrangement of buildings and placement of landscaping.

Requirements:

- Designs are to incorporate CPTED principles to enhance passive surveillance, reduce concealment, and support community-friendly environments in alignment with NSW Department of Education's duty of care under the Work Health and Safety Act.

Implementing CPTED principles and creation of inclusive spaces such as visibility, and open lines of sight supports wellbeing, mental health and reduces psychosocial hazards.

2.5.3 Climbable Elements

Note: **This Section is being updated**.

A review by the Department of Education and others is being completed to assess the climbability of building elements, services equipment, downpipes, landscape features, fences and similar in order to provide improved built solutions for these spaces.

This includes built elements within Special Support Program School Types.

Until the revised Section is published, the requirements below are to apply.

Preamble:

Access to roofs and upper levels via adjacent climbable elements must be restricted. Items defined as climbable elements include trees, low eaves, walkway roofs, structural struts, porches, sunshades, fences, balustrades, overhangs, ledges, mullions, indents, down-pipes, hardware items, services equipment including hydrants and cages around mechanical equipment, etc.

Requirements:

- Ensure that all external elements that could serve as handholds, like exposed structural struts, are positioned at least 3000mm above the finished floor level below.
- Sunshade frames located within 3000mm of the finished floor level below must be designed to prevent climbing. This can be achieved by eliminating any handholds and footholds or by filling the frame with expanded mesh or the like.
- The eaves of covered walkways and buildings must be at least 3000mm above the finished floor level below, which includes surfaces like playgrounds, public footpaths, and carparks.
- To prevent low-height structures such as walls, fences, balustrades, handrails, awnings, overhangs, ledges, service cages, and hydrants from becoming climbable, they must be positioned at least 2000mm horizontally away from trees, building eaves, and covered walkways.
- to prevent climbing, balustrades and screens are not to contain a foothold between 150 mm and 760 mm above the floor.
- Full height screens are required where covered walkway roofs adjoin verandas of the level above.
- Downpipes must not be climbable.
- Roof lights must be inaccessible or must not be used.

2.5.4 Safe Work on Roofs

Preamble:

To ensure the safety of all workers and contractors accessing school rooftops or elevated areas, the following requirements are to be applied in alignment with Australian Standards and SafeWork NSW regulations.

Regulatory Framework:

- Work Health and Safety Act 2011 (NSW)
- Work Health and Safety Regulation 2017 (NSW)

- SafeWork NSW Code of Practice: Managing the Risk of Falls at Workplaces

Requirements:

- Provide a powdercoat finish to metal roof access systems where they can be seen from outside the building.
- Roof access systems must be fit for purpose and must be designed to facilitate maintenance of whatever plant is located on the roof.
- The design of roof access systems must meet the WHS safe access and AS/NZS 1657 requirements.
- Fall protection is mandatory under General Construction Work (WHS Regulations) for any task conducted where a person is at risk of falling 2 metres or more.
- Roof access must be via fixed access systems (e.g., ladders, stairways, or internal hatches) compliant with AS/NZS 1657.
- Where roof access is provided via internal hatches guard rails compliant with AS/NZS 1657 must be included to the roof surface around the hatch opening
- Paths of travel for maintenance of plant to roofs must comply with AS 1657.
- Access systems must be secure, restricted, and lockable to prevent unauthorised use, particularly in school environments.
- Where fixed ladders are used and the fall height exceeds 3.5 metres, a fall-arrest system must be incorporated (e.g., vertical static line with harness).
- Guardrails must be installed at roof edges, walkways, platforms, and any area where a fall to a lower level is possible. If edge protection is not practical, engineered fall-arrest systems such as static lines, inertia reels, or anchor points must be installed and certified.
- All systems must be designed and tested in accordance with AS/NZS 5532, with structural loadings aligned to AS/NZS 1170.1.
- During the construction or refurbishment of school buildings, safety mesh must be installed under metal roofing in accordance with AS/NZS 4389 to prevent internal falls during roof work.
- Roofs with a pitch greater than 10° require dedicated maintenance walkways or working platforms to be provided for safe access.
- Portable ladders must not be used for roof access or prolonged maintenance work.
- Ladders may only be used for short-duration, low-risk work, and must be rated for industrial use, securely positioned, and supervised.
- Performing maintenance from a ladder is NOT acceptable.
- All roof access points must display clear signage indicating access restrictions and required fall protection PPE.
- Only trained, competent, and authorised personnel may access school roofs for maintenance or inspections.
- All fall protection systems must be inspected annually by a qualified technician, and inspection records maintained in compliance with AS/NZS 1891.4.
- Work at height must be scheduled outside school hours where possible to minimise risk to students and staff.
- Appropriate exclusion zones below work areas must be established to prevent injuries from falling tools or debris.
- All contractors must provide a Safe Work Method Statement (SWMS) for work at heights, as required by SafeWork NSW.

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Refer to:

Including but not limited to the following:

- 6 Buildings
- Other applicable sections within this document.

2.5.5 Maintenance

Preamble:

The planned strategies for maintenance of services and buildings must be reviewed by School Infrastructure's Asset Management Unit and assessed within Safety in Design reviews during each project phase to ensure that maintenance activities can be undertaken in a safe manner.

All serviceable plant and equipment is required to be provided with means of safe access for ongoing maintenance purposes.

Requirements:

- Access to all facades from a boom lift or scissor lift must be provided to all buildings of two storeys or higher. Clear access around building perimeters and a route from the street must be provided for equipment.
- Process for cleaning windows must be determined by the project team during the design phases and approved suitable in writing by the Senior Project Director or equivalent Project Lead as well as by the Asset Management Unit representative.
- Minimum path of travel widths and maintenance clearances are to be provided around all maintainable plant in accordance with regulation as well as equipment supplier requirements.
- Plant and equipment is to be located either;
    - At ground level where external area is sufficient
    - On the top level of new buildings, open to the air
- All plant area access is to be restricted to maintenance personnel only. This will require lockable enclosures, plant space doors, access path gates, or the like.
- Where plant is located in ceilings at 3 metres or less above the finished floor level, servicing can be performed via a platform ladder.
- All equipment is to be appropriately identified and tagged.
- Any equipment requiring maintenance, including air conditioning condensers, must not be located on roofs unless all alternative locations have been documented and reviewed AND the rooftop solution is approved suitable in writing by the Senior Project Director or equivalent Project Lead as well as the Asset Management Unit representative, which includes a suitable compliant access stair and safety access is provided to maintain the equipment.

Refer to:

Including but not limited to the following:

- 7 Services
- Other applicable sections within this document.

2.5.6 Collison Hazards

Preamble:

Risks associated with collision with building elements, landscape features, services equipment and other fixtures must be minimised.

Requirements:

- Circulation, access desire lines, and active play areas must be designed to avoid the hazard of students colliding with columns, hydrants and other services equipment.
- The design must prevent situations where a head could strike low building elements such as stair landings, roof overhangs or beams etc.

Column Placement and Low Building Elements

Requirements:

- Landscaping, walls, railings, seats, or enclosures must be utilised to direct student's path of travel and prevent collision with columns and low building elements.
- The placement of columns must not interrupt pedestrian flow associated with position of openings, circulation routes, and access path desire lines.
- Columns must not be located within the centre of COLAs.
- Where verandas, walkways, or COLAs converge to create a potential profusion of columns, share columns to reduce their numbers.
- Sharp edges must be avoided, use rounded and/ or chamfered edges. RHS and CHS must be used for exposed columns instead of universal sections.
- Where a collision hazard is revealed and the hazard cannot be eliminated, use bands of heavy duty, brightly coloured paint. LRV contrast of 30 points between the hazard and background must be provided from 100mm to 2100mm above finished surface level.

Bag and Change Space Hooks

Requirements:

- Hooks within High School change spaces are to be anti-ligature.
- Bag hooks must not have sharp edges. Corners must be radiused by nom. 20mm.
- Bag hooks must not protrude more than nom. 50mm from the mounting surface.
- Where original bag hooks within existing schools comply with the above, they may be retained.

Windows – Awnings and Louvres

Requirements:

- Windows, awnings, and louvres must not protrude below 2100mm Above Finished Floor Level within circulation areas.

This requirement does not apply to existing historic windows, awnings or louvres.

Door Swings

Requirements:

- Where doors swing outwards due to regulation requirements for egress, door swings into circulation routes must be assessed from a safety perspective. Performance solutions to allow doors to swing inwards may be sought if agreed with School Infrastructure Department of Education.

Sports Pitch Run Offs

Requirements:

- Where run offs are reduced, the reduction must be supported by an assessment from a specialist Sports Consultant and approved suitable in writing by the Senior Project Director or equivalent Project Lead.

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- Collision hazards such as lamp posts, columns and fixed seating, etc, must not be located within sports pitch run off areas.

2.5.7 Entrapment Hazards

Downpipe Covers

Preamble:

Downpipes create risks associated with entrapment.

Requirements:

- A hot dip galvanised steel sheath 3mm minimum thick must be provided to downpipes from 150mm AAFL to soffit or to a minimum height of 3 metres where there is no soffit.

Perforated Metal Panel Risks

Preamble:

Perforations within metal panels pose a risk of finger entrapment where they are a smaller diameter or create a foothold when of larger diameter.

Requirements:

Perforated panels within Schools are to be selected so as to:

- not be a risk for entrapment of fingers.
- not create a foothold.

2.5.8 Trip Hazards

Downpipe Trip Hazards

Requirements:

- If a bend is required at the bottom of the downpipe this must not create a trip hazard.
- Does not apply to existing downpipes on heritage buildings.

2.6 Hazardous Materials

Note: **This Section is being updated.**

Until the updated Section is published, the requirements below and on the following pages of content unchanged from EFSG 2025 are to apply.

2.6.1 General

Preamble:

This Section sets the minimum requirements to identify, assess, manage and, where necessary, remove or contain hazardous building materials in schools covering asbestos-containing materials, synthetic mineral fibres, polychlorinated biphenyls, lead-based paints and ozone-depleting substances across design, construction, refurbishment and demolition.

2.6.2 Banned or Highly Toxic Materials

Requirements:

No additional requirements above the following regulation applies:

- **Asbestos**: Occupational Health and Safety (OHandS) legislation, Work Health and Safety (WHandS) legislation and relevant environmental legislation.
- **Lead**: AS4361 Guide to Lead Paint Management
- **Polychlorinated Biphenyls** (PCBs): ANZECC Polychlorinated Biphenyls Management Plan.

2.6.3 Asbestos Removal within Heritage Buildings

Asbestos may be present in roofing, services, insulation, mortars, vinyls, wall and ceiling linings and putty repairs in heritage buildings.

Requirements for remediation works in Heritage Buildings are:

- Where asbestos linings are to be removed, they are to be replaced with the original lining if known, or matching fibre cement material, including reinstatement of batten trims in locations to match original existing condition.
- Where asbestos removal would involve permanent removal of existing material fabric of a Heritage Item or Heritage Building, propose a solution to complete the work to the Senior Project Director or equivalent Project Lead who will coordinate consultation with DoE Heritage to assess the solution. Await confirmation in writing from the Senior Project Director or equivalent Project Lead prior to commencement of any work.

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0001c Design Checklist - Hazardous Materials

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.
Until an updated version is published, the requirements set out below are to continue to apply.

0.01 Main Considerations

Hazardous Materials - General

Hazardous Building Materials may be found on existing sites and new sites that pose a significant risk to the health of the occupants. Hazardous materials include:

- Asbestos Containing Materials (ACM)
- Synthetic Mineral Fibres (SMF)
- Polychlorinated Biphenyl's (PCB)
- Lead Paint
- Ozone Depleting Substances

Existing school sites

Where works are proposed on an existing school site, a Hazardous Materials inspection and report are to be conducted. In most cases such reports have been undertaken.

New school sites

Where a new school is to be developed a Hazardous materials study is to be conducted.

Australian Standard 2601 Demolition of Structures requires that the structures and all parts of the site are to be examined in order to determine the presence of hazardous materials before commencement of any renovation or demolition.

Inspection shall be conducted by organisations with the National Association of Testing Authorities (NATA) accreditation complying with the requirements of AS/NZS ISO.IEC 17020 for the inspection of hazardous materials (HazMat) including asbestos.

Hazardous Materials inspection reports are to be produced in accordance with the requirements of the various Safe Work Australia “Codes of Practice” for the management and control of hazardous substances.

Where hazardous materials are found a Hazardous Materials Management Plan are to be prepared:

- Identifying the hazardous materials
- Assessing the risk of the hazardous materials
- Including recommendations to control the risk of exposure to the hazardous materials.

Note that DoE have management plans for some types of hazardous materials.

The most common hazardous substances identified on school sites are:

- Lead Based Paints
- Asbestos

0.02 Management of lead-based paint

The lead-based paint guidelines are interim and will remain in force until strategies currently being developed by the Lead Task Force are issued. These interim guidelines were developed in consultation with the EPA, Work Cover and the Department of Health.

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Schools built before 1970 are likely to contain some lead-based paint. The usage of lead-based paint has decreased and if the building was constructed after 1970 it can be generally assumed that the paint will not pose a problem.

Those working in an area containing lead-based paint should refer to Australian Standard AS4361.1, Guide to Lead Paint Management-Industrial Applications, and AS 4361.2, Guide to Lead Paint Management-Residential and Commercial Buildings.

Lead Hazards

Lead particles are released when old paint containing lead is damaged or peels and collects as dust flakes in ceiling, wall and floor voids. If dust is generated it must be contained and / or removed.

If runoff contains lead particles it must be contained. Lead is extremely hazardous being a cumulative poison and even small levels in the body can have severe effects. The stripping of lead-based paint and the disposal of contaminated waste must be carried out with all care.

WHS Risk Assessment

Under the NSW WHS act and regulation requirements, there is a requirement for those managing a school site to ensure that a safe environment is maintained for students, staff and visitors.

As with all potentially hazardous materials and substances where the hazard or risk are identified, an assessment is to be undertaken of the potential risk to those who may come in contact with the hazardous substance (i.e. lead based paint).

The risk assessment is to determine the approach to be followed in the management of the risk and could include options of:

- Containment of material, either in the short term until removal of the lead based material can be properly removed or longer term where the material can be adequately sealed to prevent exposure. Undamaged lead paint should not constitute a threat to health.
- Removal of the lead-based material. DoE policy is that flaking or chalking lead-based paint needs to be removed. Removal of the material will provide the greatest surety for the safety of the uses of the building, especially children.

Paint Removal

All work is to be undertaken as set out in the Australian Standards.

Emergency remedial work are to be undertaken when required to secure the material surface, when staff, students and visitors are not present.

Rectification work is to be undertaken outside of school hours or during holiday periods, when the area is not in use.

0.03 Management of Asbestos

NSW Department of Education have developed an Asbestos Management Plan to give detailed direction on the management of Asbestos that may be found on a school site.

DoE also maintain a School Asbestos Register which provides details of school sites where asbestos has been identified.

Where asbestos has been identified or discovered, the relevant authorities are to be informed, and procedures implemented for the assessment and management of the Asbestos in line with the DoE Asbestos Management Plan.

Disposal of debris

Hazardous waste is disposed of safely so that human beings and the environment are protected from the harmful effects of the waste.

All waste is disposed of in accordance with the relevant legislative requirements for the type of waste.

2.7 Heritage

2.7.1 General

Preamble:

Approximately one-third of NSW Public Schools are legislatively protected, in whole or in part, as places of heritage significance. School properties that are identified as 'Heritage Items' are listed on the Department of Education s170 Heritage Conservation Register.

Heritage Items have specific building and material typologies not commonly addressed in the EFSG. Changes to all Heritage Items must be made with consideration of each place's unique heritage significance and context, including its setting and character.

The Department of Education Heritage Team maintains the NSW Department of Education s170 Heritage and Conservation Register (2025) | Data.NSW - Data.NSW and detailed procedures and guidelines for managing Heritage Items are hosted on the Department of Education Heritage website.

Any queries regarding any Heritage Item or proposed works to Heritage Items can be directed to the Department of Education Heritage Team at SINSW.Heritage@det.nsw.edu.au.

Heritage Definitions used in the EFSG:

- **Heritage Item** is a place which is inscribed on the Department of Education's s170 Heritage Conservation Register, linked above.
  - Protections and management requirements for a Heritage Item applies to all elements listed in the name of the item inscribed on the s170 Heritage Conservation Register. If only the school is named, all of the school (all buildings, landscaping, grounds) are protected as part of the Heritage Item.
  - **Heritage Building** is a building which is protected as part of a Heritage Item.
- A **Heritage Conservation Area** is a locality which is protected to conserve its heritage character and visual streetscape. Schools which are not Heritage Items, but which are located within Heritage Conservation Areas.

Requirements:

- All new building work is required to meet the relevant applicable requirements of current regulation.
- All Heritage Items and Heritage Buildings are generally considered exempt from mandatorily satisfying EFSG requirements. Confirmation must be obtained with Department of Education Heritage Team at SINSW.Heritage@det.nsw.edu.au.
- All work to places inscribed on the NSW State Heritage Register must be coordinated with the DoE Heritage Team. There are currently 22 NSW Public Schools on the State Heritage Register.
- Planning approvals, or confirmation of works meeting relevant exempt development provisions, are required for works to all Heritage Items.
- Changes to Heritage Items are to prioritise altering elements of the place which are non-significant fabric before proposing changes to significant fabric.
- All new works to a Heritage Item are to be reversible – allowing future dismantling of the work without impacting historic fabric.
- New work at Heritage Items must be either sympathetic (visually and materially compatible) to the significance of the place; if this cannot be achieved, new work must be recessive (unobtrusive, blended in) to the significance of the place.
- Historic building materials must not be removed from buildings where these meet the requirements of regulation.

- Specialist supervision, advice and trades are required for certain works to Heritage Buildings and Items. These requirements are outlined in relevant sections of the EFSG. Refer to the relevant topic section and the heritage requirements within that section for further detail.
- When undertaking work to a Heritage Building, work must include any appropriate measures to prevent degradation of that building (waterproofing, fire protection, security from vandalism). Inaction on basic maintenance of a Heritage Item is considered 'demolition by neglect' and is treated as deliberate unlawful demolition.

Specific requirements for appropriate management of Heritage Items and Heritage Buildings are outlined under various sections throughout the EFSG.

Specific EFSG requirements for Heritage are mandated for Heritage Items and Heritage Buildings. However not all older buildings are Heritage Items or Buildings. Heritage requirements are to be considered as prudent building management recommendations for all older buildings.

2.7.2 Maintenance and Repair

Heritage buildings have a typically long life span and can remain fully functional and adaptable into the future providing they are well maintained and managed. The NSW Heritage Act requires that Heritage Buildings and Heritage Items are maintained on an ongoing basis. Common maintenance requirements for Heritage Buildings can be accessed here: Heritage Buildings – Minimum Standards of Maintenance and Repair

2.8 Bushfire Protection

Note: **This Section is being updated.**

Until the updated Section is published, the requirements below and on the following pages of content unchanged from EFSG 2025 are to apply.

2.8.1 General

Preamble:

This section outlines how schools on bush fire prone land are planned, designed and operated to remain safe and functional during a bush fire. Schools have a special fire protection purpose under the current Rural Fires Act 1997 (NSW).

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0001c Design Checklist – Bushfire Protection

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.
Until an updated version is published, the requirements set out below are to continue to apply

0.01 Main Considerations

General

Refer to section 2.8 Bushfire Protection.

NSW Building regulations requires that school buildings near potential bush fire areas (or on Bushfire Prone land) are to be designed to safeguard occupants from the effects of a bush fire.

Section 100B (6) of the Rural Fire Act 1997 states that a school is considered a Special Fire Protection Purpose and therefore requires increased level of safety from bush fires.

Development applications on bush fire prone land must be accompanied by a Bush Fire Assessment Report demonstrating compliance with the aim and objectives of Planning for Bush Fire Protection and the specific objectives and performance criteria for the land use proposed.

Local Authorities and the Rural Fire Service can provide advice on the design of buildings in bush fire prone areas.

Designated bushfire prone area means land that:

- Has been designated under legislation; or
- Has been identified under an environmental planning instrument, development control plan or in the course of processing and determining a development application.

0.02 Bushfire Protection Building Strategies

The Building Code of Australia and AS3959 “Construction of buildings in bushfire-prone areas” sets out the requirements for buildings which are within close proximity to a defined bush fire zone. The requirements are based on the assessed construction category within the standard.

In general terms the design of the buildings should allow for the following:

Floors

Prevent embers reaching under the building:

- Use concrete slab-on-ground
- Where unable to build flat on ground, use non-flammable floors and supports
- Fully seal the perimeter of the space between the floor and ground

Roofs

Simple form, non-combustible roofs are easiest to protect, clean and avoid creating pockets where debris and embers may collect. To stop spark penetration:

- Roofing must resist dislodgement by the winds that can accompany fires
- Sheet steel roofing is preferred, but gaps must be protected
- Tiled roofs where approved, must be fully sarked and adequately fixed
- Minimise valleys, skylights and roof penetrations where embers may lodge, for facilities in medium to high-risk zones
- Eliminate gutters or protect them with metal gutter guards

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Walls

Exterior walls are most affected by heat from the fire (radiant energy) and by direct flame. External walls are to be one or a combination of the following:

- Brick, concrete or block
- A framed wall incorporating sarking with a flammability index ≤ 5, behind the non-combustible external cladding and/or fire-resistant insulation material

Windows

They are one of the weakest parts of a building when exposed to fire.

- Screen all openable window sashes, including louvres with corrosion-resistant steel mesh of the maximum aperture size noted in the code
- Minimise windows facing likely direction of a fire

Doors

To prevent embers from entering through doorways and under doors, they are to be fitted with:

- Weather draught seals to full perimeter of doors
- Corrosion-resistant steel mesh of the maximum aperture size noted in the code

Vents, Eaves and Soffits

- Protect vents and weepholes with spark guards made of corrosion-resistant steel or bronze mesh having a maximum aperture size as noted in the code
- Enclose eaves with non-combustible material and seal the fascia
- Locate screened vents in the fascia rather than the soffit lining

0.03 Site Planning Strategies

An Asset Protection Zone are to be established and maintained around school buildings, to provide protection to the students.

The establishment of an Asset Protection Zone will also minimise the Bushfire Attack Level category and Construction Level required by the relevant standards, and to satisfy DA approval legislation with regards to a Site Bushfire Attack Assessment.

Asset Protection Zones

In a designated bushfire prone area, establish an asset protection zone (APZ) on the hazard side of the development, within the boundaries of the site.

Provide a perimeter fire trail useable by fire fighting vehicles under all weather conditions and linking to the street network.

Ensure an accessible water supply for fighting fires.

An APZ is to be maintained in accordance with Rural Fire Service Recommendations.

0.04 Bushfire Protection Landscaping Strategies

- Keep the amount of fuel (leaves, twigs, logs, dead grass) in the vicinity of buildings to a minimum.
- Ensure trees are located away from buildings to avoid branches overhanging and leaves collecting on roofs.
- Do not plant shrubs against buildings.
- The crowns of trees planted on the hazard side of the development should not be contiguous.

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- Plant fire resistant trees and shrubs on the hazard side of the development to reduce the potential impact of wind, fire intensity, radiant heat, and rate of spread as well as intercepting burning embers.
- Avoid combustible fencing materials.
- Provide irrigation and garden sprinklers to water areas near the buildings (subject to water authority approval).

Fire Resistant Plants

- Given the right conditions, all plants will burn, but some are more flammable. Plants that have some degree of fire resistance, have the following characteristics:
- Broad fleshy leaves with low volatile oil or resin content. Plants with fine hard leaves and/or a high volatile oil or resin content are more flammable.
- Dense foliage and smooth bark. Plants with an open airy crown and with many fine terminal branches are more flammable.
- Minimise dry material build up (i.e. plants that grow without accumulating large amounts of combustible dead branches, needles, leaves or bark). Rough or ribbon-barked trees can carry flames into the canopy.
- Salt retention ability. Plants that naturally accumulate salt in their foliage better resist burning as salt retards burning even when the foliage is dry.
- Trees and shrubs that can survive the intense heat and wind of fires and re shoot from the blackened trunks or branches after rain moistens the soil.

Refer to Planning for Bushfire Protection (NSW Rural Fire Service + Planning NSW).

3

Spatial Requirements

3.1 Area and Occupancy
3.2 Circulation

3.1 Area and Occupancy

3.1.1 Area Calculations

Requirements:

The Schedule of Accommodation (SoA) in EFSG Part B indicates the floor area required to meet the functional needs of each space. Both internal and external.

Floor Area calculations are determined based on the information in the table below.

Table 3.1.1 Area Calculation Definitions

The area calculation definitions below are primarily based on the AIQS *Australian Cost Management Manual - Volume 1.*

Acronym	Description	Definition
FECA	Fully Enclosed Covered Area	Fully Enclosed Covered Area includes the area for a space that is **enclosed with a roof, a floor and walls**. Measurement of the area for the space are to be in metres squared and based on the following methodology: — To the centre line of internal walls — To the internal face of the external walls EXTRACT from AIQS '*The **sum of all such areas at all building floor levels**, including basements (except unexcavated portions), floored roof spaces and attics, ... enclosed porches and attached enclosed covered ways alongside buildings, equipment spaces, lift shafts, vertical ducts, staircases and any other fully enclosed spaces and usable areas of the building, **computed by measuring from the normal inside face of exterior walls** but ignoring any projections such as plinths, columns, piers and the like which project from the normal inside face of exterior walls.* *It are not to include open courts, light wells, connecting or isolated covered ways and net open areas of upper portions of spaces, lobbies, halls, interstitial spaces and the like which extend through the storey being computed.*'
UCA	Unenclosed Covered Area	Unenclosed Covered Area includes the area for a space that is **enclosed with a roof and a floor, but does not have any walls enclosing the space**. Measurement of the area for the space are to be in metres squared and based on the following methodology: — To the external face of external walls — To the UCA side face of external elements, such as balustrade or the like EXTRACT from AIQS '*The **sum of all such areas at all building floor levels**, including roofed balconies, open verandahs, porches and porticos, attached open covered ways alongside buildings, undercrofts and usable space under buildings, unenclosed access galleries (including ground floor) and any other trafficable covered areas of the building which are not totally enclosed by full height walls, **computed by measuring the***

		areas between the enclosing walls or balustrade *(i.e.* ***from the inside face of the UCA excluding the wall or balustrade thickness****).* *When the covering element (i.e. roof or upper floor) is supported by columns, is cantilevered or is suspended, or any combination of these, the measurements are to be taken to the edge of the paving or to the edge of the cover, whichever is the lesser.* *UCA are not to include eaves overhangs, sun shading, awnings and the like where these do not relate to clearly defined trafficable covered areas, nor are to it include connecting or isolated covered ways.'*
GFA	Gross Floor Area	Gross Floor Area is the **combined total area** of the Fully Enclosed Covered Area and the Unenclosed Covered Area. Measurement of the area are to be in metres squared.
UFA	Usable Floor Area	Usable Floor Area is the **combined total area** of space that **can be physically accessed and used.** This area excludes spaces used for circulation, mechanical equipment, outdoor, Toilets, plant, and the like. Measurement of the area are to be in metres squared.

3.1.2 Occupancy Numbers

Requirements:

Occupancy of a school and the spaces within a school can be determined across all project types based on the information outlined within EFSG Part B.

However, each circumstance is different. Confirm actual occupancy numbers with the school prior to commencement of design or any calculations required to determine work based on occupancy numbers.

3.2 Circulation

3.2.1 General

Preamble:

The circulation strategy for schools must achieve safe, legible movement throughout the school, provide social interaction and connectivity, and facilitate the connection between learning spaces to support the school's pedagogical approach.

The design criteria for circulation spaces considers that students carrying school bags will be moving to different areas at the same time as other students coming from the opposite direction.

Circulation space requirements are in addition to the need to fully comply with all applicable building codes and regulations.

MAIN CIRCULATION SPACE

Main circulation is the public path of travel connecting a series of buildings or learning hub spaces. This includes external paths, walkways, ramps, stairs and corridors.

SUPPLEMENTARY CIRCULATION SPACE

Supplementary circulation is a secondary path of travel which may be located off a main circulation path. It does not form part of the main circulation paths for student circulation. For example, corridors serving spaces exclusively used by Administration Staff or Teachers.

Requirements:

MAIN CIRCULATION SPACE

- The unobstructed width of main circulation spaces is required to be a minimum of **2100mm clear**, providing 3 Movement Lanes.

SUPPLEMENTARY CIRCULATION SPACE

- The unobstructed width of supplementary circulation spaces is required to be a minimum of **1800mm clear**.

ALL CIRCULATION SPACES

- When bag storage or similar is installed on a main circulation path of travel, the following is to be added to the minimum clear width for the circulation space:
    - an additional 500mm if it is a hook or similar
    - the depth of the storage item if it is a locker, similar joinery item or similar furniture item
- Where downpipes are located along a circulation path the depth of the downpipe and their covers must be added to the minimum width required for the circulation path.
- Within multistorey school buildings include a circulation space for waiting in front of lift doors in the layout for the school. .
- Essential fixtures and fittings, such as fire hose reels, fire extinguishers and telephones are to not protrude into these circulation space requirements.
- Where circulation widths are modified though an EFSG Departure the following requirements are to still apply:
    - Passing spaces at intervals of not more than 6m are to be provided along the path of travel with minimum dimensions of 2000mm long and 1800mm wide.
    - A circulation space with minimum dimensions of 2270mm long and 1740mm wide is to be provided for a wheelchair user to make a 90–180-degree turn.

Refer to:

Including but not limited to the following:

- 3 Spatial Requirements
- 6 Buildings for Circulation Spaces
- EFSG Part C
- Other applicable sections within this document.

3.2.2 Movement

Preamble:

Understanding the movement of students is critical in determining requirements for circulation spaces. Circulation spaces, including stairs, are to be designed to suit the number of students that are to use the space and are to suit how they will use and move through that space.

Requirements:

The allowed area and spatial layout is to accommodate the circulation requirements for the maximum number of students who are anticipated to use each space. Include the following information based on their movement:

MAIN CIRCULATION SPACE – Mass Movement

- In Main Circulation spaces, most students are moving to one point, e.g. hall, canteen or buses at the same time.

- In Main Circulation spaces, students using the Travel Area will need to pass through in two minutes.
- Notwithstanding regulation requirements, the Mass Movement width may be distributed among several travel pathways in proportion to the amount of accommodation to which each path leads, the minimum requirement being 2100mm.

ALL CIRCULATION SPACES – General Movement

- A single lane of students will be at least **700mm wide** to allow for movement.
- Most students leave a learning space before the next group arrives.
- Students pack / unpack materials from bags and queue within a circulation space before entering a learning space. The area required for queuing is **0.5 m²** per student.
- When students are queuing, minimum movement will occur.
- Where the calculated width results in 1400mm clear or less, allow for one additional movement lane for movement against the main flow.
- Notwithstanding regulation requirements, the minimum width for circulation spaces may be distributed among several exits in proportion to the amount of accommodation to which each path leads.

Table 3.2.1 Movement Data

Movement Data	
Movement	Students will leave in the first minute of period change or break
Movement Lane Width	700mm wide, which allows for students carrying bags
Flow Rate* on Stairs	40 students per minute (S/min)
Flow Rate* Walkways and Corridors	60 students per minute (S/min)
Student Occupancy	90% of learning positions (desks) will be occupied (0.9 students)
Note	Round lanes up to the nearest whole number

*The flow rate is the volume of students that can pass a single point in the 700mm wide lane.

Worked Examples:

Required Lanes - Walkways and Corridors

$$\frac{\text{Student Occupancy} \times 0.9}{\text{Flow rate (60 S/min)}} = \text{Lane quantity}$$

Learning Space
Assume that each learning space caters for 30 students (learning desk positions).
Assume 90% of learning positions are occupied in cluster to allow a reasonable occupancy factor:

Student occupancy for a science area with 6 laboratories is calculated as follows:

6 x 30 x 0.9 = 162 students.

Circulation Space

For 6 laboratories, 180 students leave in one-minute via a walkway. The required capacity of exit openings or passages is:

$$\frac{(180 \times 0.9)}{60} = 2.7 = 3 \text{ Lanes}$$

Required Lanes - Mass Movement

(Student Quantity ÷ Flow Rate) ÷ Minutes = Lane quantity

Travel Width

A travel width for 700 students in two minutes would require:

(700÷60) ÷ 2 = 5.83 = 6 Lanes

3.2.3 Weather Protection

Preamble:

Circulation spaces (except in Agricultural educational settings), are required to be protected from sun, rain and unfavourable winds by covered walkways.

Requirements:

- Covered walkways not attached to buildings are to have overhangs of at least 450mm each exposed side of the designated circulation.
- Exposure to wind driven rain is increased on vertical schools and exposed sites. Requirements for increased screening or glazing to enclose walkways are to be assessed by the project team based on site and project specific requirements. Use of glazing or full height screens to walkways requires the permission of School Infrastructure.
- Design of covered walkways within heritage listed school sites are to be developed in accordance with the Senior Project Director or equivalent Project Lead who will consult with DoE Heritage to determine suitable requirements for each project.

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4

Site Arrangement

4.1 Site Components

4.2 Designing with Country

4.3 Designing for Future Expansion or Contraction

4.4 Existing Schools and New Additions

4.1 Site Components

4.1.1 General

Preamble:

It is important to locate a school in its surrounding context in order to identify constraints and opportunities early, align solutions with the service need and work, and reduce rework. Designs are to be based on robust site analysis including context, constraints, movement, services, and risks to enable options to be tested and cost-effective solutions be developed.

It is important to include site components in the early site arrangement of a school to ensure its future success.

NEW SCHOOL TYPES

- Arrange the site in accordance with requirements in this Section.

EXISTING SCHOOL TYPES

- Not all EFSG requirements can be applied in all circumstances for work being completed to existing education facilities in New South Wales. If any requirements of the EFSG are unable to be met for a particular existing circumstance, notify and seek direction from the Senior Project Director or equivalent Project Lead and, if as a result of a Heritage item, also in consultation with the DoE Heritage Team.
- Design to each spaces 'real-world' uses and the relationships between them (which are often different to that shown in databases and as-existing plans)
- Maximise the use of the existing built element (where possible), replacing old and/or degrading assets with a focus on safety and maintenance improvements.
- Regardless of the condition of the existing built element, if it is an existing heritage item or element, then it is to be retained. If it is an existing heritage item or element that requires rectification or replacement work, then that work must match the original material and all of its characteristics.
- Demonstrate the location of the following accommodation (through either AMS site plans or a site visit):
  - Core facilities (library, administration, gymnasium, hall and the like)
  - Permanent teaching spaces
  - Demountables
- Highlight assets of significance to be retained
- Outline the condition and age of buildings/assets and note of any new or recently upgraded assets
- Note any variances to the use of space as shown on AMS plans, based on a site visit and/or communication with the Senior Project Director or equivalent Project Lead in consultation with DEL, Principal, and/or school staff
- Note the existing quantum of open space on the site, and make comment on their quality, usability, and availability
- Note any significant features that the school wishes to retain. This may include, but is not limited to items such as memorial gardens, artwork, trees/vegetation, and the like
- Note any existing leases or licenses associated with the school facilities.

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ALL SCHOOL TYPES

- **Site Ecological Value**: Where a site is identified as including old growth forest, prime agricultural land, wetland of high national importance or impact on Matters of National Significance, the development must not destroy any identified Matters of National Ecological Significance value on site, as a result of the project.
- **Wetland Management Plan**: Where a site is identified as a wetland environment, the project is to produce a site-specific Wetland Management Plan prepared by a qualified Ecologist or similar professional and submitted to the Senior Project Director or equivalent Project Lead for review and record.

Refer to:

Including but not limited to the following:

- 9 Specialist Spaces
- EFSG Part B
- EFSG Part C
- Green Star Buildings Credit 35 – Impacts to Nature – Minimum Expectation for detailed requirements
- Other applicable sections within this document.

4.1.2 Access

Preamble:

Access to and around school facilities are critical to ensure a school can function and operate successfully on a day to day basis.

All systems and equipment that is installed within a school are to be provided with suitable access to ensure that this equipment is safely and efficiently maintainable.

Requirements:

- All connections between the school site and the adjacent street or public space, including pick up and drop off laybacks, bus stops, public street crossings and vehicle entries to the school site, must be designed and coordinated with the relevant authority controlling the adjacent public space or street.
- All entrances to the site are to be clearly defined from the public realm. Provide a clear street address, character, and frontage that promotes a welcoming entry and positive learning environment, along with welcoming and legible entry points, clear way-finding.
- A minimum of two pedestrian access points is to be provided.
- Provide safe, accessible routes and crossings associated with pedestrian access points.
- Pedestrian access points must be provided on all street frontages to the school site.
- Pedestrian access point entries must be located away from shopping centres, licensed premises, take-away outlets, bottle shops and other locations identified by the Project Team as having an increased security risk.
- Provide a separate access point entry for Preschools, with consideration for how children will be dropped-off and picked-up by their carer inside the facility.
- Provide a separate access point entry for the Supported Learning Hub, with consideration for accessible and safe arrival and pick-up of students.
- The design of the connection to active transport must align with the NSW Government Road User Space Allocation Policy.

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- Ensure clear and safe pick-up and drop-off zones that provide seamless access from public transport and school bus services to the school site, ideally without the need to cross any roads.
- All entries are to align with neighbourhood movement patterns and desire lines.
- All projects that include a new or expanded Main Entry are to provide an accessible entry path from the street frontage through the school Main Entry to the new school facilities.
- Secure bicycle and scooter parking is to be included and located near the Main Entry.

ACCESS FOR EMERGENCIES

- Provision for emergency vehicle access and vehicular circulation on site must be included within the Site Arrangement:
  - Paved areas are to be included to facilitate prompt access, to all school buildings for security, fire and other emergency service vehicles – 6m clear are to be provided around the perimeter of buildings for fire brigade access. Ambulance access is to be provided to sports pitches.
  - Height clearance requirements for emergency vehicles are to be assessed when determining emergency access strategies for the site. Covered walkways may require raised or removeable sections.
  - Provide access for delivery and removal of demountables.
- Vehicular gates are to be included in at least two locations along the site perimeter accommodating for changes to site levels with gate clear width and clear height for emergency access dependent on the maximum vehicle dimensions for an emergency vehicle that will be required to move through the access point.
- Car parking and vehicular access for deliveries, servicing and waste collection are to be consolidated and physically separated from the rest of the school to ensure safety. Separation of vehicles is to be in line with School Infrastructures Vehicle Mitigation Strategy.
- Within existing schools, site planning must support the school specific fire evacuation plan.

ACCESS FOR MAINTENANCE

- Where topography or building layout restricts vehicular access across the site, a vehicular entry must be provided to each area for maintenance.
- Main Switch Boards are to be accessed off either the school car park or the site boundary.
- Condenser locations are to consider the refrigeration pipe reticulation distance and elevation change to the indoor fan coil units. To maximise system performance, condensers are to be located as close as practical to the fan coil. Condenser distance cannot exceed air conditioning manufacturer maximum allowances.
- Delivery drop off for LPG bottles must be within 5 metres of where they are being stored.
- Access is required to grease traps.
- Access is required to waste collection areas.

Refer to:

Including but not limited to the following:

- NSW Fire + Rescue, Fire Safety Guidelines Access for Fire Brigade Vehicles and Fire Fighters
- NSW Ambulance, Vehicle Access Specifications
- 3 Circulation
- 7 Services
- Other applicable sections within this document.

4.1.3 Outdoor Spaces

Preamble:

Outdoor Spaces provide a range of opportunities for outdoor play and learning.

Outdoor Spaces are defined in EFSG Part B into individual area types described as

Outdoor Space Settings.

The EFSG sets the overall intent for Outdoor Space, including how the Outdoor Space Setting components of paths, courts, gardens, play areas, gathering places and similar fit together and support learning, wellbeing and community use.

- Outdoor Space requirements are described in EFSG Part B.
- Outdoor Space Setting requirements are described in EFSG Part C.
- Outdoor Space Setting components are described in EFSG Part D.

Refer to:

Including but not limited to the following:

- EFSG Part B
- EFSG Part C
- Applicable sections within this document.

4.1.4 Shared Community Use

Preamble:

The educational and play requirements of students need to be balanced against supporting potential shared-use opportunities with the broader community to benefit both school and community members. To enable this, the site is to be arranged into distinct zones which can be easily separated for certain uses.

Requirements:

- During the Site Arrangement phase, the designer is to confirm any shared use, or community use arrangements that are applicable to the site in accordance with the Senior Project Director or equivalent Project Lead.
- Facilities to be shared with the community are to be located with easy access from the street
- Site planning must ensure that external users (e.g. community groups) do not mix with areas occupied by students; fencing is required to separate these areas.

After-hour accessible Open Space

- The Games Field and carparking are to be designed to enable access to the public after-hours.
- Games Courts and general play space are to be designed for after-hour community use if confirmed applicable for this use by the Senior Project Director or equivalent Project Lead.

After-hour accessible building space

- The school Hall and/or Gymnasium are to be designed to enable access to the public after-hours.
- Hydrotherapy Pools within SSPs are to be designed to enable access to the public after-hours.
- The OSHC are to be designed to enable access for parents and guardians to collect students after hours.
- The Library, designated General Learning Spaces and Specialist Learning Spaces, are to be designed for after-hour community use if confirmed applicable for this use by the Senior Project Director or equivalent Project Lead.

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Note: The classification of spaces under regulation may change due to the community use of facilities.

Refer to:

Including but not limited to the following:

- EFSG Part B
- Applicable sections within this document.

4.1.5 Site Security

Preamble:

Schools operate in open community setting and may be exposed to security risks, including unauthorised access, theft, vandalism and, in rare cases, arson.

Effective site security protects students, staff and visitors, supports uninterrupted teaching and learning, and minimises operational and financial impacts while promoting a safe, welcoming environment.

Site Boundary

Requirements:

Site boundaries are to be planned early, alongside Site Arrangement and risk assessment, so that perimeter treatments support safety, daily operations and community access.

- Seek coordination from the Senior Project Director or equivalent Project Lead to consult with the DoE Security Unit during the Site Arrangement phase of a project to determine the security risk of the proposed site and agree the extent and style of the security boundaries, fencing or other measures to be implemented.
- Seek coordination from the Senior Project Director or equivalent Project Lead to consult with DoE Heritage to determine fencing requirements at heritage school sites and for schools located within Heritage Conservation Areas.
- Security fencing must be provided to all site boundaries and is to be designed to prevent climbing.
- Where security fencing abuts an adjacent property fence, provide a return panel to prevent access between the security fence end post and adjacent fence
- The height and design of the fence may need to be changed to suit the local conditions and characteristics of the students within the school.
- The fence will be a feature of the school, so must aesthetically enhance the school image in an unobtrusive manner, whilst not encouraging access to the site.
- Where no provision is made for a security fence, the building becomes the first physical point of protection. Approval for this arrangement must be obtained in writing from the Senior Project Director or equivalent Project Lead during the Site Arrangement phase.
- Barriers must be included to separate areas that have community access from school only use areas.
- **Rural/agricultural sites**: review the extent of security fencing with Asset Management and Security Units during the design phases to determine whether requirements for security fencing can be reduced.
- **Specialist Support Programs (SSPs) and Structured Learning Hubs (SLHs):** Seek coordination from the Senior Project Director or equivalent Project Lead to confirm boundary design with Asset Management, Security and the Accessibility Team to ensure safety and compliance with the Department's restrictive practice policy.

Refer to:

Including but not limited to the following:

- Restrictive Practices in Schools
- 5 Outdoor Space Components
- 6 Buildings
- EFSG Part B
- Other applicable sections within this document.

Planning and Crime Prevention

Requirements:

To minimize the likelihood of break-ins and their effects, Crime Prevention Through Environmental Design principles are to be implemented throughout all project phases, and include the following four key strategies:

- Territorial re-enforcement
- Surveillance
- Access control
- Space /activity management

Refer to:

Including but not limited to the following:

- EFSG Part B
- Other applicable sections within this document.

Emergency Management

Requirements:

The design of school security infrastructure is to support the Department's emergency response protocols, as outlined in the NSW Department of Education's Emergency Management Policy, including the four Public response types:

- Evacuation,
- Lockdown,
- Secure Alert (Lockout),
- Shelter-in-Place.

Refer to:

Including but not limited to the following:

- 8 Fitout, Furniture and Equipment
- Other applicable sections within this document.

External Lighting

Requirements:

- Security Lighting must be provided to open areas to encourage natural surveillance. It are not to be provided to concealed areas as this may only assist intruders.

- External Light Fittings are commonly vandalised so must be robust and located out of reach. External light fittings must be positioned a minimum height of 3 metres from the adjacent finished floor level unless they are soffit mounted.
- Seek coordination in accordance with the Senior Project Director or equivalent Project Lead to consult with DoE Heritage regarding the methodology and placement of external light fittings and fixtures for heritage buildings.

External Fixtures

Requirements:

- External fixtures must be of robust design to resist vandalism.
- External fixtures are to be positioned a minimum height of 3 metres from the finished floor level. For heritage buildings the location of fixings and CCTV equipment are to include inputs from DoE Heritage for methodology and placement of equipment.

Storage of Materials and Tools

Requirements:

- Ensure that secure storage is provided for materials and tools. When not appropriately stored such items may be used to force entry and/or assist in arson.

4.1.6 Buildings

Preamble:

The height and scale of school buildings, including the lengths of their facades which face the public realm, can have a significant impact on the character of the surrounding area.

Requirements:

- Design school buildings to suit the context of the existing surroundings.
- Locate buildings for schools to ensure a suitable setback from site boundaries as well as to create separation for outdoor spaces between built components.
- The maximum height of new buildings is the greater of 4 storeys or the maximum height permitted for a building under an environmental planning instrument applying to the land.
- The height and siting of buildings are to be designed to minimise overshadowing and loss of visual privacy to adjacent or adjoining receivers.
- Facades of buildings which are three storeys or higher must not to exceed **55 metres in length** without articulation.
- Building setbacks required to the front site boundary:
  - Provide setbacks that respond to local context, whilst maximising usable open space.
  - Setbacks are to be not less than the average distance of the front setbacks of all existing buildings that are located within 70 metres of the building, or if there is no building located within 70 metres of the building — setbacks are to be of at least 5 metres, unless in an urban environment.
  - In an urban environment set back buildings by 1.5 metres to enable a landscaping buffer.
  - Where context is appropriate, a zero setback may be considered if the Senior Project Director or equivalent Project Lead approves in writing that the proposal is suitable.

    Note: articulation/ ground floor activation must be demonstrated for a zero to 1.5 metre setback.
  - Deep soil soft landscape zones are required to 50% of street frontage setbacks.
- Building setbacks required to adjoining property boundaries:

  - All new buildings or building additions that are to be constructed close to an adjacent residential or conservation zone are to be set back from the site boundary, as follows:
    - Where the proposed building is up to 4 storeys or 15 metres in height, a minimum of 6 metres from the site boundary
    - Where the proposed building is above 4 storeys or above 15 metres in height, a minimum of 9 metres from the site boundary,
    - Alterations or additions to an existing building must not result in the building having a front setback less than above.
- For learning spaces of up to 4 storeys, separate buildings by at least **6 metres**.
- Between opposing glazing of learning spaces **12 metres** separation is required.
- A minimum of **6 metres clear** is required around the perimeter of all buildings for fire brigade and similar emergency services access.
- Where sites are located within a Heritage Conservation Area, or directly adjacent to a Heritage Item, the project team is to consult with Senior Project Director or equivalent Project Lead and the DoE Heritage Team to manage the heritage context of the site.

4.1.7 Views and Vistas

Preamble:

The design and location of school buildings are to consider and maintain where possible existing views and vistas.

Requirements:

- All projects are to be designed to preserve views and vistas to local identified landmarks from the adjacent street frontages and public spaces as well as main circulation routes within the school site.
- All projects are to identify the following in order to include solutions to address each item:
  - Identify the significant features in the area, both natural and built.
  - Identify views and vistas from street frontages to the site and adjacent public spaces.
  - Identify any view corridors or visual links through the site.
  - Identify any opportunities to provide visual permeability to the street scape.

4.1.8 Visual Privacy

Preamble:

The design and location of school buildings are to consider the visual privacy in spaces within the school as well as ensuring the protection of visual privacy to adjoining neighbours, especially the dwellings of local residents.

Requirements:

- Where a window in a new building or a new window in any alteration or addition to an existing building is **less than 6 metres** from an adjoining residential dwelling, the windows in the proposed building:
  - Are to be offset from the edge of the windows in the adjoining dwelling by a distance of at least 1 metre; or
  - Have a sill height of at least 1.7 metres above the floor; or
  - Have fixed obscure glazing in any part of the window below 1.7 metres above the floor; or

— Provide privacy screen for any part of the window that is less than 1.5 metres Above Finished Floor Level.

4.1.9 Sunlight and Shadows

Preamble:

School buildings are to be oriented and designed to take advantage of natural light.

Overshadowing of adjacent residential habitable spaces and private open spaces is to be minimised.

Requirements:

- School buildings are to be orientated and designed to maximise natural daylight to general learning areas while minimising glare.
- A minimum of 30% of Outdoor play areas are to have solar access during school hours, being between 9am and 3pm.
- A new building or an alteration or addition to an existing building must not overshadow any adjoining residential accommodation so that solar access to any habitable space or principal private open space on the adjoining property:
  - Is reduced to less than 3 hours of solar access between 9:00 am and 3:00 pm at the winter solstice, or
  - Is reduced in any manner if solar access to any habitable space on the adjoining property is already less than 3 hours.

4.1.10 Noise

Preamble:

Noise levels impact the usability of spaces within schools and could adversely affect the amenity of adjoining or neighbouring properties. There are two aspects of noise to consider within the Site Arrangement design, as follows:

- Noise within the local environment but generated outside the school site
- Noise generated within the school site

Requirements:

- Regularly occupied spaces in buildings are to be orientated away from significant sources of external noise, such as roads and building service zones.
- Spaces producing high levels of noise in the school, such as playgrounds are to be oriented away from neighbouring residential properties.
- Include landscape buffers where appropriate.

4.1.11 Biodiversity

Preamble:

The development must minimise any impacts on areas of high ecological value on, or adjacent to, the site.

Applicability:

All projects new, renewal and refurbishment where any landscape works are in project scope.

Requirements:

The development must not destroy any identified Matters of National Ecological Significance value on site, as a result of the project.

The following biodiversity and climate resilience measures must also be met:

- At least 60% of planted species to be indigenous
- At least one upper storey nesting tree per 500m2 of landscaped area
- No invasive species, as per the Australian Weeds Strategy 2017 to 2027
- A diverse plant selection, with no more than:
  - 10% of plants from one species,
  - 20% of plants from one genus, or
  - 30% of plants from one family.
- Note: all projects including upgrades must deliver diversity across whole DoE site to ensure effective integration with existing biodiversity.

4.1.12 Site Services

Note: **This Section is being created.**

Until this section is created, please refer to other Parts of the EFSG, and seek direction in accordance with the Senior Project Director or equivalent Project Lead for requirements.

4.1.13 Site Components in Heritage Areas

Requirements:

- When proposing new work within Heritage Items or within Heritage Conservation Areas, approval for the proposed work must be sought in writing from the Senior Project Director or equivalent Project Lead who will consult with the DoE Heritage Team.
- Do not remove significant fabric, including landscaping and significant vegetation, to replace them with new buildings
- Do not site new structures in places which would block heritage significant views
- Do not construct new buildings which would overshadow significant views or settings
- New structures must avoid physical connections with significant heritage fabric, to minimise physical impacts
- New buildings are to be sympathetic in appearance to the Heritage item. Where new buildings cannot be sympathetic, they must be recessive – unobtrusive as much as possible
- New work must not seek to make replicas of historic buildings.

4.2 Designing with Country

Note: **This Section is being created.**

Until this section is created, please refer to other Parts of the EFSG, and seek direction in accordance with the Senior Project Director or equivalent Project Lead for requirements.

NOTE: The current artwork shown within this document was created by Suzanna, who is one of the students featured in the Department of Educations Reconciliation Action Plan.

The EFSG provides opportunities and flexibility for integration of Connecting with Country in various ways.

Any artwork shown within the EFSG is not prescriptive and does not dictate Connecting with Country design requirements, neither does it replace the consultation process and knowledge holder engagement to understanding of Country.

4.3 Designing for Future Expansion or Contraction

Note: **This Section is being created.**

Until this section is created, please refer to other Parts of the EFSG, and seek direction in accordance with the Senior Project Director or equivalent Project Lead for requirements.

4.4 Existing Schools and New Additions

Note: **This Section is being created.**

Until this section is created, please refer to other Parts of the EFSG, and seek direction in accordance with the Senior Project Director or equivalent Project Lead for requirements.

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5

Outdoor Spaces

5.1 Outdoor Space Components
5.2 Civil and Stormwater Work
5.3 Site Work

5.1 Outdoor Space Components

Note: **This Section is being updated.**

Until the updated Section is published, the requirements below and on the following pages of content unchanged from EFSG 2025 and EFSG Version 2.0 are to apply.

5.1.1 General

Preamble:

This section outlines the built elements that shape the Outdoor Space Settings in Schools.

Including shade structures and canopies, retaining and low walls, edges and stairs, fences and gates, site furniture and play equipment.

It explains how these features support the comfort, supervision and durability or Outdoor Space Settings, and how they interface with pavements, drainage and planting.

Components in Outdoor Space Settings provide an opportunity to incorporate culturally responsive design solutions.

Requirements:

- E-bike parking is not suitable to be located directly adjacent to building structures.

SUSTAINABILITY

If the work includes new landscape irrigation, the new landscape work should either utilise drip irrigation with moisture sensor override or have no potable water utilised for irrigation.

The landscaping and associated systems are to be designed to reduce the consumption of potable water required for irrigation through the installation of subsoil drip irrigation and moisture sensor controls.

In the case of a xeriscape garden, the provision of irrigation systems is to be able to be removed within three months of landscaping installation and the landscaping shall require watering after that time.

All new unshaded hardscaping elements are to have a three-year Solar Reflectance Index (SRI) of minimum 34 or an initial SRI of minimum 39.

Typical SRI values for various materials are as below:

- Grey concrete: 35
- White concrete: 86
- Standard white paint: 100
- Standard black paint: 5
- New asphalt: 0

For material or product specific SRI values, refer to the relevant current written supplier information.

OUTDOOR GAMES COURTS

- Outdoor Games Courts are to have a blue, slip-resistant textured sports court coating system across the full playing area and all run-off areas. The system is to be suitable for the intended outdoor sporting use and compatible with the asphaltic concrete substrate and line-marking paint. Markings for each sport are to contrast clearly with the court surface and be distinguishable from other sports markings. Where the SRI requirements of this section apply, the selected finish is to meet those requirements, supported by supplier evidence.

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Refer to:

Including but not limited to the following:

- Green Star Buildings Credit 25 – Water Use for detailed requirements
- Applicable sections within this document.

5.1.2 Outdoor Space Components in Heritage Areas

Preamble:

Components in outdoor spaces may be of heritage significance. Heritage Listed Items can include existing outdoor components such as grounds, trees, landscaping components and similar.

Heritage significance for outdoor space components is usually identified by the item name in the s170 Heritage Conservation Register – either directly as the individual item or generally if the item is designated as the whole school area.

Heritage significance for outdoor spaces is also designated in other ways, such as in terms of a Heritage Conservation Area.

Requirements:

For heritage significant elements in Outdoor Spaces, the following requirements apply:

- Heritage protected trees, grounds or landscaping must not be altered.
- Fencing and ground works at Heritage items are to be designed to enable the protection of heritage significant trees at Heritage Items
- An arborist report is required for modification to any existing trees which are considered significant fabric
- New landscaping must be sympathetic to the heritage setting of significant grounds, vegetation and landscaping.

The following applies to **shade structures** located within Heritage Conservation Areas.

- The design must demonstrate how the heritage context and visual context of the heritage place has been considered.
- Shade structures are not to impede light or ventilation to heritage buildings.
- Shade structures and COLAs are not to impact on the drainage and physical surrounds of a heritage building.
- Shades structures are not to be located in heritage significant frontage to heritage items and within conservation areas.

The following applies to **fences and gates** located within Heritage Conservation Areas.

- Where historic fences are present these must be retained in place and restored.
- Seek approval in writing for fencing design at both Heritage Items and HCAs from the Senior Project Director or equivalent Project Lead, who will coordinate with the DoE Heritage Team. Await confirmation in writing that the proposal is suitable prior to commencement of any work.
- Security fencing must be designed and located to minimise visual impacts on heritage significant views, primarily from the public domain
- Security fencing must not remove or trim back heritage significant trees or landscaping works
- Compliance with EFSG requirements for Security fencing is not applicable in Heritage Conservation Areas

CONTENT UNCHANGED FROM EFSG 2025

0001c Design Checklist - Landscape and Open Space

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.

Until an updated version is published, the requirements set out below are to continue to apply.

0.02 Landscape Planning and Design

Landscape Planning and Design encompasses all elements in a development proposal, including:

- to provide a rational solution to site specific factors,
- to facilitate site development and management.

The overall landscape conceptual design with defined landscape zones is to be developed by the Landscape Architect in conjunction with the Project Team.

Detailed landscape design involves fine resolution of hard and soft elements.

- Soft Works relates to the planting component in a landscape design, including soil preparation
- Hard Works applies to playgrounds, pedestrian pavements, steps, low retaining walls and external furniture etc.

Detailed design development of other hard works such as bulk earthworks, retaining walls higher than 1m, vehicular pavements or site services are to be undertaken by appropriate professions such as Civil and Structural Engineers in co-ordination with the Landscape Architect.

The information contained in this Document is intended to provide guidance for the design of school landscape in New South Wales.

The school landscape has unique requirements that must be addressed at the design stage. The external environment of the school must form a beneficial, long-term asset to the school community, and potentially to the wider community. Understanding the issues affecting the design of the school landscape and suggesting possible ways to resolve them is critical. The information provides opportunities to maximise the potential of the school landscape for environmental benefit, student learning and community engagement.

This guide applies to every school development in NSW, whether refurbishment or a new facility, and to all stages of the development of a new facility including;

- Site Arrangement,
- Concept design,
- Schematic design,
- Detailed Design,
- Construction and Maintenance.

Potential Benefits of the School Landscape

An attractive and safe landscape projects a positive image of a school and encourages parents, students and the community to have pride and interest in their school, and to have a strong sense of ownership and community.

Spatial Definition

The landscape can be used to define spaces and activities such as areas of movement, play and out of bounds areas. The landscape treatment reflects the areas used and assists in guiding the use and behaviour patterns of students.

CONTENT UNCHANGED FROM EFSG 2025

Climate Control

Appropriate landscape treatment contributes to a comfortable micro-climate both within buildings and in external areas. Examples include shading of building facades, external shade, and wind break planting.

Social Benefits

The landscape design, in particular planting, can have a positive psychological effect on the behaviour of students. The landscape can support a variety of activities by providing a range of settings that allow students to engage and interact with each other.

Learning

The landscape can add to, and support the school curriculum, by integrating with outdoor learning spaces and facilities, to reflect an increasing acceptance of the benefits of outdoor learning including developed imagination and social interaction, opportunity for expanded environmental knowledge and engagement, team building, planning, play and fun.

0.03 Landscape Planning Elements

Incidental Items and Fixtures include:

- Flagpoles, signs, seating and fencing as well as Drinking Water Dispensers. Additional non-standard fixtures may need to be incorporated such as play structures, bell, bicycle rack/rails and cricket nets.
- Service elements which may affect site landscape planning include gas meters, regulators or bulk storage, Power (electrical kiosk); septic tank and transpiration/absorption area (non-sewered areas); water meter, fire booster assemblies and hydrants; site lighting/security lighting; telephone and stormwater infrastructure.
- Planting elements include retained vegetation, grassed areas, trees in grass, trees in paved areas and mass planting.
- Demountable learning facilities may be required to carry peak enrolment.

Site facilities in Schools generally comprise of:

- Assembly Area
- Games Court for PE and other activities
- Games/ Playing
- Batting Practice Nets
- Ancillary Paved Pedestrian Areas (access, paved areas and bus zone).
- Agricultural Field Area (High School)
- Open Space
- Pedestrian access paths, ramps, steps and covered ways.
- Vehicular Circulation.

0.04 School Landscape Design Principles

The following outlines the four main design principles that apply to every school, and in every zone of the school:

- Healthy and safe
- A sense of place
- Sustainable

CONTENT UNCHANGED FROM EFSG 2025

- Low maintenance

In all instances, these need to be balanced with other design requirements including the site-specific brief, stakeholder/authority requirements and budgetary constraints.

0.05 A Healthy and Safe Landscape

Safe Materials

Aims

- Create a safe school environment using materials that will not cause harm to students, teachers or visitors.

Safety and security are key considerations for the school landscape. The principles of safe design must be carried through all aspects of the design development.

Areas addressed in this section include:

- Safe materials
- Security
- Shade
- Safe and equal access
- Harmful or irritant plants
- Bushfire management
- Health

Strategies

- All products used in the school landscape must be safe. Particular consideration must be given to the specific end user groups. Further consideration must be given to construction/ installation processes, in terms of their potential for exposure to unsafe products, particularly on occupied premises (works at existing schools).
- All products must be tested and certified to ensure that they comply with relevant Australian Standards and applicable health and safety guidelines.
- Refer to the relevant Australian Standards, Kidsafe, and/or the National Industrial Chemicals Notification and Assessment Scheme for further information.

Security

Aims

- Maximise safety and security and facilitate surveillance of students by maintaining sight lines and minimising opportunities for hiding.
- Consider the safety and security of the school grounds when locating planting to screen, expose or filter views.
- Consider planting locations in relation to security lighting and after hours use areas.

Strategies

Understand and address the requirements of the school and local council, in relation to visual access (sight lines) and privacy. This may include openness for supervision, screening for privacy, aesthetics or safety, restricted access and physical screening. Views into the site from nearby residential properties and roads may be desirable to allow informal neighbourhood supervision. Choose appropriate plant species to fulfil requirements.

Shade

Aims

- Exposure to UV rays is a principal cause of skin damage and long-term adverse health impacts. Immature skin is particularly vulnerable to damage. Provision of adequate shade in the school landscape is therefore paramount.
- Provide adequate areas of shade where students can eat, play and work outside while being protected from the sun's harmful rays. Especially provide summer shade to seating and eating areas.

Strategies

- Locate trees and planting to provide shade for learning spaces and staff areas. Afternoon shade in the summer months is particularly vital.
- Design the external environment so that at least 50% of seating is shaded by trees or building elements.
- Choose tree species that are effective in providing shade, such as broad dense canopy trees. Ensure that appropriate trees are selected to suit the conditions including high pedestrian traffic (root compaction), location in pavements and the like. Refer to the School Plant Palette for examples of appropriate species.
- Ensure that a degree of shade is provided in external areas throughout the year, especially in hot or dry climates.
- Consider the growth rate and size of trees when planting for shade including the potential need for interim design solutions such as shade sails or structures.
- Select appropriate species and locations for shade trees to minimise the potential damage of pavements, structures and buildings by the root system. Use structural soil to increase the volume of soil available for tree growth and root control barriers where appropriate to protect adjoining pavements.
- Where applicable, ensure solar panels are not obscured by plants as they mature.
- Provide architectural shade (shade structures, covered areas, verandas, in accordance with the EFSG and project brief) to cater for shade requirements in new schools. This will provide instant shade while trees mature.
- Refer to organisations such as Kidsafe, Australian Standards and the Cancer Council for relevant recommendations and guidelines regarding the provision of shade.

Safe and Equal Access

Aims

- Provide safe access to all key facilities including outdoor (learning and main play) spaces for people of all abilities.

Strategies

- Provide equal access to all key facilities within the school grounds. Refer to the Building Regulations (NCC) and Access sections of this Design Guide.

Harmful or irritant plants

Aims

- Minimise the potential for harm arising from the selection of plant material in the school landscape.

Strategies

- Plants known to be toxic, and especially those known to be toxic in small quantities, must not be used in the school landscape.

Health

Aims

- Design the school landscape to support the healthy development of children through the provision of spaces that encourage physical activity and social interaction.

Strategies

- Provide play areas which facilitate opportunities to develop fine and gross motor skills and encourage students to be physically active.
- Where the provision of play equipment is included in the landscape brief, ensure play equipment and facilities are varied and appropriate to age and abilities, offering an appropriate physical and learning challenge.
- Where fixed play equipment is provided, a variety of equipment must be considered to meet the needs of different age groups (such as K-2, Y3-6, Y7-9, Y10-12). This will reduce the potential for conflict between different age groups and avoid the potential for frustration with equipment that challenges too little or too much, which may lead to disruptive or destructive behaviour.
- Play equipment are to be chosen and designed in accordance with relevant Australian Standards (AS) 4685 and AS 4422, Educational Facility Standards and Guidelines (EFSG) Design Principles and Design Framework: New playground equipment in schools, published by the NSW Department of Education.

Sense of Place

This section provides the design principles to guide the creation of a sense of place within the school environment.

Specific areas addressed by the principles are:

- The local context
- Landscape character
- The educational landscape

Local Context

Aims

- Integrate with the landscape and architectural context so that the school becomes part of the community.
- Contribute to the street character and amenity.
- Provide definition to a variety of inviting and usable spaces.

Strategies

- Where possible, provide street tree planting that continues the street planting theme, to achieve a consistent outcome along the street. Provide a unique identity for the school by using distinct mix of plant species that complement the school surrounds. Refer to the School Plant Palette for suggested species and to the local Council to determine if a street tree Site Arrangement is in place to ensure continuity to surrounding streets.
- Anchor the school in its built environment context by referencing local plants, building materials, rhythms, textures and colours in the landscape design.
- Consult with the Architect and project team to achieve cohesive landscape spaces between buildings and siting of buildings to respect existing landscapes.

Landscape Character

Aims

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- Integrate existing established vegetation into the landscape design to enhance the visual character and amenity of the school.
- Provide a distinctive and attractive environment. The repetitive nature of school architecture can lead to a level of homogeneity irrespective of location. The landscape provides an opportunity to individualise schools and provide a memorable landscape setting.
- As much as practical, retain existing trees and habitat, for inclusion in the school landscape. They are key elements to a specific local character and provide important shade to external areas.

Strategies

- Retain and protect existing trees. They are landmarks and often provide gathering points within the school. They also help reduce the perceived scale of new buildings.
- A void disturbance to and construction within the root zone of existing retained trees. The root zone generally extends beyond the drip line of the crown. Disturbance to the root system can be caused by compaction due to stockpiling materials, parking of vehicles, cutting or exposure of roots and changes in ground level, including placement of fill in excess of 100mm. Refer to AS 4970-2009 Protection of Trees on Development Sites.
- When work in the vicinity of an existing tree cannot be avoided, an arborist will need to be engaged to provide expert advice on how to best manage the tree (throughout the construction and in the long term), to ensure long-term tree health and viability, as well as student safety. This includes an assessment of possible changes to their environment (soil levels, water table and root disturbance). Reports produced by the Arborist must be provided to the contractor and be kept on site throughout the construction as a reference document.
- Implement a regular program of tree management and maintenance practices based on the advice of the Arborist. Where disturbance to the root zone cannot be avoided altogether, seek advice from the Arborist as to what works can be undertaken within the Structural Root Zone. As a guide the Structural Root Zone can be measured as (SRZ = 5 x DBH (Diameter of trunk at Breast Height)). Avoid earthworks within the Tree Protection Zone (TPZ = 10 x DBH) surrounding retained trees, unless recommended otherwise by the site arborist.
- Use advanced specimens selectively for aesthetics and early effect. This will need to be balanced with budgets and potential longer establishment periods.
- Use smaller stock in areas that do not require an instant landscape. Young, small plants generally establish quickly and are more likely to thrive. They more readily adapt to local conditions and grow quickly to result in a healthy, vigorous landscape.
- Investigate planting types, sizes and techniques that support the successful establishment of the school landscape, for example protective fencing and surroundings to avoid damage from students and pests such as rabbits.
- Identify opportunities for custom solutions to site specific issues, to distinguish the school from other schools.
- Give preference to endemic (locally native) species or use other native or exotic species that suit the local climatic and rainfall conditions, as well as the specific site conditions.

0.06 Educational Landscape

Aims

- Provide curriculum opportunities for education through the creation of appropriate spaces for outdoor learning.
- Provide a landscape that is stimulating and provides aesthetic benefits and enjoyment for the senses: sight, sound, touch and smell.

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- Foster an awareness of sustainable food production and positively influence the food choices of students.
- Provide opportunities to learn about natural systems through the provision of areas for environmental education.
- Provide opportunities for play in unstructured, and unprescribed natural settings.

Strategies

- Develop the landscape design so that outdoor spaces of varying character, form and size are provided. These facilitate formal and informal outdoor learning opportunities and be able to accommodate a variety of tasks and group or individual learning. The landscape must not be seen as purely aesthetic, but as an extension of the learning spaces that have been provided in the learning space.
- Provide kitchen, herb, fruit or vegetable gardens as an opportunity for students to connect and engage with the cycle and process of growing food. They allow students to participate in growing, harvesting and preparing of fresh food, fostering an understanding of food production as well as natural processes generally. Consider the location of gardens relative to other facilities such as kitchens, water access, tool sheds, composting areas and vehicular access.
- Set aside areas for environmental education. These could be either existing areas on site, or newly established. Suitable areas include creeks/ponds/wetlands, groves of trees, embankments and rockeries. Use species, and combinations of species, that provide examples of natural systems and processes. Refer to the School Plant Palette via Related Resources for plant species that are suitable for attracting birds, butterflies and other wildlife.
- Consider establishing a weather station with basic environmental measurements that can be regularly monitored for example temperature, rain gauge, wind direction and barometer.
- Provide opportunities for imaginative play and the chance to explore, discover and connect with nature. This can increase awareness of natural systems and the environment. Integrate natural elements such as stone boulders, fallen logs and areas of mulch, gravel or sand, to provide stimulating free play areas.
- Include plants that stimulate the sense of touch through the selection of plants with varying leaf forms, bark and flower texture. An example is the contrast between the smooth trunk of Scribbly Gum - Eucalyptus haemastoma and the rough fissured bark of Red Iron Bark - Eucalyptus sideroxylon. These two tree trunks also provide contrasting colours.
- Include plants and combinations of plants that stimulate sight through contrasting colours. For example, large beds of mass planting of varying colours contrasting with the trunks of trees and the seasonal presence of large bright flowers.
- Allow for the experience of different sounds by using plants with a variety of leaf forms and attract a variety of birds. Tree foliage can have distinctive sound effects in the wind e.g. *Casuarina*. Consider providing complementary elements such as wind chimes.
- Use aromatic plants in appropriate, strategic locations to provide a range of different fragrances in the landscape. Refer to plant palette for fragrant plants.
- Consider the provision of sensory gardens as an opportunity to develop the senses: touch, sight, taste, smell and sound. These garden spaces also provide opportunity for a variety of surface finishes, such as gravels, rocks, timber and exposed aggregate concretes. Also consider wind chimes, mirrors and wind sculptures that will stimulate the senses. Such gardens also provide attractive passive or 'break-out' spaces for quieter children. Consider seating areas within these garden areas.

0.07 Sustainable Landscapes

Thermal Comfort

Aims

CONTENT UNCHANGED FROM EFSG 2025

- Maximise thermal comfort and energy efficiency through integrated architectural and landscape design
- Maximise thermal comfort within buildings.

Strategies

- In warm climates, utilise courtyards as cooling zones. Consider the use of shade structures and water.
- Locate suitable windbreak species where required to ameliorate prevailing cold winter winds.
- Select species and locate trees to allow sufficient winter solar access to buildings and external spaces in winter.
- Consider the location of trees and planting to provide shade for learning spaces and staff areas in summer months. Shade to walls and opaque surfaces can be effective in cooling learning spaces as well as shade to transparent and glass surfaces.
- Maximise shade and thermal comfort in mid-February.

Water Management

Aims

- The school landscape must be integrated with the stormwater design.
- Incorporate Water Sensitive Urban Design (WSUD) principles in consultation with a Civil Engineer as a part of the site wide drainage strategy.
- The school landscape must minimise additional irrigation requirements.

Strategies

- Reduce site run-off and peak flows of water downstream through on-site detention measures and by minimising impervious areas where possible. Contact local authorities for guidelines and requirements. Work with the Civil Engineers to meet requirements for on-site detention and investigate opportunities to increase rain/stormwater percolation into the site to recharge water tables.
- Utilise planted swales and on-site detention basins to capture, store and treat runoff and overland flow.
- Where possible, plant swales and boggy areas with species that have high evapo-transpiration rates and are known for their filtering abilities. Co-ordinate with Civil/Stormwater Engineers to ensure appropriate flow rates are maintained. E.g. Juncus spp, Isolepis spp, Carex fascicularis.
- Select and locate species to suit site conditions such as water-tolerant plants in boggy areas or drought tolerant plants on ridges or free-draining sandy soil.
- Utilise porous paving and split kerbs where possible to reduce the speed and volume of overland flow and to assist in the re-charging of groundwater tables.
- Collaborate with Hydraulic Engineers to identify non-potable sources of water for use in garden bed irrigation. Work with the engineers to identify the most appropriate locations for infrastructure, including water tanks, pumps and the like.

Re-use and recycle

Aims

- Re-use ‘surplus’ natural, weed-free and safe site materials in the design, where possible.

Strategies

- Chip site vegetation to use as mulch where possible (do not use weed species as mulch).
- Re-use site soil for planting and to create landform where possible. If required, treat site soil prior to planting to ensure it is weed and contaminant free.

CONTENT UNCHANGED FROM **EFSG 2025**

- Where habitat creation is an objective, consideration must be given to creating natural substrate characteristics rather than an even spread of homogenous imported soil.
- Use surplus rock as a feature, play or infill material if appropriate.

0.08 Low Maintenance Landscapes

The principles for an easily maintained landscape aim to ensure that ongoing labour and upkeep costs associated with maintenance or repair work are kept as low as possible.

Specific areas addressed by these principles are:

- Pedestrian Movement and Wear and tear
- Pests
- Integration with service design
- Maintenance
- Potential for Damage

Pedestrian Movement and Wear and Tear

Aims

- Reduce the potential for unsightly, worn or eroded areas by designing to cater for desire lines and by providing appropriate hard-wearing surfaces of sufficient width to cater for the expected number of students using each area
- Provide for generous width of pavements in high use areas.

Strategies

- Address desire lines during the design development process and locate hard-wearing surfaces accordingly.
- Provide a hierarchy of surfaces with each surface material suited to the level and concentration of student use and associated potential for wear and tear and erosion. Turf is suitable for low use areas or where use is spread over a wide area. Materials such as concrete, asphalt, unit paving or soft fall surfaces are required in high use areas or where student access is restricted to narrow, small spaces.
- Address transitions between surfaces. In spill out zones and narrow connections consider the most suitable transition from hard paving to grass.
- Consider path intersections and change in directions with adequate transitions to avoid short cutting and wear and tear of adjoining soft landscape areas.
- In selecting materials consider slope, flow and movement of water across the land.

Pests

Aims

- Minimise the risk attack from pests through appropriate materials use and installation techniques
- Provide ease of visual inspection to allow for early detection of possible pests

Strategies

- Keep dense vegetation clear of building edges to improve ventilation and chances of termite detection.
- If the risk of termite infection is high or where otherwise required, use termite resistant materials and details known to assist in the prevention of termite attack. Timber must be naturally termite resistant or treated in a way recognised as giving termite resistance.

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- Note that the use of certain methods of treatment such as Copper Chrome Arsenate (CCA) treated timber is no longer appropriate in the school landscape, due to potential adverse health effects.
- The Australian Pesticides and Veterinary Medicines Authority (APVMA) has placed restrictions on the use of CCA treated timbers and states:
- CCA timber cannot be used in garden furniture, picnic tables, exterior seating, children's play equipment, patio and domestic decking and handrails.
- The detailed instructions for timber treatment operations, waste management and disposal and protection of the environment are met
- Test existing retained trees for termite activity and implement appropriate treatment if required.
- Carefully select plants that are not prone to attracting insect and pests.
- Install pest barriers to aide establishment of planting i.e. temporary fencing or plastic plat surrounds to limit damage from rabbits and other vermin.

Integration with services design

Aims

- Integrate landscape design with the design of services infrastructure.

Strategies

- Collaborate with services engineers to ensure services are located in areas that do not prevent the establishment of an attractive school landscape, in particular the provision of shade trees. Conversely, the landscape design must not hinder access to services for maintenance.
- Where possible, gas and electricity meters and street connections must be integrated with features such as school signage or walls, or disguised from prominent access points and public views, through the use of planting or other means.
- Service covers must abut hard edges and / or be incorporated into paved areas. Drainage pits in or near planting beds can easily become obstructed with mulch and plant material, creating maintenance problems and overflow/flooding situations.
- The design of landscape planting and structures must consider the requirements and limitations of (service) easements.

Maintenance

Aims

- Design the school landscape to require minimal maintenance generally. Higher maintenance requirements may be appropriate in public areas such as the entrance and assembly zones.

Strategies

- Turf species must be carefully selected and located. Investigate different types of turf to suit specific locations e.g. shade tolerant on southern sides of buildings, slow growing in boundary and out of bounds areas, hardy in active areas. Ensure that turf areas are of a size and slope that are easily accessible for maintenance.
- Design turf surfaces in large simple areas, minimising sharp corners and fragmentation by services and paving.
- Design turf areas to allow for management of turf for "rest" periods on a rotation bases, this may be helped by having easily distinguishable zones. Consider the use of synthetic grass materials in high use zones, shaded areas and other spaces where the growth of natural turf is problematic.

CONTENT UNCHANGED FROM EFSG 2025

- Garden beds must be designed to add form and colour, define spaces and desire lines and to provide shade. Garden beds must not be used to simply fill narrow or awkward spaces, or tapering corners, due to the high maintenance requirements and associated costs.
- Design garden beds that are simple in shape, and of sufficient area to allow for mature established plants.
- Ensure garden beds are appropriately edged to allow for ease of maintenance for mowing / trimming of adjoining grass areas
- Beds that are raised or isolated from the ground water are prone to drying out and must preferably be minimised or provided with irrigation where possible.
- Bed widths of less than one metre must be avoided due to the risk of drying out and plant failure.
- Ensure that garden beds do not obstruct desire lines.
- Space plants so that the soil is covered and shaded by the end of the establishment period. This utilises the natural tendency of plants to out compete one another for ground space and light. By the same principle, weed removal after the establishment phase must be followed by immediate infill planting where required.
- Space trees to allow for ease of access between trees for ride on mower, push mower or slasher in order to avoid accidental damage.
- Use plants that provide a natural mulch or weed suppressant in areas of low use. Install plants in sufficient numbers (density of spacing) that will ensure full coverage of garden areas avoiding empty patches were weeds may establish.
- Select and locate plants to ensure that they will not overhang paths or obstruct passageways.
- Consider the maintenance implications of trees in grass. Mowing or edge trimming around the trunks can cause ring barking or infestation by pests and diseases which can affect the health and structural safety of the tree.
- Avoid creating wear zones from children regularly seeking shade. This can cause the grass or tree to fail, as the ground surface becomes compacted. Potential solutions are mulch around tree trunks and provision of adequate alternative shade throughout the school grounds.
- Seating or garden beds around trees are a means to avoid excess wear and compaction around the root zone.
- Consider the need for tree protection to prevent the risk of damage or vandalism until trees are established. Examples are the use of tree guards, low height fencing or planting around trees and garden areas.
- Work with the hydraulic/ storm water engineers to ensure that overland flow of water is not impeded.

Potential for Damage

Aims

- The school landscape must not cause damage or exacerbate maintenance problems to school buildings or neighbouring property.

Strategies

- Carefully select tree species to ensure that the mature form and habit are suited to their location and will not cause costly long-term damage to buildings, walls, pavements or other structures.
- Consider the potential adverse impacts of species on their surroundings. Ensure appropriate setbacks from school buildings, services, roads and neighbouring properties. Problems include unwanted screening, overshadowing, leaf fall blocking gutters and pits, and fruit drop staining pavement.
- Select and locate plants to ensure that they will not overhang paths or obstruct passageways.

CONTENT UNCHANGED FROM EFSG 2025

- Use root barriers to services where appropriate to prevent root invasion.

0.09 Landscape Softworks

The planting strategy for any school must comprise grassed surfaces with trees outside the building precinct, paved surfaces with trees inside the building precinct and a minimum of mass planted beds. The whole scheme must require only simple maintenance appropriate to available resources.

Existing Vegetation

Refer to relevant school type in EFSG Part B.

The educational value of nature areas and conservation areas in schools has been well recognised, but their establishment and maintenance has met with varying degrees of success. The establishment of School Environmental Areas (SEA) have been advocated under the DoE “Greening of Schools Program”, and packages (including DoE's "Hands on Learnscapes" CD) have been issued to schools to assist them in developing their own "Learnscapes".

- Policy is to retain existing trees and tree stands, both native and exotic, plus the understorey native vegetation where practicable. Existing trees can usually be retained and maintained subject to their age, condition and effects of site development upon water supply, drainage, soil compaction and disturbances/partial removal of the root system generally. Assessment of trees to be retained must be undertaken in consultation with a suitably qualified Arborist to assess suitability for plant retention / removal.
- The ground survey data reliability /order of accuracy must be considered. The relevant Australian Standard only guarantees contour accuracy to half a contour interval, although spot levels are considerably more accurate. Where tree retention looks to be questionable, the situation must be reassessed early in the construction phase to eliminate the cost of tree removal when buildings are complete.
- Indigenous Australian species, particularly Eucalyptus spp., have evolved over time to survive inhospitable/hostile conditions. Under stress, these trees will sometimes sacrifice a limb to ensure the survival of the whole tree. As a result, retained mature trees may contain dangerous dead branches which can snap off in high winds: all retained vegetation must be inspected and reassessed and any necessary tree surgery carried out by an arborist/tree surgeon as part of the construction contract.
- Retention of understorey vegetation depends very much on the motivation and attitude of senior school staff. Understorey vegetation, perhaps due to poor design integration, is sometimes seen as:
    - Providing secluded areas which are difficult to supervise
    - Acting as rubbish traps
    - Harbouring vermin
    - Being of a “poorer” quality than adjacent newly laid turf
    - Presenting a bush fire hazard

It can however be:

- Used effectively to define spaces
- Attract native birdlife
- Provide instant maturity
- Areas of retained vegetation are more fragile than turfed areas and will not survive unrestricted access. Except where the understorey is extremely dense, nature/conservation areas only succeed when fenced off to control access. The effect of fencing is two-fold:
    - Restricted access enables the area to flourish, thereby maintaining or even improving its original quality and diversity; and

- The delineation of the area gives it a special “cachet”, projecting the image that the school is the custodian of a valuable resource.

- Protect areas of retained vegetation during the construction period by fencing to eliminate compaction by construction plant, equipment and vehicles as well as the storage of materials within the tree root zone. Fencing must be placed beyond the drip line of trees
- Where an area is to be retained to represent the whole pre-existing plant community, it must also be fenced.

Grassed Areas

Refer to relevant school type in EFSG Part B.

Maximum grade for residual open areas is 1:4 or 25 % with a preferred grade of 1:8 / 12.5 % or flatter (ie. walking grade to allow for informal use).

- Gradient range for free play areas is 1:30 or 3.3 % to 1:60 1.66 % (note that where gradients are flatter than 1:40 or 2.5%, sub-soil drainage must be considered for most soils).
- Maximum gradient recommended for playing fields 1:60 or 1:6 %, demands sub-soil drainage.

Turfing

Turfing is the preferred technique for installation of grass because:

- **Speed of establishment.** The use of grassed external areas is essential for a school to function adequately; landscape softworks are usually installed just prior to occupation.
- **To sprig or seed** is impractical because of the length of time required to establish a useable grassed surface; except in relatively flat, low-use areas of a school site, not affected by last minute service installations or required for builders’ access, equipment, sheds or materials storage.
- **The soil surface** is vulnerable to weed invasion and erosion with all grassing techniques other than turfing. An on-going maintenance problem could be created.
- **Seeding** must never be considered when the specified species is Kikuyu. Grass produced from Kikuyu seed is more upright in form than is desirable for a dense turf sward; however, Kikuyu seed may be included in seed mixes.
- **Free Play Areas** must be turfed rather than seeded, and existing rough grass must not be used unless inspected and recommended by a Landscape Technical Specialist.
- **Consider the use of alternatives** to turfing in non-play areas e.g. Woodland areas.
- **Consider the use of synthetic grass** in areas where the conditions are unsuitable for turfing.
- Turf Species Selection:
  - Kikuyu (Pennisetum clandestinum): has vigorous growth habit under most conditions but can also be a weed, which needs strong control. Suited to active areas.
  - Couch (several species): It requires suitable climate and soil conditions. It can also be a weed with fine pollens, which are a major source of allergens.
  - Buffalo (Soft Leaf Shademaster, Sir Walter, Palmetto, ST 85, ST 91, ST 26 Austine)- shade tolerant requiring less mowing than Couch or Kikuyu.
  - The Contractor or Turf Supplier is to provide Certification of grass type.
  - Commercial soil testing laboratories make it possible to specify precise sub-soil and soil treatments and to establish the most appropriate species selection for a particular site. Utilisation of this technology must improve the general standard of grassed areas in schools as dependence on artificial fertilising is reduced.

Maintenance of Grassed Areas

- **Include** watering, mowing, trimming, weeding, as well as fertilising and aeration.
- **Aeration** by coring or slicing must be carried out at least once a year to combat the compaction resulting from intensive use during the school year. Undertake this activity during school holiday periods
- **Regular maintenance** is essential to retain a healthy sward, capable of withstanding normal use.
- Consider the use of different mowing regimes to reduce costs.
- **Consider rest periods for** turf areas and rotation of areas during term time particularly in harmer months to avoid wear and tear and complete loss of turf cover

Tree Planting

Generally: tree planting improves the visual and physical amenity of a school with minimal interruption to functional flows and relationships.

- **Locate trees** at least 3.0m from any roof gutter - where soils are highly reactive to soil moisture levels, this distance may need to be increased (check adjacent development for any signs of cracking, etc.).
- **Trees in grass** must be > 1.2m from adjacent paving, (although a wider separation would reduce damage from roots) and 1.5m minimum from other trees, to facilitate mowing.
- **Trees in paving** are usually limited to the building precinct:
    - Unit paving allowance of 2.0 x 2.0m may be installed around the base of the tree to maximise site availability and minimise soil compaction.
    - In this situation, eliminate compost from the soil mixture to minimise differential settlement.
- **Root barrier** to be installed to minimum 500 mm depth using flexible polyplastic product. A ‘gap graded’ ‘structural soil’ mix is to be used in this location to allow an increase in the volume of soil provided for trees to root and minimise the incidence and severity of pavement damage due to root movement. Incorporate drainage at the bottom of the structural soil and connect to the stormwater system.
    - The selected stock must be advanced and tree guards provided, because of the high level of activity in these areas.
    - Ties must never be attached to the tree guards.
    - Installation of a watering system to distribute water, nutrients and oxygen evenly around the root ball will encourage deep root growth to avoid damaging the paving. Root directors may also be appropriate.
- **Trees can contribute** more to spaces between buildings than mass planted beds, by controlling the sun, providing a sense of scale, spatial definition, and the high aesthetic value of ever-changing shadow pattern on pavement.
    - **Distance between roof overhangs** is to be greater than 6.0m where possible, to allow for tree planting.
    - **Selection of tree species** must consider the size of the space plus climatic and soil factors.
    - **Sub-soil drainage** is required to all trees in paving with pipe brought to surface (and capped) to allow for hand watering to subsurface

Site planting must:

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- Create a strong visual framework
- Define major functional units on the site and integrate the whole while acknowledging the pre-development patterns of vegetation
- Accommodate modified conditions on site resulting from development
- Consider wind protection and excessive overshadowing of playing fields, plus the more obvious amenity of summer shade
- Help define movement and circulation

Site planting techniques must:

- Consider existing soil conditions
- Avoid excessively deep excavation
- Brake up sub-grades to prevent “welling” around tree roots
- In very heavy soils, consider graded drip lines and/or soil mounding to enhance plant performance

Local native species must be used wherever they can effectively fulfil the design requirements. The order of preference for selection of species must be:

(1). Local habitat zone. (2). NSW (3). Australian (4) Exotic

Refer to the local Council for advice on plant species that are suited to local conditions (Native and Exotic species) and cross check to avoid potentially harmful varieties.

Where Australian native species are to be used:

- Modify fertiliser selection to suit
- In rural areas, rabbit protection may be necessary
- Use the smallest stock practicable

In the past, forestry tubes have been avoided because their small size rendered them vulnerable to accidental damage: now that the “Tuley Tube” is locally available, forestry tubes could be viable.

Mass Planted Areas

Generally, keep mass planted areas to a minimum, located in highly visible areas to encourage maintenance and minimise misuse/abuse. It must not be considered as a “make-up” surface treatment in confined areas, too narrow for trees or easy mowing access. - the cost of properly prepared and planted beds approximates that of paving, (excluding further maintenance) and is therefore a “luxury” item to be used for a functional purpose.

- **Mass planting** such as shrubs and climbers, which could conceal signs of termite activity, must be kept clear of building edges. Low ground covers requiring minimum watering may be considered.
- **Maximum slope** is **1:3** for mass planted banks - surface run-off must be diverted around the top and bottom of the bank to reduce the risk of erosion or bank collapse.
- **Selected plant species** must be long-lived, hardy and able to withstand long periods of neglect - for this reason, plant species must be selected on a site specific and performance basis, with native shrubs being used with discretion.
- **The planting preparation** where mass planted areas occur in paved areas, must finish flush with adjacent paving to take advantage of inadvertent watering maintenance when paving is being hosed down.
- **In car parking areas**, a kerb edge is essential to prevent contamination from oil, grease and petrol washed off the road surface.

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Hazardous Trees/ Plants

When selecting tree and plant species for specific locations on school sites, the following must be considered:

- **Trees that may shed large branches** when under environmental stress must not be planted in school play or assembly areas, adjacent to buildings or in car parks. (Eucalyptus ssp. River Red Gum (camaldulensis), Lemon Scented Gum (citriodora), Spotted Gum (maculata), Mannifera (mannifera ssp.), Red Spotted Gum (maculosa), Mountain Ash (regnans), Candlebark Gum (rubida), Manna Gumm (viminalis), Coral Tree (Erythina ssp).
    - If a specimen of a species prone to limb drop exists as a mature tree on site, carefully consider its location relative to the proposed future use of the surrounding area. Review the design and species and assess the suitability for retention, with a view to minimising the potential risk.
    - Consult a qualified arborist to review existing trees assessing the risk to provide management guidelines and measures to reduce stress and potential limb drop.
- **Trees or Shrubs that may cause injury** must not be positioned within assembly areas, adjacent to games courts and along circulation routes. The use of shrubs or trees that have thorns or prickly foliage, produce large fruit or cones are discouraged
- **Trees with aggressive root systems** must not be used as they can damage walls, paving or drainage pipes. Ie. Figs and Rubber Trees (Figis Sp.), Poplars (Populus Sp.), willows (Salix Sp.), Camphor Laurel (Cinnamomum Camphora), Coral Trees (Erythrina), Black Locust (Rubinia Pseudoacacia).
- Avoid planting species where they will drop leaves to block roof gutters. (Casuarina ssp., deciduous trees and climbers).
- **To minimise the risk of termite infestation** in buildings, improve the chances of termite detection by ensuring planting will not obscure the building edges, inhibit sub-floor ventilation for elevated floors and watering systems do not create damp conditions conducive to termites.
- **Avoid poisonous or high allergy risk plant species**. Refer to recommended planting lists as published by Kidsafe® and the NSW Asthma Foundation.
    - Plants known to be toxic, and especially those known to be toxic in small quantities, must not be used in the school landscape. Common toxic plants include:

Table 01: Commonly known toxic plant species

Common Name	Botanic Name
Angels Trumpet	Brugmansia x candida
Arum Lilies	Zantedeschia aethiopica
Castor Oil Plant	Ricinus communis
Crepe Jasmine	Tabernaemontana divaricata
Daphne	Daphne mezereum
Deadly Nightshade	Atropa belladonna
English Yew	Taxus baccata
Hemlock	Conium maculatum

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Lily of the Valley	Convallaria majalis
Native Loquat	Eriobotrya japonica
Oleander	Nerum oleander
Poinsettia	Euphorbis pulcherrima
Rhus	Toxicodendron succedaneum
Rosary Bean	Abrus precatorius
Golden Chain Tree	Laburnum anagyroides
Yellow Oleander	Thevetia ssp.
White Cedar	Melia azeradarach var. australasica

Note: This list is not exhaustive. It is the responsibility of the designer to ensure that selected plant species are not known to be toxic at the time of undertaking the design.

0.10 Landscape Fixtures

Seating

To be located by the Senior Project Director or equivalent Project Lead, in conjunction with the School Principal.

Fabric: Aluminium or other material approved suitable in writing by the Senior Project Director or equivalent Project Lead.

Spaces/Requirements: 250mm run of seating per student

Height:

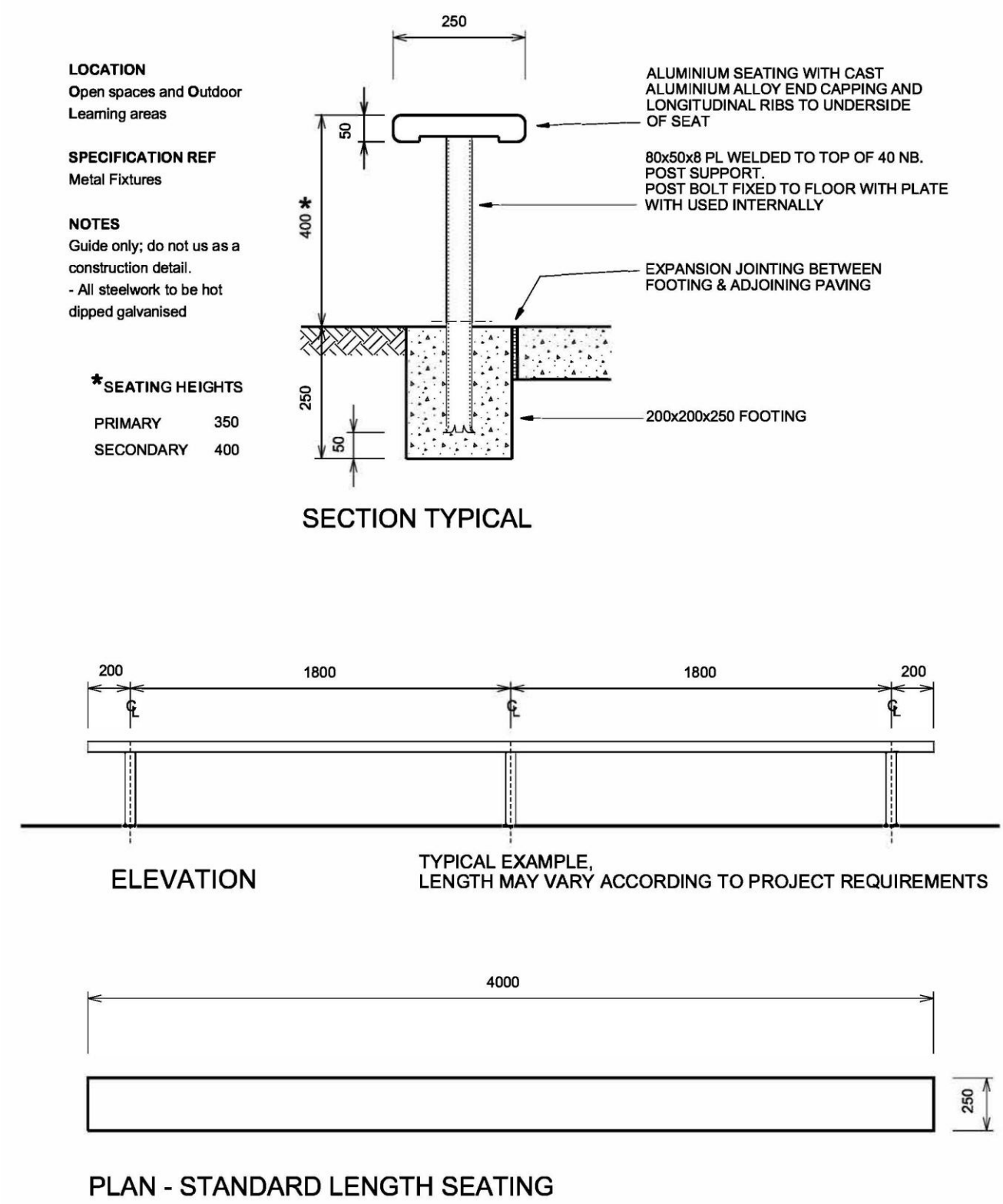
- Public Schools seating 350mm above finished paving
- High Schools seating 400mm above finished paving

Refer to: Drawings below, EFSG Part B and section 5 Outdoor Spaces within this document.

Guide only for metal fixtures. Do not use as a construction detail. Not to Scale (NTS)

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Figure 01: Seating details for open space and outdoor learning units.



Flagpole

Refer to: EFSG Part B and section 5 Outdoor Spaces within this document.

Batting Practice Nets

Refer to: Drawings below, EFSG Part B and section 5 Outdoor Spaces within this document.

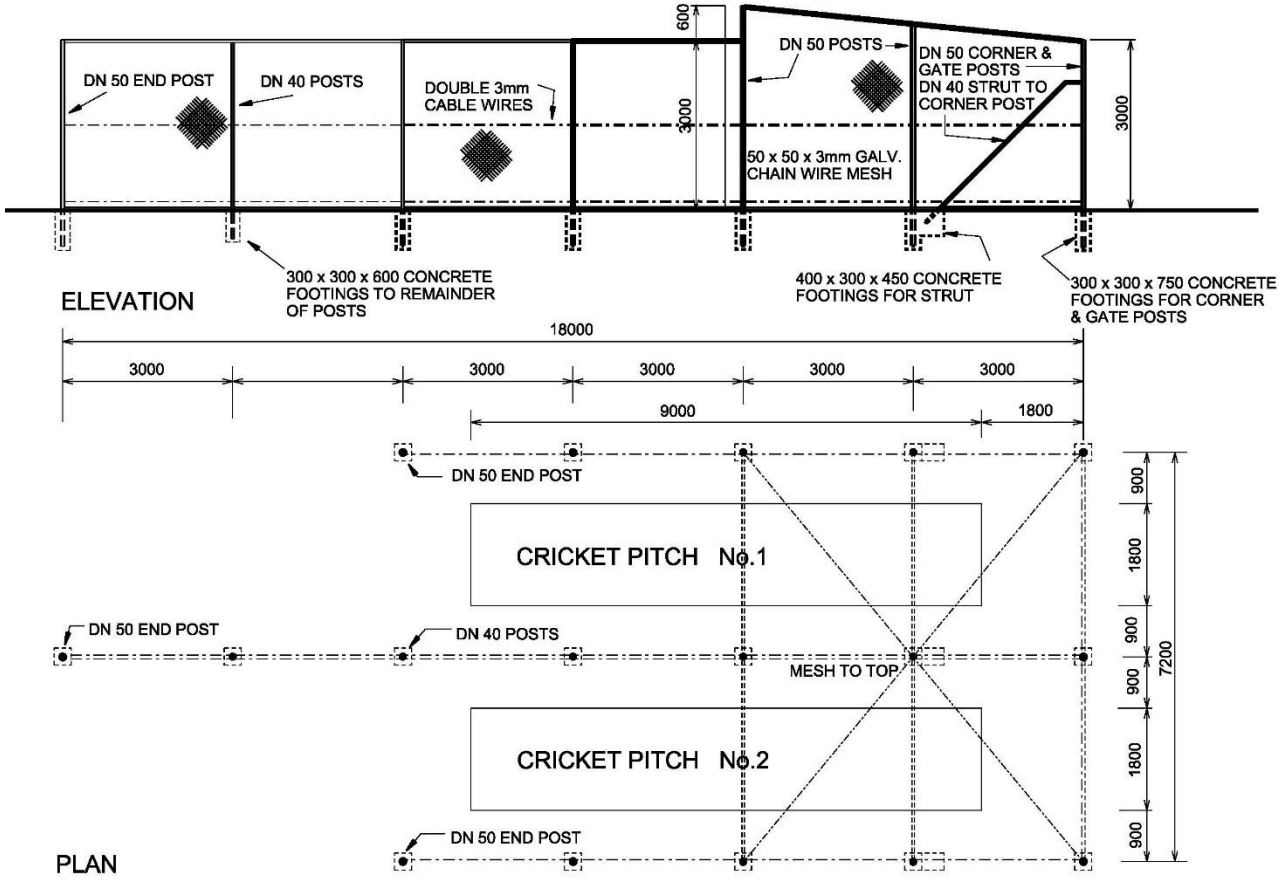
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Guide only for fences and external walls. Do not use as construction detail. Not to Scale (NTS)

Fix chainwire to the inside of enclosures and to both sides of the intermediate divisions.

Figure 02: Batting Practice Nets



Games Field

Fabric:

- Turfed (natural or synthetic)
- Spectator Bank turfed
- Sub soil drainage: where necessary depending on sub soil conditions

Play Equipment

Provision of play equipment in new Public Schools is standard procedure. A nominal budget is included as part of the overall cost of a new Public School build.

Play equipment are to be chosen and designed in accordance with relevant Australian Standards (AS4685 and AS4422), EFSG Design and Design Framework: New playground equipment in schools, published by the NSW Department of Education.

Ongoing safety checks and maintenance of the play equipment is the responsibility of the school, and are to be undertaken in accordance with Australian Standards AS4685.

Play equipment provided by a school may require location or relocation. Location to be determined/approved by the Senior Project Director or equivalent Project Lead.

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Water Tanks and Drip Irrigation

Refer to EFSG Part B and section 7 Services within this document.

Where a rainwater tank/s is installed, the harvested water must be used to supplement a drip irrigation system/s (existing or new). Tap mechanism is for manual use with provision of power to assist in use of pump.

Services:

- Hose cocks for irrigation. Must be located a minimum of 5m from the sidelines of the field to ensure student safety.
- Sufficient quick coupling valves are also required for planting maintenance in other landscape areas of the site.

0241 Landscape - Walling and Edging

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.

Until an updated version is published, the requirements set out below are to continue to apply.

0.02 Building/ Site Interface

Many new schools generally have reinforced concrete slab-on-ground, requiring level changes, paving falls and drainage to be accommodated within the spaces between buildings. In these often limited spaces, avoid excessive fill with surface distortion, particularly in paved surfaces, which reduces the usefulness of such areas.

0.03 Retaining Walls

- Carefully consider location where retaining walls are necessary to meet site development parameters.
- Retaining walls may be incorporated under the edge of the building slab, to simplify providing acceptable surface grades and positive drainage.
- Walls adjoining grass slopes, batters or garden beds, should include a return.
- If retaining walls are located close to covered ways or roof overhangs they must be minimum 2.0 metres (horizontally) away from the roof edge to inhibit access onto the roof.
- Construct retaining walls in concrete or masonry (concrete blockwork, brickwork)
- Heights are to be limited, if possible, to 1.0 - 1.2 metres (maximum) as this constitutes a reasonably economical solution.

Note that DoE requires a balustrade wherever level change exceeds 300mm, including level changes in external areas.

- Timber retaining walls are NOT considered acceptable as they can deteriorate quickly and occur a higher maintenance cost. (unless approved suitable by the Senior Project Director or equivalent Project Lead for exceptional circumstances).

0.04 Steps

Unit paved steps are generally not considered appropriate as there is potential for the individual pavers to move or be removed and should not be used unless specifically approved by the Senior Project Director or equivalent Project Lead.

0.05 Seating Steps / Tiered Seating / Amphitheatre Seating

- Seating steps where appropriate, are to be considered as an alternative method of retaining level changes.
- The design of the seating steps is similar to that of tiered seating as nominated within the Building Code of Australia Section H1, as such are to be designed to meet the requirements of the NCC.
- Subject to the land slope and available area, the preferred dimensions for external stepped seating are:

  Risers 300mm (Public) – 350mm (Secondary)

  Going 800mm (Public) – 900mm (Secondary)

  Intermediate access steps (preferably at the ends of seating rows)

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Risers ½ seating riser

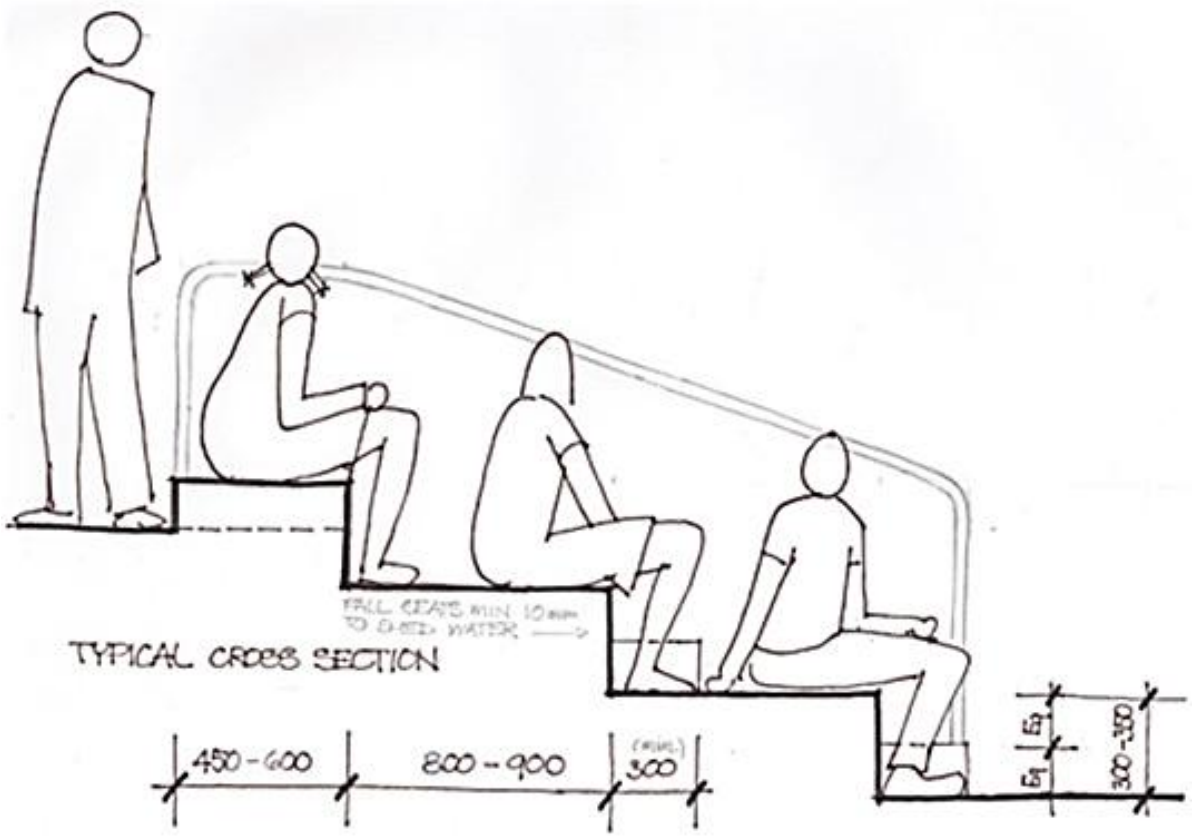
Going 300mm (min.)

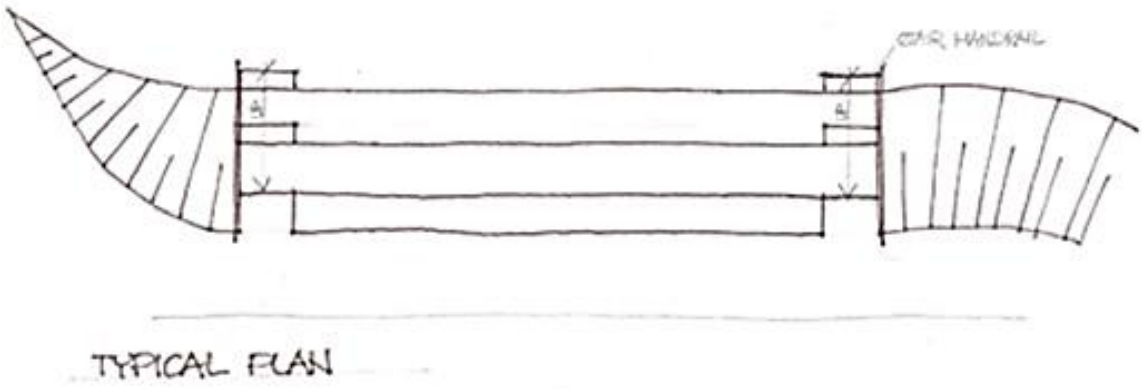
Width900mm (min.) (size to suit estimated traffic).

- Top seating step are to be at least ½-seating riser above ground level behind and 450 – 600mm wide.
- To shed water, provide at least 10mm fall across each seating row.
- Stair handrail to be provided to outer side of access steps.

Tactile indicators will be required to the top and bottom of external seating steps.

Figure 01: Typical Cross Section and Typical Plan





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0.06 Edging

Edging are to be installed between mass planted areas and grassed areas to facilitate maintenance and contain mulch.

- **Timber edges** are to be sturdy and termite resistant. 100 x 50mm preferred, (100 x 38 for curves), fixed to 50 x 50 x 600mm [minimum] long pegs on garden sides of edge to withstand mower pressures.
- **Metal edges** must not be used. Do not use metal spikes to secure edging. There is an injury risk if a student were to fall onto metal edging or spikes.
- **Flexible synthetic** edges can be used to create curved edging. Use timber pegs to secure.
- **All Exposed CCA treated timber** must be sealed with a minimum of one coat of a premium quality semitransparent penetrating finish based on oil-alkyd resin for exterior applications.
- **Concrete mowing strips** 200mm to 300mm wide are recommended between turfed and vertical surfaces.

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0242 Fences and Barriers

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.

Until an updated version is published, the requirements set out below are to continue to apply

03 Execution Specification

In accordance with current NATSPEC except as follows:

3.3 Timber Fencing

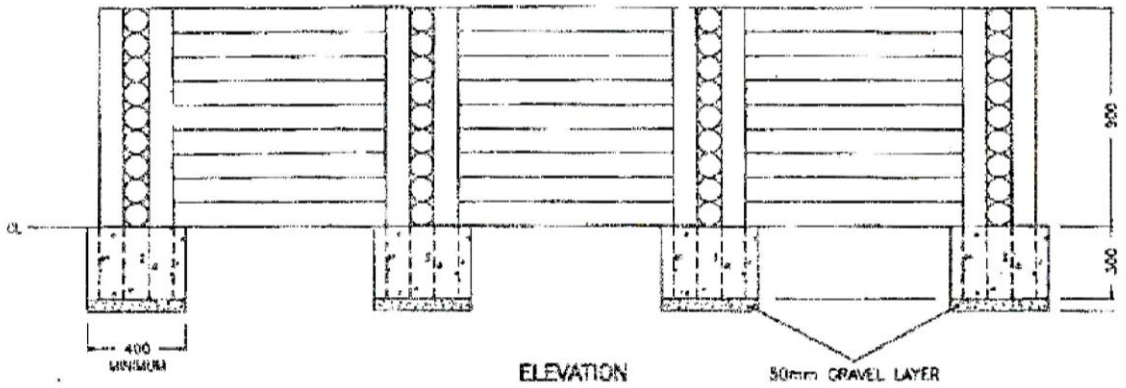
Radiata pine paling fence

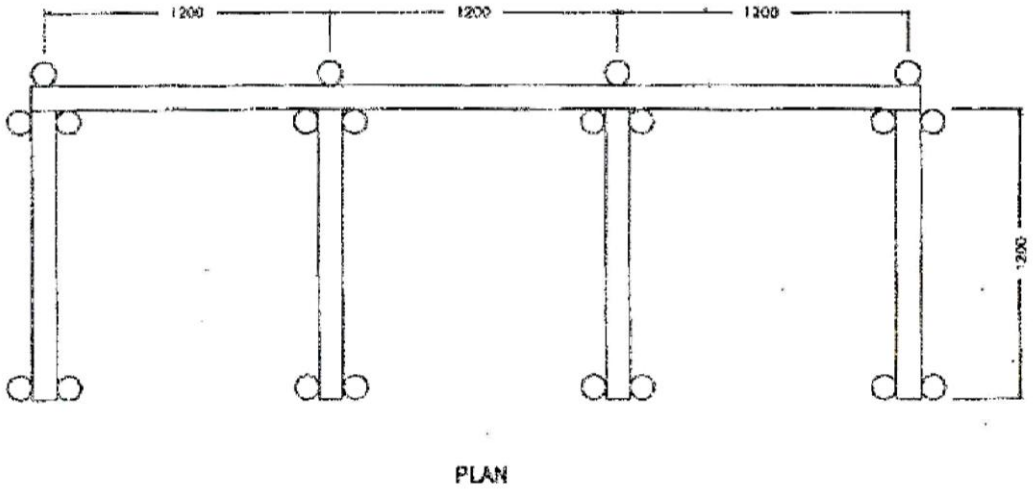
Height (mm): 1800

Preservative treatment: Hazard Class H4 to AS1604.1

Waste recycling fence

Figure 01: Waste Recycling - Secondary





CONTENT UNCHANGED FROM EFSG 2025

3.7 Swimming Pool Fencing

GUIDE NOTE: Generally Swimming Pool Type Fencing to be used for all retaining walls at a height of 300mm or more.

Location:

- Play enclosures
- Retaining walls
- Swimming pools

Standards: To AS 1926.1 and AS 2820

Additional hardware

- For padbolts, padlocks and master keying, refer to 6.10 Doors within this document.

Fencing and gates – zone fencing (1500mm swimming pool type fencing)

Location:

Standards:

- Generally, to AS 1926.1 and AS 2820 (excluding fencing and gate/s height).

Fencing height:

- The effective fencing height are not to be less than 1500mm above intended finished ground level.

Types:

- Square picket top type pool fencing panels. Spear top picket fencing is not acceptable and must not be used.
- Proprietary end caps to pickets to be colour matched compatible metal and permanently fixed to picket ends.
- Flat top pool type fencing panels
- Loop top pool type fencing panels

Gate/s height:

- The effective gate/s height are not to be less than 1500mm above intended finished ground level.

Additional hardware:

- For padbolts, padlocks and master keying, refer to 6.10 Doors within this document.

3.4 Chain Link Fabric Security Fencing and Gates

GUIDE NOTE: Check with the local statutory authorities' requirements for enclosed water storage for fencing dams on school sites. Height of fencing must not be less than 1800mm.

General

All fence posts to have permanently fitted end capes to tops. The end caps to be of the same material and finish as the fence posts.

CONTENT UNCHANGED FROM EFSG 2025

Animal space - external barrier

GUIDE NOTE: Insert project specific locations.

Location:

Type: Post and rail type chainwire barrier. Posts are to have permanently fitted proprietary galvanised steel caps.

General standard: To AS 1725

- Height (Nominal): 2100 mm above ground level

Gate: To AS 1725

- Number of Leaves: 2 (1 per pen)
- Width (nominal): 750 mm
- Locking: Provide 200 mm padbolt and padlock.

Refer to 6.10 Doors within this document.

Installation:

Secure frame with four galvanised heavy-duty mild steel saddles each bolted with two 16 mm diameter galvanised masonry anchors. Fix two to the wall and two to the floor.

Extend top rail over gate opening to opposite wall and fix with ferrule and two 16 mm diameter masonry anchors.

Fix gate to wall with two galvanised heavy-duty mild steel saddles each with two 16 mm diameter masonry anchors, allow gate to swing and support with proprietary foot pivot. Spot weld chainwire to screen and gate and cut "D" shaped hand access to padbolt.

Sheep-proof fence

GUIDE NOTE: Insert project specific locations.

Location:

Type: Railless chainwire

General Standard: To AS 1725

- Height (Nominal): 1200 mm above ground level

Posts:

- Permanently fitted with proprietary galvanised steel caps
- Maximum spacing: 1800 mm

Wire Strands: 5 rows

Gate: To AS 1725

- Number of leaves: 1
- Width (Nominal): 2000 mm
- Opening direction: Outwards
- Locking: Horizontal shoot bolt complete with hasp and staple

Footings/Installation:

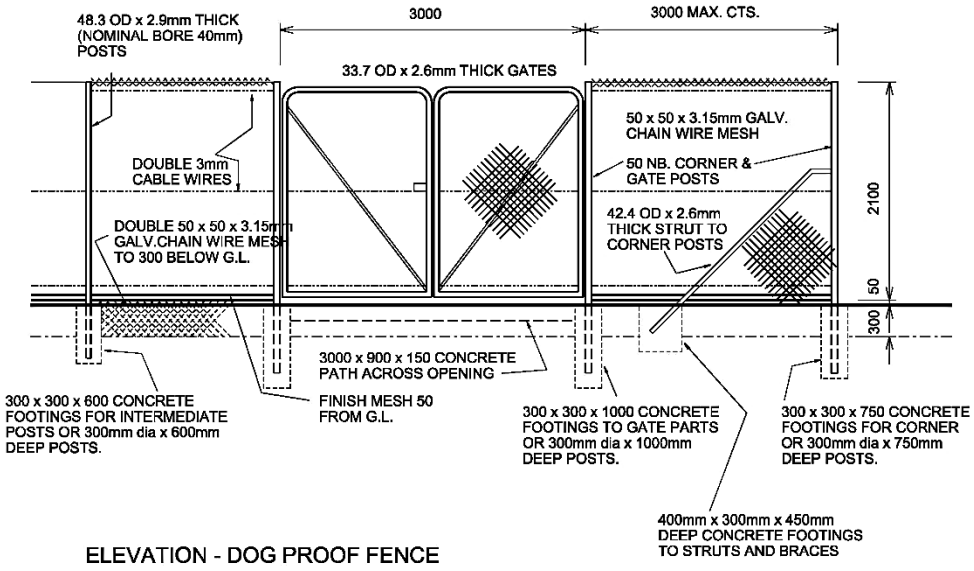
- Finish: Flush with surrounding ground at perimeter, trowelled to a 25 mm crown at centre.

Dog-proof fence

GUIDE NOTE: Insert project specific locations.

Drawing: Refer to Figure 02 below

Figure 02: Dog Proof Enclosing Fence – Secondary



Location:

Type: Railless chainwire

General Standard: To AS 1725

- Height (nominal): 2150 mm height above ground and 300 mm depth below ground

Drawing Reference:

Posts:

- Permanently fitted proprietary galvanised steel caps
- Maximum Spacing: 3000 mm
- Bracing stays: Double bracing stays to corner posts and to every twentieth intermediate post in multiple (side by side).

Gate:

- Number of Leaves: 2
- Width (Nominal) per leaf: 1500 mm (total nominal width 3.0 metres)

Locking: Coil spring closer, gate latch, add pad bolt with ferrule imbedded in concrete for two leaf gates.

Gate latch and pad bolt to have provision for padlocks, as specified in Door hardware.

Refer to 6.10 Doors within this document.

Concrete erosion strip: 20 Mpa.

- Location: Central across gate openings.
- Size: 900 mm wide x width of gate x 150 mm thick. Reinforcing: F72 mesh.
- Concrete: 20 Mpa

CONTENT UNCHANGED FROM EFSG 2025

Footings/Installation

- Finish: Flush with surrounding ground at perimeter, trowelled to a 25 mm crown at centre.

LPG Enclosure

GUIDE NOTE: Insert project specific locations.

Location:

Type: Post and rail type chainwire barrier.

Drawing reference:

General standards: To AS 1725, AS 1596

- Height (nominal): 2100 mm

Posts:

- Permanently fitted proprietary galvanised steel caps

Gate: To AS 1725

- Number: 2
- Leaves per gate opening: 1
- Width (nominal) per leaf: 1000 mm
- Opening Direction: Outwards
- Location: Diagonally opposite corners
- Locking: Fit pad bolt for 50 mm padlock, masterkey to PW "E" key.

Warning notice:

To AS 1596 and any other requirements by statuary authorities.

3.7 Chain Link Fabric Cricket Net Enclosures

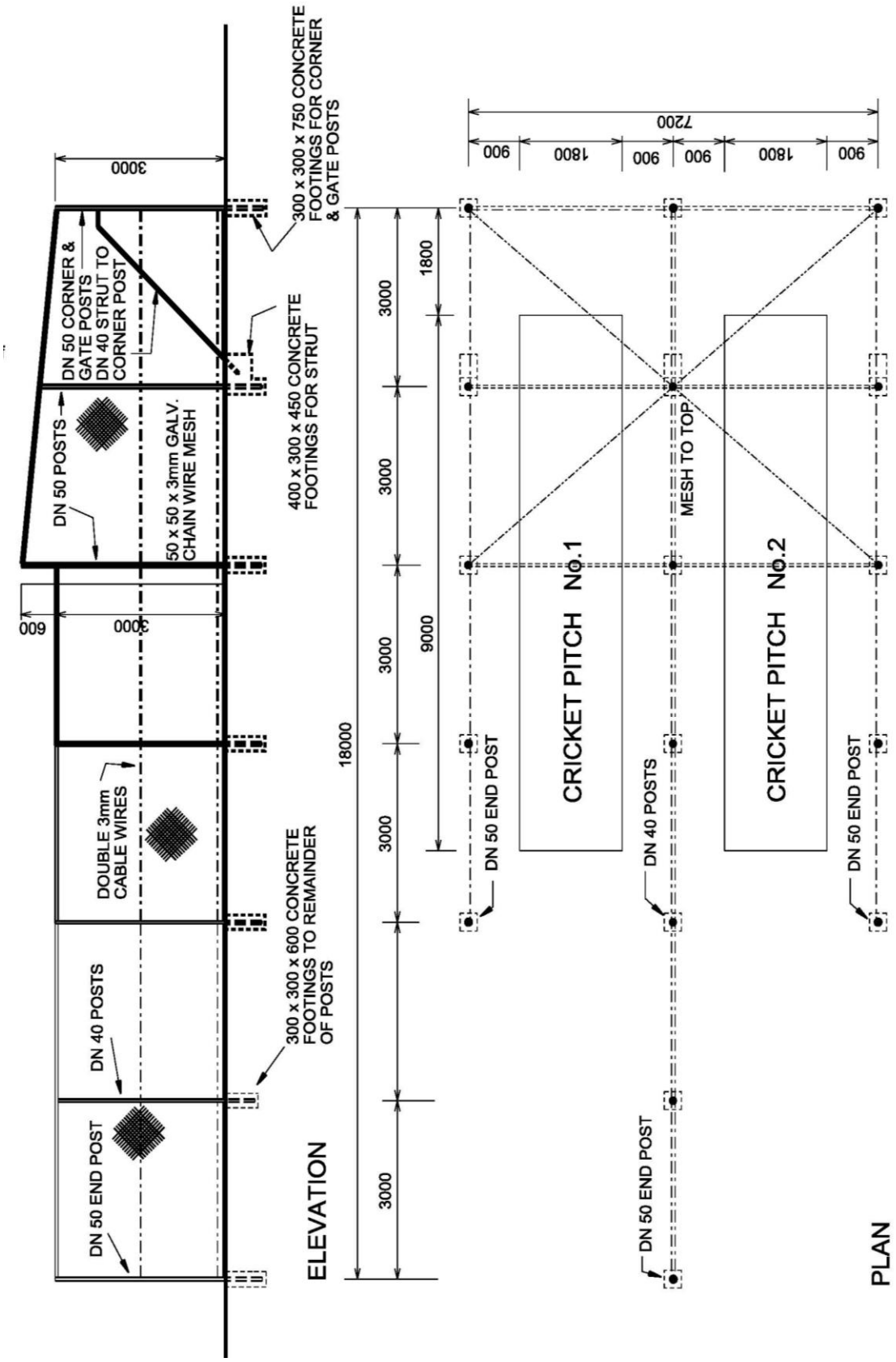
GUIDE NOTE: Insert project specific locations.

Location:

Drawing Reference: Refer to Figure 03 below and note to fix chain wire to the inside of enclosures and to both sides of the intermediate divisions.

CONTENT UNCHANGED FROM EFSG 2025

Figure 03: Batting Practice Nets - Secondary



Height: As shown on drawings

Intermediate enclosure: Fix the chain wire on both sides of the intermediate enclosure frame.

Posts: Permanently fitted proprietary galvanised steel caps

Footings: As shown in Figure 03.

CONTENT UNCHANGED FROM EFSG 2025

3.8 Chain Link Fabric Sports Ground Fencing

GUIDE NOTE: Insert project specific locations. Applies to High School Games Court fences/gates only.

Location:

Type: Post and rail type chainwire barrier.

Standard

- General: AS 1725
- Height (Nominal): 2400 mm

Posts:

- Permanently fitted proprietary galvanised steel caps
- Maximum Spacings:2400 mm
- Bracing Stays: Double bracing stays to corner posts and to every twentieth intermediate post in multiple (side by side)

Rails:

- Top and bottom rails:
- Bottom rail 150mm above ground level.

Cable:

- Centre support cable

Gate: To AS 1725

- Number of Leaves: 2
- Width (Nominal) per Leaf: 1 metre (total nominal width 2.0 metres)

Footings/Installation:

- Finish: Flush with surrounding ground at perimeter, trowelled to a 25mm crown at centre.

3.9 Welded Mesh Fencing

Refer to section 5 Outdoor Spaces within this document for fencing requirements.

General: All fence posts to have permanently fitted end capes to tops. The end caps to be of the same material and finish as the fence posts.

Location:

Weldmesh fencing

Generally: Galvanised welded mesh panels with tops and bottoms of panels rolled and returned set between galvanised tubular posts

Protective coating: To AS 4680

Weldmesh panels:

- Nominal mesh size: 50 mm (long) x 75 mm (cross)
- Nominal dimension of wire: 5 mm
- Top and Bottom Roll: 50 mm at 90o and then 100 mm return.
- Height (Nominal): 900 mm above ground level.

Posts: To AS 1074.

CONTENT UNCHANGED FROM EFSG 2025

Drilled for bolt fixing panels and fitted with permanent proprietary galvanised steel caps.

- Intermediate/Corner: Nominal size: 40 NB.
- Maximum spacing: 2500 mm
- Gate, Single: Nominal size: 50 NB.
- Gate, Double: Nominal size: 80 NB.

Gates, generally:

Proprietary gate/s including all accessories compatible with fence/panel system.

Protective Coating: Hot dipped galvanised after fabrication

- Tube frame: 33.7 OD
- Tube frame thickness 2.6 mm
- Nominal mesh size: 50 mm (long) x 75 mm (cross)
- Nominal dimension of wire: 5 mm

Gate, single

- Number of leaves: 1
- Width (nominal): 900 mm
- Locking: Gate latch with provision for padlock

Gate, double

- Number of leaves: 2
- Width (Nominal): 2700 mm (total opening width)
- Locking: Gate latch, add pad bolt with ferrule imbedded in concrete

Footing to posts:

- Depth: 600 mm
- Diameter: 200 mm
- Finish: Flush with surrounding ground at perimeter, trowelled to a 25 mm crown at centre.

Installation:

Secure panels with 5 mm diameter proprietary hooked galvanised bolts passed through pre-drilled holes in post securing the next panel with galvanised washers and nuts. Turn down bolt ends preventing removal of nuts.

Panels, finishing height: Must not finish higher than the top of the fence post cap.

Fence clearance: 50mm minimum, 200mm maximum above ground level (concrete mower strip or retaining wall whichever is higher) to underside of fence. Where ground clearance exceeds the maximum clearance the panels are to be cut, infilled, stepped etc. to achieve the appropriate clearance.

Gates and movable panels for pens - Animal Space

GUIDE NOTE: Nominate appropriate location. Include reference to drawing showing position of moveable panels.

Location:

Generally: Galvanised welded mesh panels with tops and bottoms of panels rolled and returned set between galvanised tubular posts and/or walls.

Protective coating: To AS 4680

Drawing reference:

Weldmesh panels:

- Coating mass for wire: Type A
- Nominal mesh size: 50 mm (long) x 75 mm (cross)
- Nominal dimension of wire: 5 mm
- Top and bottom roll: 50 mm at 90o and then 100 mm return.
- Panel height (nominal): 1200 mm above floor level.

Posts: To AS 1074 with permanently fitted proprietary galvanised steel caps

- Nominal size: 60 mm OD medium (flanged gate posts)
- 40 mm OD medium (flanged gate posts)
- Flanges: 130 x 130 x 5 mm with 4 x 13 mm diam. holes. Flanges welded to posts and securely fixed to concrete floor
- Protective coating: Hot dipped galvanised after fabrication

Installation:

Panels are to be installed so they can be easily detached and attached.

Gates, generally: Proprietary gate/s including all accessories compatible with fence/panel system.

- Protective Coating: Hot dipped galvanised after fabrication
- Locking: Lockable, gate latch and strike welded on gate/panel assembly.
- Tube frame: 33.7 OD
- Tube frame thickness: 2.6 mm
- Nominal mesh size: 50 mm (long) x 75 mm (cross)
- Nominal dimension of wire: 5 mm

Weldmesh fencing, security - standard security fence

Refer to section 5 Outdoor Spaces within this document for fencing requirements. The specification below is based on the DoE security unit's specification for standard security fence. The extent of fencing is to be determined by the DoE.

Positioning of fence: The fence is to have a minimum clearance of 1000mm from any obstacle that may reduce the effective height of the fence. (Eg stairs, retaining walls trees substation etc.). Returns are to be installed around such objects.

- Adjoining fence: Provide a return panel to prevent access between the security fence end post and adjacent property fence.

Fence type: Hot dipped galvanised welded mesh double roll panels set between galvanised tubular posts in concrete footings. Hot dip galvanised after fabrication

- Galvanised Wire: To AS 2423

Fence height:

- Top of Fence Panel: 1825mm above ground level (concrete mower strip or retaining wall whichever is higher).
- Panels, finishing height: Must not finish higher than the top of the fence post cap.
- Fence clearance: 50mm minimum, 150mm maximum above ground level (concrete mower strip or retaining wall whichever is higher) to underside of fence. Where ground clearance exceeds the

maximum clearance the panels are to be cut, infilled, stepped etc. to achieve the appropriate clearance. Cut panels must be a minimum length of 1200mm.

Weldmesh panels:

- Protective coating: Hot dipped galvanised after manufacture.
- Weld: All joints
- Nominal mesh size: 50mm horizontal x 75mm vertical spacing.
- Length: 2400mm
- Nominal dimension of wire: 5mm
- Top and Bottom Roll: 75mm at 90° and then returned at 45°.

Installation, weldmesh panels:

- Secured to pre-drilled posts with hot dipped galvanised 8mm hexagonal headed bolts and nuts with galvanised “U” clips for holding mesh panels. Secure nuts by spot welding.
- M8 x 90mm for 50mm NB posts
- M8 x 100mm for 80mm NB posts
- M8 x 150mm for 100mm NB posts
- Fixing: All panels to be fitted with a minimum of 8 “U” clips per panel.

Posts, general:

- To AS 1163 grade 350 tube, drilled for bolt fixing panel and with permanently fitted proprietary galvanised steel caps.
- Post extension: 550mm cranked inwards (towards site) at 45 degrees and drilled to receive three rows of barbed wire.
- Concrete keying: Part of the post set in concrete is to be dimpled or deformed.
- Protective coating: Hot dipped galvanised

Posts, corner and intermediate:

- Nominal size: 50mm NB medium grade x 3.6mm wall thickness x 3250mm long.
- Maximum spacing: 2460mm nominal (to suit panels) unless otherwise stated.

Posts, gate:

- Complete with adjustable galvanised gudgeons and gate clips at required heights to receive gate/s.
- Fittings, security: Gudgeons and gate clips to be firmly secured with a 9.5mm diam. MS pin through a 9.5mm diam. hole drilled in gudgeons, clips and post. Pins to be spot-welded to prevent removal.
- Nominal size, single gate: 80mm NB medium grade x 4mm wall thickness.
- Nominal size, double gate (up to 6000mm opening): 80mm NB medium grade x 4mm wall thickness.
- Nominal size, double gate (over to 6000mm opening): 100mm NB medium grade x 4.5mm wall thickness.

Back stays:

Location: All posts supporting double vehicular gates.

- Nominal size: 50mm NB medium grade.
- Fittings: Connect to posts with proprietary “T” fittings.

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- Maximum spacing: To the first intermediate post 2400mm.

Footing to posts:

- General:

Finish: 50mm below ground level. In paved areas, finish the concrete flush with the paved surface.

Backfilling, (other than paved surfaces): Earth, well rammed to effect rigidity of posts.

- Other than rock:
- Position each post on a minimum 75mm bed of concrete, consolidate posts in the holes to full depth (concrete) with a minimum of 100mm of concrete cover all round.

Intermediate post holes: 950 deep x 250mm minimum diameter.

Gate, change of direction and end posts: 950 deep x 300mm minimum diameter.

- Rock:

Excavate post holes to full depth to allow a minimum of 30mm of concrete cover all round. Consolidate with concrete for full depth

- Concrete: 20MPa minimum strength for all footings

Barbed wire

- To AS N4, Hot dipped galvanised barbed wire, comprised of two 1.57mm diameter wire twisted together with four-point barbs at nominally 90mm centres.
- Strained tight after concrete post footings have set (minimum 24 hrs).
- Tie in place with two strands of heavily galvanised 1.57mm tie wire secured through predrilled holes.
- Rows: Three.
- Spacings: 150mm

Gates, general:

- Galvanised
- Fixing, weldmesh panels: All horizontal and vertical members to be welded to the outside of the frame.
- Height: Match height of fence.
- Extension: Gate extension to be level with gooseneck extension on fence.
- Barbed wire: Match lines of barbed wire in fence.
- Diagonal brace for barbed wire (regardless of size).
- Weldmesh panels: Cut to suit frame. Panels to match and be kept level with fence panels.
- Gate/s must be lockable in both open and closed position.
- Drop bolt/s: Lockable 850mm long on each gate.
- Pipe dowel keepers: Provide at ground level to lock gate/s in both open and closed position.
- Where drop bolts do not reach the ground when the gates are in the open position, a yellow 1800mm high post and steel cap with bolt keeper, is to be installed. Post is to be concreted 600mm in the ground.
- Yellow posts: 65 x 65 x 2.5mm galvabond steel with galvabond steel caps.
- Each leaf is to have a 25mm NB internal stile between middle and bottom rails, with a 100mm space with no mesh from the closing stile, to allow external access to the drop bolt and lock.

CONTENT UNCHANGED FROM EFSG 2025

- Hanging: Hang gates on adjustable gudgeon pins and gate clips fixed to gate posts. Fixing bolts to be spot welded to prevent removal.
- Swing: Inwards.

Single gates (e.g. pedestrian)

- Number:

GUIDE NOTE: Generally, Size is 1050mm wide

- Size: ___mm wide
- Galvanised frame: 25mm NB
- Proprietary locking mechanism: Internal protected encased locking device and hand hole 1500mm from bottom of gate.
- Proprietary item: Broadhurst lock.
- Slide bolt to be lockable in both open and closed positions.
- The internal protected encased locking device to have 20mm diam. steel bar.
- Proprietary lug to be bolted to closing post.

Double gates (eg: vehicular)

- Galvanised frame: 32mm NB
- Number: Two, equal leaves.
- Proprietary locking mechanism: Internal protected encased locking device and hand hole 1500mm from bottom of gate.
- Proprietary item: Broadhurst lock.
- Slide bolt to be lockable in both open and closed positions.
- The internal protected encased locking device to have 20mm diam. steel bar. Shoot bolt to prevent gates opening when drop bolts are not closed and/or locked.

Hardware:

- For padbolts, padlocks and keying requirements generally for gates, refer to section 6.10 Doors within this document.

Protection:

- After preparing surface apply two coats of zinc rich paint in accordance with the paint manufacturer's instructions to any galvanised surfaces damaged (eg: by welding, cutting etc.).

GUIDE NOTE: Alternative – 2000m high Weldmesh panels without barbed wire are to be used, with posts made to suit as detailed where councils and/or communities will not accept barbed wire.

3.10 Temporary Fencing

Temporary fencing - Security

Extent of temporary fence and position of access gates must be clearly shown on drawings. Refer to section 5 Outdoor Spaces within this document for fencing requirements.

Location: Builders compound and the whole area of works.

CONTENT UNCHANGED FROM EFSG 2025

General Description: 2100 mm high galvanised rail-less chain wire temporary security fence braced and strained taut, fixed to galvanised steel posts complete with gates where shown on drawings.

General Standard: To AS 1725.

Fencing Wire Products: To AS 1725.

- Top Selvedge: Twisted and barbed.
- Bottom Selvedge: Twisted and barbed.

Galvanising: To AS 4680

Posts:

- Height: 2100 mm
- Nominal Size and Maximum Spacings: To AS 1725 Tables 1 and 2.
- End Treatment: Welded and drilled flanges where required for bolted connections; otherwise permanently fitted with proprietary galvanised steel caps to post tops.

GUIDE NOTE: Include post extension if barbed wire is to be attached.

- Post Extension: 380 mm vertically, cranked inwards at 45 deg. or vertical.

Bracing Strut: To AS 1725.

Back Stay: To AS 1725.

Bracing Stay: To AS 1725.

Support Cable: To AS 1725.

- Number: 3 rows x 2 strands each row.

Bracing Cable and Turnbuckle: To AS 1725.

GUIDE NOTE: Include barbed wire if required.

Barbed Wire: To AS 1725.

Footings: To AS 1725.

Gate: To AS 1725 Section 3.

Nominal width:

Locking:

Safety Signs:

Text: "DANGER - AUTHORISED PERSONNEL ONLY"

Colour: Standard red and black lettering on white background.

Size: 450 mm long x 300 mm high.

Material: Galvanised sheet metal.

Spacing: Displayed at 25 metre centres at 1800 mm height.

Removal: Maintain fence, gates and signs and remove on completion of project.

CONTENT UNCHANGED FROM EFSG 2025

3.11 Tubular Steel Security Fence - Square Hollow Section

Refer to section 5 Outdoor Spaces within this document for fencing requirements. The specification below is based on the DoE security unit's specification for tubular steel security fence. The extent of fencing is to be determined by the DoE.

Positioning of fence: The fence is to have a minimum clearance of 1000mm from any obstacle that may reduce the effective height of the fence. (e.g. stairs, retaining walls, trees, substation, etc.). Returns are to be installed around such objects.

- Adjoining fence: Provide a return panel to prevent access between the security fence end post and adjacent property fence.

Fence type: Proprietary galvabond square hollow section pickets and frame security fencing.

- Height: 2150mm
- Fence clearance: 50mm minimum and a 150mm maximum above ground level (concrete mower strip or retaining wall whichever is higher) to underside of fence. Where ground clearance exceeds the maximum clearance the panels are to be cut, stepped, infilled etc. to achieve the appropriate clearance. Stepped panels must be a minimum length of 1200mm.
- Panels (mm): 2400 long x 2100 high x 40mm square hollow section frame 1.6mm thick.
- Pickets: Pressed and cut to form spear point top, 2100 long x 25mm square x 1.2mm thick.
- Picket spacings: 115mm (nominal) fixed to all panels and gates.
- Welds: Silicone bronze

Posts:

- Galvabond square hollow section posts complete with permanently fitted proprietary galvabond steel caps.
- Posts: 65 x 65 x 3000 x 2.5mm thick wall.

Gate posts:

- Galvabond square hollow section posts complete with galvabond steel cap:
- Single gates with less than 3000mm opening, and double gates with less than 6000mm opening to be hinged from:
- 100 x 100 x 3000 x 5 x 3000mm long posts.
- Double gates with a 6000mm opening or more to be hinged from:
- Twin (2) 100 x 100 x 3000 x 5 x 3000mm long posts.

Fittings:

- Rail brackets: Compatible rail brackets and sleeves fastened to post using 5mm stainless steel rivets. Rivets are to be on the inside of the fence unless prevented by bracket positioning
- Brackets and sleeves must be powder coated to match finishes panels and posts.

Footing to posts:

- General:

Finish: 50mm below ground level. In paved areas, finish the concrete flush with the paved surface.

Backfilling, (other than paved surfaces): Earth, well rammed to effect

Rigidity of posts

- Other than rock:

Position each post on a minimum 75mm bed of concrete, consolidate posts in the holes to full depth (concrete) with a minimum of 100mm of concrete cover all round.

CONTENT UNCHANGED FROM **EFSG 2025**

Intermediate post holes: 800 deep x 250mm minimum diameter.

- Posts minimum setting depth: 700mm

Gate, change of direction and end posts: 900 deep x 300mm minimum diameter.

- Posts minimum setting depth: 700mm

Rock: Excavate post holes to full depth to allow a minimum of 30mm of concrete cover all round. Consolidate with concrete for full depth

- Concrete: 20MPa minimum strength for all footings

Gates, general: Galvabond frame, pickets and fittings

- Vertical stiles: 65 x 65 x 1.6mm (minimum).
- Horizontal rails; 65 x 65 x 1.6mm (minimum).
- Twin (2) 65 x 65mm bottom rails
- Pickets: 25mm square picket to match fence panels.
- Drop bolt/s: Lockable 850mm long on each gate.
- Pipe dowel keepers: Provide at ground level to lock bolts in both open and closed position.
- Where drop bolts do not reach the ground when the gate/s are in the open position, a yellow 1800mm high post and steel cap with bolt keeper, is to be installed. Post is to be concreted 600mm in the ground.
- Yellow posts: 65 x 65 x 2.5mm galvabond steel with galvabond steel caps.
- Finish: Gates must be fully powder coated in nominated colour.

Gates, single:

- Proprietary locking mechanism: Internal protected encased locking device positioned 1500mm from bottom of gate.
- Proprietary item: Broadhurst lock.
- Slide bolt to be lockable in both open and closed positions.
- The internal protected encased locking device to have a 20mm diam. Steel bar.
- Proprietary lug to be elongated height and to be bolted to closing post.

Gates, double:

- Proprietary locking mechanism: Internal protected encased locking device positioned 1500mm from bottom of gates.
- Proprietary item: Broadhurst lock.
- Slide bolt to be lockable in both open and closed positions.
- The internal protected encased locking device to have 20mm diam. steel bar. Shoot bolt to prevent gates opening when drop bolts are not closed and/or locked.

Hardware:

- Refer to section 5 Outdoor Spaces within this document for gate pivots, padbolts, padlocks and keying requirements for gates generally.

Protection:

- All damaged, cut or welded surfaces to have two coats of zinc rich paint and two coats of colour touch up paint to match original colour surface. All surfaces must receive the appropriate preparation and application in accordance with the paint manufacturer's instructions

Colour finish: All fencing panels, pickets, posts, gates and accessories are to be fully powder coated.

0272 Asphalt

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.

Until an updated version is published, the requirements set out below are to continue to apply.

02 Product Specification

In accordance with current NATSPEC except as follows:

GUIDE NOTE: Add the following subclause to "Products" nominated in NATSPEC Building Template/Worksection

2.5 Asphaltic Concrete, Games Courts

Termite Control

Refer to section 6.19 Vermin Control within this document for paving next or close to buildings where termite barriers have been installed.

Base course material

GUIDE NOTE: The following applies to asphaltic concrete for Games Courts only.

(i) Normally deep lift asphaltic concrete or in some circumstances fine graded crushed rock with a minimum depth of 100mm

(ii) Type and thickness depend on quality of sub base and/or sub grade. Consult with engineer for project specific requirements.

(iii) Subbase: Normally fine graded crushed rock. Consult with engineer for project specific requirements.

GUIDE NOTE: Subgrade drainage may be required on the "Cut" side of the Games Court. Include subsoil drainage in the stormwater section of the Specification.

Bituminous Paving

Proposed job mix:

GUIDE NOTE: Consult with engineer if mix listed below is suitable for project specific requirements (in some locations a weaker mix may be acceptable).

Asphalt surfacing schedule

Games court surface courses:

1. 25 mm thick levelling course (AC10) (between base and surface course)
2. 25 mm thick surface course (AC5)

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0274 Concrete Pavement

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.

Until an updated version is published, the requirements set out below are to continue to apply.

00 Design Reference

0.02 General requirements

3. Unenclosed circulation floor finishes must be broomed or coved concrete finish. Sample panels to be provided for approval.
4. Coloured concrete to assembly areas to reduce glare.

02 Product Specification

In accordance with current NATSPEC except as follows:

GUIDE NOTE: Add the following subclauses to “Products” nominated in NATSPEC Building Template/Worksection

2.9 Step and Treads

Anti-slip tread: Contrasting colour anti slip strip or nosing to define each step.

2.10 Concrete Pavements

Termite control

Refer to section 6.19 Vermin Control within this document for paving next or close to buildings where termite barriers have been installed.

Coloured (anti-glare) concrete: Ready mixed coloured concrete incorporating a synthetic colouring agent (5% synthetic colouring pigment by weight of the concrete content) for the full depth of the concrete slab.

Location/s: All large areas of concrete: Assembly areas, Games Courts, wide paths and circulation areas, outdoor seating areas, handball courts etc.

Finish: After screeding and floating, give the surface a course texture (anti-slip) by scoring with a broom across the surface.

Oxide Colours: To prevent glare the oxide specified must be a deep tone, example oxide colours from Concrete Colour Systems (CCS) and Bayferrox (BFX) listed below.

Table 01: Table of Oxide Colours

Red/Brown tones	Blue/Grey tones	Green tones	Yellow tones
CCS Walnut	CCS Smoke Blue	CCS Kakadu	CCS Golden Bronze
CCS Grape	CCS Gothic Blue	CCS Jungle	BFX Yellow 420
BFX Brown 686	BFX Black B100		

Samples: Supply samples of the specified coloured concrete to the Senior Project Director or equivalent Project Lead before construction. Sample Size: (nominal): 150 x150 x 100mm

0277 Pavement Ancillaries

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.

Until an updated version is published, the requirements set out below are to continue to apply.

03 Execution Specification

In accordance with current NATSPEC except as follows:

3.2 Channels and Kerbs

GUIDE NOTE: Add the following text to “Channels and Kerbs” nominated in NATSPEC Building Template/Worksection

Termite control

Refer to section 6.19 Vermin Control within this document for paving next or close to buildings where termite barriers have been installed.

Kerbing

Material: Concrete.

Refer to section 5 Outdoor Spaces and section 6.6 Structure within this document.

Width: 150 mm.

Depth: 150 mm.

Finish: After screeding and floating, give the surface a course texture (anti-slip) by scoring with a broom across the surface.

Surface: Flush with the adjacent surface levels

Joint spacing

Expansion Joints: 9.0 m (maximum) intervals

Construction Joints: 3.0m (maximum) intervals

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0278 Roadwork Ancillaries

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.

Until an updated version is published, the requirements set out below are to continue to apply.

01 General Specification

In accordance with current NATSPEC except as follows:

GUIDE NOTE: The roadwork ancillaries worksection is to be written in full under the NATSPEC Building Template – Site.

Table 01: Special Finishes Schedule

Location	Finish
Heavy duty service roads (concrete).	Incorporate a synthetic colouring agent in controlled quantities for the whole thickness of the slab to effectively to reduce glare. Submit samples of the coloured concrete to the Senior Project Director or equivalent Project Lead before construction.
Bulk waste pad when linked to the heavy-duty service road (concrete)	Incorporate a synthetic colouring agent in controlled quantities for the whole thickness of the slab to effectively to reduce glare. The colour and colouring agent proportions to be the same as the heavy-duty service road.

Refer to section 2.4 Inclusive Design, section 6.6 Structure and section 2.3 Colour and Pattern within this document for appropriate use in determining colour selections.

Select the required colour from the list below. Nominate the selection in the colour schedule. Colours of pigments are based on the Colour Index International (CII).

Red – 77491.0000, Green - 77288.0000 or Charcoal/black - 77499.0000

1.2 Traffic Control Devices

GUIDE NOTE: If road humps are to be installed to the service roads, refer to AS1742; use a proprietary high impact composition rubber type with rounded ends, coloured with yellow and black. Appropriate signage to be in accordance with AS1742.

CONTENT UNCHANGED FROM EFSG 2025

0251 Landscape – Soils

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.

Until an updated version is published, the requirements set out below are to continue to apply.

01 General Specification

In accordance with current NATSPEC except as follows:

1.4 Interpretation

GUIDE NOTE: Add the following definition to the NATSPEC, Building Professional Template/Worksection.

Topsoil mixture

Four parts by volume of topsoil and one part of compost as specified in compost and fertilizer, thoroughly mixed before placing.

03 Execution Specification

In accordance with current NATSPEC except as follows:

3.5 Topsoil

GUIDE NOTE: Delete subclause “Surplus Topsoil” nominated in NATSPEC Building Template/Worksection and replace with the following:

Surplus Topsoil

Dispose of surplus topsoil remaining on site after placing by spreading as directed over the areas already placed.

GUIDE NOTE: Add subclause “herbicide” to “topsoil” nominated in NATSPEC Building Professional Template/ Worksection.

Herbicide

GUIDE NOTE: Specify the type of herbicide, if any, and the application rate. Restrictions are in force on the use of herbicides 2-4-5-T and 2-4-D. 2-5-5-T is totally banned.

5.2 Civil and Stormwater Work

Note: **This Section is being updated.**

Until the updated Section is published, the requirements below and on the following pages of content unchanged from EFSG 2025 are to apply.

5.2.1 General

Preamble:

This section outlines how the requirements for hard surface areas outside of the building and includes roads, parking areas, bus bays, paths and hard standing areas.

It also outlines the requirements for how surface water is collected, slowed and safely directed away from buildings and play areas. It introduces site grading, pits and pipes, overland flow paths, water sensitive urban design (WSUD) measures, and connections to council systems.

0001c Design Checklist - Civil Works

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.

Until an updated version is published, the requirements set out below are to continue to apply.

0.02 Civil Works

Civil works is a general term for hard surface areas outside of the building on the site that includes roads, parking areas, bus bays, paths and hard-standing areas and games courts.

Design of civil works needs to be from a "Whole of Life" perspective and provide:

- Value for Money
- Fit for purpose
- Long term reliability
- Durability and serviceability

Minimal maintenance requirements

- Low maintenance costs
- Having minimal impact on the site and environment from contamination, erosion, sedimentation, dust and noise both on completion and during construction.

Standards

Compliance is meeting the standards of the Education Facilities Standards and Guidelines (EFSG) which is above, but inclusive of, all relevant authority's and regulation's including:

- Local Council
- Environmental Protection Authority (EPA)
- Roads and Maritime Services (RMS)
- Mine Subsidence Board (if applicable)
- Relevant Australian Standards (AS) but design to school standards where called for in the EFSG.
- Geotechnical Report on the site
- "AUSTROADS Guide to Pavement Technology" for pavement design.

Pavement Design

- All pavements to be designed for a 25-year life.
- All pavements trafficked by buses and trucks to be designed for a minimum 5 x 105 repetitions of a standard axle load, as defined by AUSTROADS.
- For other vehicular traffic areas design for 1.0 x 105 repetitions of a standard axle load, as defined by AUSTROADS.
- Allow for movements in the foundations caused by moisture variations and mine subsidence.
- Design rigid pavements so there is no vertical differential movement between panels at joints.
- For truck turning areas pavements are to be rigid in construction and finished with a reinforced concrete surface.
- For other areas pavements may be either flexible or rigid in construction. For flexible construction finish with a surface coat of asphaltic concrete.
- Breccia or dolerite is not to be used in road base or concrete mix.

CONTENT UNCHANGED FROM **EFSG 2025**

Grades

- Fall all paving away from the buildings and covered areas.
- Finished vertical grades to be limited to < 1 in 10. Provide vertical curves where change of grade exceeds 3%. Provide cross-falls, as required.

Finishes

- Non-skid finish for vehicular trafficked pavements
- Non-slip finish for pedestrian trafficked pavements, including carpark

Drainage

Refer to section 5 Outdoor Spaces and section 7 Services within this document.

- Design for subsoil moisture movements/seepage
- Provide sub-soil drainage to cut side of road or ramp pavements and to the back face of retaining walls
- Provide subsoil drains at all low points to remove water trapped in the base/sub-base course of road and paving formation

Stability

- Keep structures adjacent to the new works in a stable condition
- Provide safe access to existing structures for when new work is adjacent to occupied buildings

Edging

- Provide continuous edging of concrete or kerbs to free perimeter of roads and parking areas to ensure the stability of roadworks
- Timber edging is acceptable for footpaths only
- Provide a minimum 1 metre clearance between road edging and buildings, retaining walls and other obstructions

0.03 Materials

Filling

- General filling are to be graded material, maximum particle size 75mm
- Hardcore: Inorganic hard material capable of being compacted to an even stable surface
- Granular material: Maximum particle size 75mm; percentage passing 0.075mm sieve – 25% max; plasticity index not greater than 15% and not less than 2%

Road Base

Road Base to comply with Roads and Maritime Services Standards

Asphaltic Concrete (AC)

- AC for roads and parking to be AC10 and have minimum thickness of 40mm or greater as the design requires
- AC for games courts to be AC5 and have minimum thickness of 25mm levelling course plus 25mm surface course or greater as the design requires

Concrete

- Limit fly ash content to 20% of cementitious content of mix by weight
- For roads and parking areas concrete are to have minimum 32 MPa characteristic compressive strength

For Rigid Construction

- For rigid method of construction finish with a reinforced concrete surface
- Concrete pavements for vehicles are to be a minimum 150mm thick and reinforced with not less than SL92 mesh at top and 100 mm thick road base
- Other concrete pavements are to be a minimum 100mm thick and reinforced with not less than SL72 mesh at top
- Provide a thicker pavement and heavier mesh as the design requires and to meet durability requirements for minimum cover to reinforcement

For Flexible Construction

- For flexible construction finish with a surface coat of asphaltic concrete

Joints

- Provide joints to concrete pavements to prevent shrinkage cracks and to allow for temperature movements
- Prevent vertical differential movement between panels at joints
- Hot-dip galvanise all dowels in joints

0.04 Hard Works

Heavy Duty Service Roads

Heavy Duty Service roads are to be of:

- Drainage to swale and perimeter subsoil drains
- Kerb and gutter with piped stormwater drains
- Heavy Duty reinforced concrete. Colour to reduce glare

And include the following Fixtures

- Lockable bollards may be necessary to restrict vehicle movement on the site
- Speed Humps may be required to reduce speed within the site
- Where Speed Humps are provided; one are to be placed close to the site entrance and then approximately 30m apart

Light Duty Service Roads

Light Duty Service Road are to be of:

- Asphaltic concrete
- Kerb and gutter and stormwater drainage as necessary

And include the following Fixtures

- Lockable bollards may be necessary to restrict vehicle movement on site
- Speed Humps may be required to reduce speed within the site
- Where Speed Humps are provided, one are to be placed close to the site entrance and then approximately 30m apart

Service Road Access

Service access roads are to be of:

- Road metal base with bitumen flush seal
- Hose cock within 10m

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Car Parking

Car Parking areas are to be of:

- Reinforced concrete – broomed finish, or
- 40mm asphaltic concrete on minimum 100 DGB 20 plus sub-base in accordance with design
- Drainage to swale and perimeter subsoil drains, or
- Kerb and gutter with piped stormwater drains
- Fall carpark to drains

And include the following fixtures:

- Line markings and wheel stops to be provided to parking bays
- A wheel stop cannot function as a vehicle barrier. Appropriate vehicle impact barriers are to be provided and designed in accordance with requirements of relevant Australian Standards

Bus Zone

Bus zone paving areas are to be:

- Road in Bus Zone; heavy duty reinforced concrete
- Kerb and gutter as necessary
- Student Waiting Zone; broomed and coloured concrete

Truck Turning Areas

Truck turning paving areas are to be of rigid construction, reinforced concrete slab

Bulk Waste Pad

A bulk waste pad surface is to be:

- Reinforced concrete slab. Colour to reduce glare when linked to heavy duty service road
- Screened by planting as a preference as Masonry walling may impede access by bulk waste removal vehicles

Crossovers

Crossovers to be of Reinforced Concrete, Complying with Local Council, RMS and Austroads Publications

Pedestrian Areas / Courts - Paved

Pedestrian paved areas and paved courts to be;

- Paving generally to reduce glare will be spaced or coloured concrete
- No exposed aggregate is to be used in paving of school projects
- Gravel is not an allowable alternative as it represents a safety risk
- Unit paving is appropriate around trees

Games Court

- Games court surface is to be of Asphaltic concrete for resilience, non-slip, low maintenance and non-glare properties
- Minimum fall 1:100 to minimise ponding
- Maximum fall 1:40
- Chain wire on pipe frame for fence and gates
- A Ball wall included as part of fence

Services

- Perimeter subsoil drainage to be provided

Cricket Practice Nets

Cricket Practice nets are to be of the following;

- Pitch: Concrete slab with bituminous covering
- Surrounds: Grassed, fall away from pitch
- Enclosure: Chain wire on pipe frame
- Security: Two lockable gates to serve openings at wicket end

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CONTENT UNCHANGED FROM EFSG 2025

0224 Stormwater – Site

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.

Until an updated version is published, the requirements set out below are to continue to apply.

0.01 Main considerations

The drainage systems within school facilities includes all the associated pipework and services for the removal and disposal of sanitary drainage and stormwater management in two separated systems. This section covers the Stormwater drainage system.

The stormwater drainage services are to be designed from a "Whole of Life" (WOL) perspective in accordance with section 1.2 Whole of Life within this document and, in particular, provide:

- Drainage is to be designed to prevent flash flooding entering into buildings and covered ways and to ensure that site facilities are available for students use in all weather conditions up to a 1:100 ARI storm event.
- Design Drainage to channel stormwater away from buildings and facilities and to provide a backup system in case of blockages.
- Ensure that stormwater is designed to ensure the safety of students and staff.
- Design the stormwater system to compensate for movements in the foundations caused by moisture variations and subsidence.
- Ensure electrical pits and slabs beneath sprung timber floors, are graded to outlets connected to the stormwater system, to remove moisture/seepage. Incorporate reflux valves to prevent backflow.
- A Water Cycle Management Study is to be included with the design documents for all education facility developments.
- Stormwater drainage is not to effect adjacent properties.
- Treat stormwater to remove foreign matter.
- Generally, all underground drainage systems within the site area are to be CCTV inspected after installation and submitted as part of the work as executed submission.
- Avoid placing grated drainage pits to the centre of grassed free play areas where they can become a safety hazard.
- Support sustainable design principles including reducing water consumption and waste production.
- Appropriately treat any waste to ensure minimal environmental impact
- Be accessible and serviceable - easy to maintain with minimal impact on school use when maintenance is being performed
- Use products with a long life span – many drainage services are concealed so durability is essential.

0.02 Standards

Refer to section 7 Services within this document for Australian Standards and relevant cross sections.

- Integrate the storm water system with the requirements set by all relevant authorities especially the local Council and Water Authority, and in accordance with the "Australian Rainfall and Runoff " Guide.
- Comply with all relevant Australian Standards, but design to the higher standard where called for in this Design Guide.

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- Comply with the requirements of the site Geotechnical Report.
- Determine legal points of discharge from relevant authority and undertake all relevant connection approvals.

0.03 Stormwater Design Principles

- Design a reticulated Public in ground piped stormwater and subsoil drainage system to collect and dispose of stormwater running onto and off the developed site.
- Design a secondary stormwater drainage overland flow system to safely and effectively dispose of stormwater, preferably over finished and natural ground, in the event of partial or complete blockage of the Public system.
- Design the in ground drainage piped system for a 20 year ARI Storm event or to the requirements of the Local Council whichever is more severe. Provide above ground overland flow paths for 100-year ARI storm events in accordance with the current NSW Floodplain Development Manual.
- Provide scour protection to head walls, pipe outlets and overflows.

Refer to section 2.2 Acoustics and section 7 Services within this document for acoustic treatment of piping.

0.04 Future Works

Design the stormwater system to allow for known future stages of the development of the site, including the use of demountable buildings.

0.05 Detention/Retention System

Refer to section 7 Services within this document for Stormwater detention tanks and pumps requirements

- Design a drainage on-site detention/retention system (OSD) for the site to the requirements of the Local Council. An above ground OSD or adsorption system is preferred, where practical.
- Design a discharge control pit with an orifice plate and trash screen to be incorporated into the above ground OSD system
- Design a silt arrestor pit to be incorporated into the adsorption system.
- Water level height for OSD basin above ground is a maximum 200mm

0.06 Existing Stormwater Drainage

GUIDE NOTE: Existing Stormwater to be investigated and assessed by the project's civil and hydraulic engineers prior to commencing work.

- Incorporate into the new drainage system existing stormwater intercepted or disturbed by the proposed works.
- Evaluate the existing services on the site to ensure that they are adequate for incorporation into the works.

0.07 Subsoil Drainage

Refer to section 5 Outdoor Spaces and section 7 Services within this document for trenching, bedding and surrounds requirements.

- Connect all subsoil drainage lines to stormwater system.

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- Minimum fall of the subsoil drainage system are to be 1%
- Provide a Geotextile sleeve to all subsoil drainage lines.
- Where soil conditions are expansive, provide subsoil drains to the high side of flexible pavements.
- Provide subsoil drains to drain boggy ground.
- Provide subsoil drains to all retaining walls above 300mm in height.

0.08 Pipes under Slabs

Avoid locating pipes under building slabs. Where this is unavoidable:

- Minimise the extent of pipe runs under building slabs.
- Ensure pipe runs in a straight line.
- Provide pits each side of building to allow for cleaning.
- Provide concrete encasing.

Pipework

Prior to stormwater pipeline design confirm soil classification from the Geotechnical Report.

Pipeline design to provide minimum cover relevant to selected material.

Trench, pipe bedding and surround are to consider ground conditions.

Minimum Pipe sizes are to be:

- DN 100 for subsoil drainage
- DN 225 downstream of any grated pit
- DN 225 downstream of any side entry pit

0.09 Pits

Provide:

- Pits at changes of direction of pipe runs carrying ground surface water.
- Ensure that debris cannot enter the stormwater system.
- A pit along straight pipe runs at 100 metres max.
- 225mm-diameter minimum size of outflow pipe from grated pits.
- Scour protection to head walls, pipe outlets and over flows.
- Section of subsoil drainage line to all stormwater pits, on the upstream face, to remove sub-ground moisture from the trenches.
- Flap type or duckbill type reflux valves to stop stormwater back flow into the trenches.
- Litter baskets to carpark and driveway stormwater gullies.
- Where possible, avoid locating in circulation and play areas in order to prevent trip hazards

0.10 Electrical Pits

Refer to section 7 Services within this document for Electrical Installations requirements.

- Ensure all electrical pits are adequately drained, preferably by gravity.
- Connect electrical pit drainage lines to the stormwater system.
- Incorporate a reflux valve and inspection opening terminating at surface level in the line to prevent stormwater back flow into the electrical pit.

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0.11 Stability of Adjacent Structures

GUIDE NOTE: Provide dilapidation report prior to the commencement of work.

- Provide suitable methods to maintain existing structures adjacent to new works in a stable condition.
- Provide for safe access to occupied buildings adjacent to new work.

Water Cycle Management Study

The Water Cycle Management Study is to include the following considerations:

- Rainwater reuse
- On Site Retention and Detention
- Erosion Control
- Litter, pollution and sediment control
- Maintenance requirements

0.12 Documentation

Refer to section 7 Services within this document for testing, commissioning and as built requirements. Documentation must comprise final construction drawings to be used in conjunction with the technical specification in current NATSPEC format.

Include the following on drawings:

- Note Soil Classification
- Pipe inverts and ground levels at all pits and changes of slope
- Pipe gradients
- Design Flows (litres / sec)
- Maintenance schedule

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5.3 Site Work

Note: **This Section is being updated.**

Until the updated Section is published, the requirements below and on the following pages of content unchanged from EFSG 2025 are to apply.

5.3.1 General

Preamble:

This section explains how the site is readied before construction begins: confirming surveys and services, protecting trees and heritage items, setting up access and safety, managing topsoil and spoil, and opening trenches for new utilities. It helps readers understand how early decisions about levels, temporary works and service routes affect later drainage, pavements, planting and maintenance.

0221 Site Preparation

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.

Until an updated version is published, the requirements set out below are to continue to apply.

03 Execution Specification

In accordance with current NATSPEC except as follows:

3.8 Tree Protection

Work near trees

GUIDE NOTE: Delete subclause "Backfilling" nominated in NATSPEC, building template/work section and include the following:

Backfilling: Backfill to excavations around tree roots with topsoil mixture as specified in section 5 Outdoor Spaces within this document. Add fertilizer at the rate specified within the same section. Place the backfill in layers, each of 300 mm maximum depth, compacted to a dry density similar to that of the original or surrounding soil. Do not backfill around tree trunks or over root zone to a height above the original ground surface unless approved. Immediately after backfilling, thoroughly water the root zone surrounding the tree.

3.11 Site Clearing

Clearing and grubbing

GUIDE NOTE: Include the following paragraph.

Surface Layer: Remove the surface layer of the natural ground. Keep topsoil removal to a minimum.

3.19 Substation Site

GUIDE NOTE: Include this clause when applicable.

Requirement

Clear the area indicated for the location of the sub-station easement in accordance with **3.11 Site Clearing** above, providing a satisfactory excavatable site, free of all services and obstructions which could interfere with the installation of an earthing electrode which may extend to a depth of 10m or more.

Levelling

Level the site by removal of topsoil and/or filling and suitable compaction. Any filling material are to be clean, stable and reasonably fine. Where the site is cut into a slope, provide retention of the bank and the diversion of all surface water from the sub-station.

Carry out all work to the satisfaction of the local supply authority.

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0222 Earthworks

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.

Until an updated version is published, the requirements set out below are to continue to apply.

00 Design Reference

0.02 Earthworks

Policy is to minimise site disturbance and to balance cut and fill operations where practicable, i.e. to develop each site as economically as possible.

Site specific factors needed to be considered when determining the extent of earthworks possible to achieve a genuinely economical solution include:

- Existing vegetation
- Site and surrounding topography
- Soils
- Drainage
- Levels

As well as functional factors such as:

- Site availability
- Access between facilities
- Maintenance

Site soil engineering qualities must be established when balancing cut and fill. Frequently some of the site soil is not suitable for foundation purposes.

0.03 Landscape Level Changes

Refer to Site Planning and Landscape sections of EFSG Part A.

- 1:4 or 25 % (max) grade for grassed areas,
- 1:3 or 33 % (max) grade for unreinforced mass planted areas

Whilst 1:4 is a more realistic standard than past practices, several factors need to be considered including:

- Soil stability: Most soils are stable at a gradient of 1:4 while some soils are stable at considerably steeper grades.
- Useable space availability.
- Limiting factor is appropriate maintenance for a particular site.

Gang mowers are generally capable of mowing 1:5 or 20% slopes but become unstable on slopes steeper than 1:4;

Motor mowers are satisfactory on slopes up to 1:4.

Specialist moving equipment such as strimmers and “Fly-Mos” can be used to maintain very steep grassed banks.

Specialist mowing equipment, may be a better long-term solution than mass planted areas, however it shall be noted that General Assistants have very limited time for landscape maintenance.

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Mass planting of slopes steeper than 1:4 or 25% is a viable surface finish if planting is maintained and the bank does not interrupt pedestrian desire lines: non-maintained planted banks deteriorate, become unsightly and suffer erosion.

Reinforcing banks with synthetic or wire mesh is not recommended because of inherent danger to pupils if/as the bank deteriorates.

Use retaining walls or steps for at least part of the level change where banks must be steeper than 1:3 and grass maintenance with specialist equipment is not viable. This will also maximise useable space.

0.04 Pedestrian Access

Refer to Site Planning and Landscape sections of EFSG Part A.

Necessary level changes where possible, are to be turned to advantage on a school site, especially in association with site facilities.

- Seating steps overlooking Playing Fields, PE courts or Assembly Areas (particularly on the north or south side) can facilitate spectator viewing and supervision.

Refer to section 5 Outdoor Spaces within this document.

- Grass banks overlooking Playing Fields, PE courts or Assembly Areas can provide informal spectator seating.
- Allow easy pedestrian access along logical desire lines to playing fields, where extensive banks occur, by modifying grading in parts, to reduce deterioration to the bank surface.

0.05 Management of Turf Wear

Turfed areas will not stand up to a regular concentration of pedestrian traffic. Where possible, distribute traffic, particularly between the Canteen/COLA and Games Court, through a hard-surfaced flow out area such as the Assembly Area.

Areas subject to concentrated use will occasionally need time to recover. Where possible, place turfed areas relative to hard paving, so some areas may be roped off as necessary on a rotation basis.

01 General Specification

In accordance with current NATSPEC except as follows:

1.8 Geotechnical and Environmental Site Investigation

GUIDE NOTE: Add the following subclause “Report” to the NATSPEC, Building Professional Template/Worksection.

03 Execution Specification

In accordance with current NATSPEC except as follows:

3.2 Geotechnical

GUIDE NOTE: Delete the subclause “As Found Site Conditions” nominated in the NATSPEC Building Template/Worksection and replace with the following:

CONTENT UNCHANGED FROM EFSG 2025

As found site conditions

General: If the following are encountered, where not identified by the geotechnical report for the site or the documentation, give notice immediately and obtain instructions before carrying out any further work in the affected area:

- Bad ground
- Discrepancies
- Rock
- Springs, seepages
- Topsoil > 100mm deep

3.4 Removal of Topsoil

GUIDE NOTE: Delete subclause “Topsoil Stockpiles” nominated in NATSPEC, Building Template/Worksection and include the following:

Topsoil stockpiles

Stockpile site topsoil approved for re-use, and imported topsoil before placing as specified in section 5 Outdoor Spaces within this document. Establish stockpiles in directed locations, to heights not exceeding 1.5m. Provide drainage, erosion protection and aeration. Do not remove plant growth occurring during storage unless approved. Do not allow traffic on stockpiles. If to remain for more than four weeks, sow with approved temporary grass

3.14 Placing Fill

GUIDE NOTE: Include the following subclause:

General

Loose fill: Maximum loose layer thickness of 150mm.

3.17 Compaction Requirements for Fill and Subgrade

GUIDE NOTE: Consult structural / civil engineer for the % moisture content requirements.

Include the following subclauses:

Moisture content

Consult structural/civil engineer for the % moisture content requirements.

Settlement of earthworks

Fill, compact and trim all settlements of earthworks which take place during construction. Dig out soft spots or unsound areas and fill with sound material properly compacted to a condition equivalent to the surrounding material.

0223 Service Trenching

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.

Until an updated version is published, the requirements set out below are to continue to apply.

03 Execution Specification

In accordance with current NATSPEC except as follows:

3.3 Excavating

GUIDE NOTE: Delete subclause "Obstructions" nominated in NATSPEC, Building Professional Template / Worksection and include the following:

Obstructions

Cut back roots encountered in trenches to the edge of trench or a distance not less than 600 mm clear of the relevant service, and as specified in 5.3.2 0221 Site Preparation. Remove such other obstructions including roots, stumps, boulders and the like which may, interfere with the proper functioning of the service.

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6

Buildings

6.1 Building Components
6.2 Building Security
6.3 Waterproofing and Weatherproofing
6.4 Corrosion and Electro-Chemical Reactions
6.5 Paint Finishes
6.6 Structure
6.7 Masonry
6.8 External Cladding
6.9 Roof
6.10 Doors
6.11 Windows
6.12 Glazing
6.13 Insulation and Membranes
6.14 Flooring
6.15 Internal Lining
6.16 Ceilings
6.17 Tiling
6.18 Circulation Spaces
6.19 Vermin Control

6.1 Building Components

6.1.1 General

Preamble:

This section outlines the built elements that shape the Indoor Spaces in Schools.

Including structure, materials, windows, doors, flooring, ceilings and circulation elements.

It explains how these features support the comfort, supervision and durability, and how they interface with pavements, drainage and planting.

Components in buildings to create Indoor Spaces provide an opportunity to incorporate culturally responsive design solutions.

Requirements:

Components for a building include:

- A solid plinth to allow for a mowing / landscaping zone to abut building base.

  Configurations for multi-storey buildings in schools:

  — For 3 storey buildings – 3 storeys of framed façade on a concrete or masonry plinth to manage topography change.

  — For buildings of 4 storeys or above – The project team may consider extending plinth up to the first level.
- External cladding systems that are robust, create a comfortable indoor and outdoor environment as well as create an environment with site within its context.
- Openings in the façade to allow for natural light and ventilation.
- Built components in the façade to protect from local weather elements, control direct sunlight, control glare, control views, separate for fire risk and the like.
- Built components that deter bird roosting with particular attention to eliminating horizontal built elements, including in structural steel components. Ensure there is a 15 Degree slope for horizontal shading elements to prevent bird roosting.
- Additional screening to buildings is suitable to be applied to ensure each school space responds to site specific conditions such as privacy, overlooking, sun / heat control, security, weather protection, acoustic buffering, regulatory compliance and the like.

Worked Example:

The facade design for schools shown in EFSG Part C is based on the following assumptions and parameters for a typical General Learning Spaces.

The following is placed here for information only:

Minimum glazed area of 8.2 m2 per classroom for daylight purposes.

Minimum grille of 4.3 m2 per classroom for natural ventilation purposes. Refer to section 3.3 for natural ventilation requirements.

Wall R-value 1.4 (all Climate Zones).

Roof R-3.7 (all Climate Zones, except 6 with R-3.2).

Slab R-2.0 (all Climate Zones).

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Single-glazing with an overall U-value of 6.2, SHGC of 0.55 and VLT of 0.6, including framing.

Vertical and horizontal fins of max 600 mm for street-facing façades towards North, East and West, around each of the 4 panels.

Mechanical system of a VRF type system with individual fancoil units per space, such as LG or Daikin. Classroom cooling capacity of approximately 15 kW with a FCU fan power of approximately 250 W per classroom. Temperature setpoint of 20°C to 25°C.

Lighting wattage of 4.5 W/m2.

Glare control to be managed via internal blinds.

Louvres or grilles to allow air and/ or light to pass through should be selected to have appropriate levels of sealing, water tightness and acoustic performance.

Fire separation spandrel requirement in accordance with current regulation.

The depth, width, proportion, and arrangement of louvres or grilles may be adjusted in conjunction with sun shading elements to suit site conditions.

6.2 Building Security

6.2.1 General

Preamble:

The security needs of the various spaces and spaces of schools are categorized from A (low) to E (high) to determine the security requirements.

Requirements:

- All openings and building fabric must comply with the corresponding security category requirements listed below, and the entire building fabric is to satisfy the performance standard for each category.
- For lockdown purposes, buildings and spaces must be capable of being locked from the inside.
- Secluded or vulnerable windows regardless of the security category noted within the tables below, must have high and steep sills and/or be protected by security grilles or security mesh, etc.
- Doors and roller shutters are to be selected to suit the individual security application.

Table 6.2.1 **Security Category by Space**

Space Type	Spaces	Security Category
Learning Spaces	General Learning Spaces, Multi-Purpose Spaces, Library, Special Programs Spaces, Senior Study, Computer Learning Space, Seminar Spaces, Learning Commons, STEM Space	**A** [Low]
	Sensory Space	**TBC**
Hall / Gymnasium	Gymnasium, Communal Hall, Movement Studio, Stage	**A** [Low]
	Control Space, Sound Cupboard,	**D**

Space Type	Spaces	Security Category
Administration and Staff	Entry Vestibule, Reception Areas, Staff Lounges, Staff Kitchenettes	**A** [Low]
	Administration, Offices, Interview Spaces, Meeting Spaces, Staff Study, Library Office	**C**
	Security Store (secure filing space)	**D**
Canteen and Food	Canteen	**D**
	Canteen Office and Store, Pantries	**C**
	Food and Hospitality Learning Spaces	**A** [Low]
Science	Science Laboratories, Science Preparation, Botany / Zoology Space	**A** [Low]
Visual Arts	Visual Arts Workshop / Visual Arts GLS	**A** [Low]
	Kiln	TBC
	Dark Room	**D** [Medium High]
TAS	Wood / Metal Workshop / TAS Learning Spaces	**A** [Low]
PE Fitness, Performing Arts and Multimedia	PE Fitness Laboratories Performing Arts Workshop, Multimedia Workshop	**B** [Low Medium]
	PE Fitness GLS	**A** [Low]
	Multimedia Studio (recording space)	**D** [Medium High]
Lecture	Lecture Theatre	**B** [Low Medium]
Agriculture	Agriculture Indoor Areas (typical)	**A** [Low]
	Agriculture Shed Workshop	**C** [Medium]
	Agriculture Animal Space	**B** [Low Medium]
Wet Areas	Toilets, Accessible Showers, Clinic, Sick Bay, Utility Space, First Aid	**A** [Low]
	Laundries, Change Spaces	**B** [Low Medium]
Circulation	Internal corridors, stairwells, circulation	**A** [Low]
Storage	Learning Space Storage, Library Storage, Computer Store	**D** [Medium High]

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Space Type	Spaces	Security Category
	Garden Store, Chemical Store Room, Archive Store, Security Store, Science Apparatus Storage, Sports Equipment Store, Lecture Store, Kitchen Store	**D** [Medium High]
	Bulk Store, Large Equipment Store, Outdoor Equipment Store, TAS and Visual Arts Project Store Rooms	**C** [Medium]
	Chair Store, Movement Store, Cleaner's Stores	**B** [Low Medium]
Services	BCR, Main Communications Space	**D** [Medium High]
	Distribution Board Cupboard	**TBC**
	Main Switchboard Space / Cupboard	**TBC**
	Dust Extraction Space	**TBC**

Table 6.2.2 **Security Category A** Requirements [Low]

Item	Performance Requirements
Category A	
Windows	Securable.
Doors	Lockable, except that security is not required between adjoining spaces and spaces of this category or enclosed corridors.
Walls	No additional requirements.
Roofs	No additional requirements.
Other	The above requirements for Category A are applicable to doors and windows associated with internal walls only. All external doors and windows require locks.

Table 6.2.3 **Security Category B** Requirements [Low Medium]

Item	Performance Requirements
Category B	
Windows	Securable.
Doors	Lockable.
Walls	No additional requirements.
Roofs	No additional requirements.

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Table 6.2.4 **Security Category C** Requirements [Medium]

Item	Performance Requirements
Category C	
Windows	Securable and physically protected to the interior side with either grilles or security mesh.
Doors	Lockable, solid core door leaf. Steel door frame OR Secure roller shutters/grilles.
Walls	No additional requirements.
Roofs	Ensure roof penetrations (i.e. Domelites/roof lights) are protected.

Table 6.2.5 **Security Category D** Requirements [Medium High]

Item	Performance Requirements
Category D	
Windows	No windows unless it is a habitable space which is securable and physically protected to the interior side with either grilles or security mesh.
Doors	Return air grilles must not be specified. Options: • Solid core door leaf, min 40 mm thick with 2-point deadlocking. Steel door frame 2.5 mm thick. • Double sheeted steel door (sheets min 1 mm thick) with 2-point deadlocking. Steel door frame 2.5 mm thick. • Double leaf steel doors with Semaphore locking. Steel door frame 2.5 mm thick. • Steel roller shutters up to 1800 mm maximum width.
Walls	Options: • Single thickness masonry. • Stud walls protected with steel mesh under lining (mesh to be on the outer side of the stud. • For conversions stores may use steel sheet 1.6 mm thick. Ensure walls continue to underside of slab or roof.
Roofs	Ensure roof penetrations (i.e. Domelites/roof lights) are protected with security mesh.
Ceilings	Protection (e.g with steel mesh) where access is possible between the roof and ceiling.

Item	Performance Requirements
Floor	Concrete, compressed fibrous cement or steel.

Table 6.2.6 **Security Category E** Requirements [High]

Item	Performance Requirements
Category E	
Windows	No windows.
Doors	Steel security door set 4-point locking bars. Steel door frame 2.5 mm thick. Return air grilles must not be specified.
Walls	Double thickness bonded masonry min 190 mm. Walls must continue to the underside of the roof or slab soffit.
Roofs	No roof penetrations for skylights.
Ceilings	Protection (e.g with steel mesh) where access is possible between the roof and ceiling.
Floor	Concrete, compressed fibrous cement or steel.

Keying

Requirements:

The general principles and requirements of security keying are as follows:

- Key-Controlled Access is required only for initial entry points to security zones or spaces.
- Access by key at one point is desirable for easily found switching to security alarm systems and access lighting.
- Locks within each separable portion are to be keyed alike, unless tabulated key to differ for individual spaces.
- All Toilets are to be keyed alike.
- Locks must not be Grand Master Keyed.
- The Canteen must not be Master Keyed.
- Roof access points must not be Master Keyed.
- Electrical Switch Spaces containing metering and Authority equipment must be master keyed to the Supply Authority requirements.

Refer to:

Including but not limited to the following:

- 6 Buildings
- SSU Installation Guidelines and SSU Specifications.
- Other applicable sections within this document.

6.3 Waterproofing and Weatherproofing

Note: **This Section is being created.**

Until this section is created please refer to other Parts of the EFSG, and seek direction in accordance with the Senior Project Director or equivalent Project Lead for requirements.

6.3.1 General

Preamble

This Section sets the minimum performance standards for keeping water out of the building envelope and safely contained within internal wet areas in schools. It explains how to manage rain and wind-driven rain, surface and sub-surface water, water vapour and condensation, and plumbing leaks to protect learning continuity, building durability, and indoor air quality.

Refer to:

Including but not limited to the following:

- 6 Buildings
- 2 Building Performance
- Other applicable sections within this document.

6.4 Corrosion and Electro-Chemical Reactions

6.4.1 General

Preamble:

Corrosion is a natural electro-chemical reaction between metals and their environment or between galvanically incompatible materials (bimetallic corrosion).

Unacceptable levels of corrosion can impact the function or amenity of school assets, shorten service life and increase ongoing maintenance costs.

Control and protection relies on selecting the correct materials and applying appropriate protection (paints, applied finishes, protective materials, physical separation or exclusion) in the final design and construction of the building.

Requirements:

This DTR applies to the following building and landscape elements:

- All structural and non-structural elements and metals
- External finishes, such as metal roofing and cladding
- Substructure and buried services
- Exposed fixings, external lighting, balustrades and screens, fencing, and utility enclosures
- Wet zones such as bath rooms, kitchens, plant spaces, and pool areas
- Fixtures and fittings, including plumbing, metalwork and any other areas where dissimilar metals may be encountered.

Corrosion protection methodology and detailing are to mitigate against corrosion associated with, but not limited to the following scenarios:

- Outdoor atmospheric exposure – if component is installed externally
- Nearby corrosive activities – if installation is near high risk activities (e.g. airborne pollutants and acids, near industrial zones, or in aggressive micro-climates.).
- Marine influence – if site is within proximity to the coastline and exposure to sea salts. I.e. Categories C4 and C5 as defined by AS4312.
- Dissimilar metals - if there is direct contact with galvanically incompatible materials or contact with water run-off from such materials.

Warranties:

- Adhere to the manufacturer's recommendations on the suitability and compatibility of their metal roofing, cladding, protective coatings, and rainwater accessories. Obtain written confirmation and warranties from the manufacturer verifying that these products are suitable for the intended exposure conditions.
- Warranties are to be as high available from the manufacturer based on the site exposure conditions.

Refer to:

Including but not limited to the following:

- 1.3 Warranties
- 6 Buildings
- Other applicable sections within this document.

6.4.2 Corrosion

Preamble:

Metals are vulnerable to attack from certain atmospheric gases and particles including salts, industrial fallout, and acids.

Requirements:

- In severe corrosive environments where use of metal is necessary, design for the location and selected metal, considering maintenance provisions and protective measures including coatings.
- Where the protective coatings are unable to provide suitable protection to meet the warranty periods required under School Infrastructure warranties periods, provide substitute materials. E.g. substitute steel roof sheeting with Aluminium.
- Where elements of the structure are difficult to access or replace, the chosen product and protective coating (if required) must achieve the nominated warranty period without maintenance.
- **Protective Coating:** Steel protective coatings are to comply with AS/NZS 2312 parts 1 and 2. Time to first maintenance of applied finishes are to be specified on the drawings (15 years UNO).
- **Purlins:** Steel purlins are to be electro-galvanised or zinc coated to mitigate condensation risks under roof sheeting. Coating types for exposed purlin sections are to be compatible with the specified time to first maintenance.
- **Marine or severe marine environments:** (C4 and C4 AS4312: Stainless Steel for embedded items in masonry (e.g. lintels and cavity ties) are to be specified. Facade secondary steel, tops hats and fixings are to also be Stainless Steel in Marine or Severe Marine environments
- **Concrete durability:** The concrete strength grade and reinforcement cover required for reinforced concrete elements are to comply with the durability requirements of AS3600.

6.4.3 Electro-Chemical Reactions

Preamble:

Galvanic (bimetallic) corrosion between metals occurs when moisture or another electrolyte is present between dissimilar metals. Electro-chemical reactions can also occur between metals and other incompatible materials.

Requirements:

- **Material compatibility**:
  - Do not use galvanically incompatible materials in direct contact.
  - Avoid contact between metal pipework and incompatible metal surfaces.
- **Material Separation:** Where incompatibility cannot be avoided, separate with an inert material (e.g. bituminous, zinc or rubber paints; plastic sheet or tapes; bituminous membrane) and show the separation on drawings/specifications.
- Runoff and Discharge control:
  - Rainwater must not run off from copper, brass or copper alloy onto aluminium, galvanised iron, or Zincalume surfaces.
  - Overflows from copper lined hot water tanks must not be discharged onto aluminium, galvanised iron, or Zincalume surfaces.
- **Aluminium in concrete**: Aluminium structures are not to be embedded into concrete structures (e.g. core drilled and embedded balustrade posts) without providing additional protection).

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6.5 Paint Finishes

6.5.1 General

Preamble:

Paints, powdercoats, adhesives, coatings and stains protect substrates, provide corrosion and moisture resistance, enable hygiene and cleaning, and contribute to the school's visual identity. Specifying the appropriate paint or powdercoat products and applying it correctly is crucial to ensure durability, ease of maintenance and continued aesthetic appeal of finishes.

Requirements:

- Standards and selection:
  - The selection of paints and methods of application must be approved under the Australian Paint Approval Scheme (APAS).
  - Paint and coatings must be the supplier's "Ultra-Premium" product or equivalent.
  - Paint finishes must be selected from table below to suit durability and cleaning performance requirements.
  - UV-resistant paints and powdercoating products must be used where they are subject to direct and reflected sunlight, including internal locations, to prevent colour fading.
  - Paint finishes must be durable and suit wash and wear maintenance for all walls and ceilings in wet areas.
  - External finishes are to be prefinished to ensure durability, impact resistance, and low maintenance.
- Volatile Organic Compound (VOC):
  - Low-VOC products: At least 95% of all internally applied paints, adhesives, sealants, and carpets are required to be within the stipulated 'Total Volatile Organic Compounds (TVOC) Limits'.
- **Application**: Avoid painting external surfaces below 2100mm. This includes Steelwork, Concrete structural elements, walls, or soffits. This requirement will minimise ongoing maintenance. Exceptions where items can be painted:
  - Timber finishes and posts associated with existing buildings may be painted.
  - Painting of surfaces as required for accessibility associated with visual impairments.
  - External solid core doors and door frames.
- **Uniformity**: Coating products used in each installation area and finish type are to be from the same product batch to maintain uniformity.
- **Maintenance access:** Ensure coatings applied to height-restricted areas can be accessed safely for upkeep.

6.5.2 Paint Removal

Requirements:

For removal of paint which is not lead based the following requirements apply:

- Emergency remedial work is to be undertaken when required to secure the material surface, when staff, students and visitors are not present.
- Rectification work is to be undertaken outside of school hours or during holiday periods, when the area is not in use.

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For information regarding management and removal of lead-based paint along with requirements associated with Work Health and Safety.

Requirements for the removal of existing paint from Heritage Buildings include:

- All paint removal techniques for work on Heritage buildings must be confirmed with DoE Heritage.
- Where paint is to be removed it is to be removed using non acidic and nonabrasive methods.
- Heat gun removal is to be avoided.
- Paint removal from masonry and stone to heritage buildings must be carried out by specialist heritage paint removal contractors, and are to be non-abrasive and non-acidic including:
  - Poultice Paint removal systems
  - Water based gentle paint removal systems
  - Proprietary paint removal alkaline systems such as “Peel Away”

6.5.3 Substrate Preparation

Requirements:

- Surface preparation is to be in accordance with the paint / powdercoat manufacturer’s recommendations.
- All surfaces must be clean, dry and dust free prior to application.
- For galvanised surfaces that has been subsequently welded or damaged comply with current applicable regulation.
- For abrasive blast cleaning comply with current applicable regulation.
- All paint systems must include a primer/undercoat as recommended by the paint system manufacturer.
- Any timber internally and externally which is to have a painted finish must be primed all around before fixing.

6.5.4 Atmospheric Conditions and Compatibility

Requirements:

- Assess the site-specific atmospheric environment before choosing a paint or powdercoat system for all metal fixtures including aluminium, organic or inorganic zinc primed metal, hot dipped galvanised metal.
- The project Structural Engineer are to provide a site-specific detailed specification for corrosion protection and coating systems for all structural steel.
- Determine powdercoat systems for interior use based on the measured moisture levels and chemical corrosivity of the internal environment. Supplier advice is to be obtained to confirm suitability of the coating system.
- Powder coat finishes used externally must be formulated to meet AAMA 2604 or AAMA 2605 and be appropriate for the corrosive environment in accordance with current applicable regulation.
- Ensure that any paint system used on steel surfaces is chemically compatible with the specific steel substrate. Supplier advice is to be obtained to confirm suitability of the coating system.

Refer to:

Including but not limited to the following:

- A4312 (Atmospheric corrosivity zones in Australia)

- AS3715 (Metal Finishing – Thermoset powder coatings for architectural applications and aluminium alloys).
- Other applicable sections within this document.

6.5.5 Paint Types and Finishes

Requirements:

- Paint and coating systems used externally must be appropriate for the environment.
- Paint and coating systems used within wet areas must be appropriate for the environment.
- Listed below are paint finish requirements for the interior and exterior of school buildings.

Table 6.5.1 Paint Systems – VOC Limits

Location	Paint Type / Coating System	VOC Limit (G/l)	Additional Performance Requirements
Interior – Walls	Matt or Low Sheen	16	Mould resistant and washable finish
Interior – Ceilings (White)	Ultra Flat	16	Mould resistant
Interior – Ceilings (Other Colours)	Matt or Low Sheen	16	Mould resistant
Interior – Door Frames, Door Leafs, Painted Windows and Painted Trims	Water Based Enamel – High Gloss	75	
Interior – Wet Area Walls	Low Gloss	16	Mould resistant and washable finish
Interior – Wet Area Ceilings	Low Gloss	16	Mould resistant and washable finish
Exterior – Door Frames, Door Leafs, Painted Timber Windows and Painted Timber Trims	Water Based Enamel – High Gloss	75	
Primers, Sealant and Preparation Coats		65	

6.5.6 Powdercoat Finishes

Requirements:

- Powder coatings must be applied by an applicator accredited by the powder manufacturer. The applicator must adhere to the powder manufacturer's application and product specifications for the intended project.
- Powdercoat specification must be specific to site conditions and suitable for the location within the building.
- Powdercoat colours are to be selected from the supplier's standard ranges and be appropriate for the intended application, location and corrosive environment.

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- Selection of custom powdercoat colours requires approval in writing from the Senior Project Director or equivalent Project Lead prior to the commencement of any work.

Table 6.5.2 Powdercoat Systems

Location	Standard Requirement	Coating Technology
Interior – Typical	AAMA 2603, AAMA 2604 or AAMA 2605	Polyester or Fluoropolymer
Interior – Wet Area	AAMA 2604 or AAMA 2605	Polyester or Fluoropolymer
Interior – Wet Area (Accessed Externally within a Coastal Application)	AAMA 2605	Fluoropolymer
Interior – Hydrotherapy Pool	**TBC**	**TBC**
Exterior - Typical	AAMA 2604 or AAMA 2605	Polyester or Fluoropolymer
Exterior - Coastal Applications	AAMA 2605	Fluoropolymer

6.5.7 Sealant for Concrete

Requirements:

Concrete sealant is to have the lowest VOC possible while being 'fit for purpose' for the required application with reference to the following:

- Application to internal floors
- Application to external paving (modular and insitu)
- Concrete finish
- Required slip resistance with reference to current applicable regulation.
- Anti-dusting qualities
- Warranty and maintenance requirements
- Sealant must be selected with reference to the manufacturer's current written Technical and Safety Data Sheets

6.5.8 Line Marking

Requirements:

Line marking systems are to be based on the following colours, widths and systems.

Table 6.5.3 Paint Schedule: Line Marking

Location	Surface	Paint system	Colour	Width
Carpark	Asphaltic concrete	Road marking paint	Yellow	50mm

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Outdoor Games Court - Basketball	Asphaltic concrete With blue, slip-resistant textured sports court coating system to contrast in colour to the colour of line marking	Slip resistant line marking paint compatible with the court surface	Yellow	50mm
Outdoor Games Court - Volleyball	Asphaltic concrete With blue, slip-resistant textured sports court coating system to contrast in colour to the colour of line marking	Slip resistant line marking paint compatible with the court surface	Red	50mm
Outdoor Games Court - Netball	Asphaltic concrete With blue, slip-resistant textured sports court coating system to contrast in colour to the colour of line marking	Slip resistant line marking paint compatible with the court surface	Green	50mm
Outdoor Games Court - Tennis	Asphaltic concrete With blue, slip-resistant textured sports court coating system to contrast in colour to the colour of line marking	Slip resistant line marking paint compatible with the court surface	White	50mm
Gymnasium Games Court - Basketball	Timber	Two-part polyurethane paint system	Yellow	50mm
Gymnasium Games Court - Volleyball	Timber	Two-part polyurethane paint system	Red	50mm
Gymnasium Games Court - Badminton	Timber	Two-part polyurethane paint system	White	38mm
Gymnasium Games Court - Netball	Timber	Two-part polyurethane paint system	Green	50mm
Safety Zones – Hangar Doors	Timber	Two-part polyurethane paint system	Yellow or White	50mm
Safety Zones – Hangar Doors	Asphaltic concrete or concrete	Road marking paint	Yellow or White	50mm

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Safety Zones – TAS Equipment Clearances	Concrete with epoxy finish	Road marking paint	Yellow	50mm

Line Marking: Games Courts

Requirements:

- Line markings for sports courts and run offs are to be based on the dimensional requirements of the sporting standards outlined below.
- Where line markings diverge from the sporting standards outlined within the table below seek approval in writing from the Senior Project Director or equivalent Project Lead prior to commencement of any work.

Table 6.5.4 Games Court Spatial Requirements

Games Court Type	Sporting Standard
Basketball Court	FIBA court dimensions (available through Basketball Australia)
Netball Court	International Federation of Netball Associations court dimensions (available through Netball Australia)
Volleyball Court	FIVB Official Rules (available through Sydney Volleyball)
Badminton Court	Sydney Badminton Association (SBA) court dimensions

Line Marking: Safety Zones

Preamble:

Safety line marking is required to the movement zones associated with sectional overhead doors and to operator and trafficable zones associated with TAS equipment.

Requirements:

- Line marking paint which is included for safety purposes must be appropriate for the floor finish and reviewed by both the paint supplier and flooring supplier.
- Safety clearance markings associated with TAS equipment and overhead opening doors must have a LRV of at least 30 points between the floor finish and line marking.

Refer to:

Including but not limited to the following:

- 9 Specialist Spaces
- Other applicable sections within this document.

Line Marking: Roads

Requirements:

- Paint used for road marking must be a waterborne coating approved for RTA R141 and AS/NZ 4049.3.

6.5.9 Murals

Requirements:

- Where murals are included within schools these are to be applied on a concrete or on Compressed Fibre Cement Sheet substrate fixed to masonry behind.

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6.5.10 Anti-Graffiti Coatings

Requirements:

- Anti-graffiti coatings must be non-sacrificial systems.
- Anti-graffiti coatings must not alter substrate appearance.
- Anti-graffiti coatings must be selected with reference to the manufacturer's current written technical specifications and Safety Data Sheets.

Refer to:

Including but not limited to the following:

- 6 Buildings
- Other applicable sections within this document, including those immediately below regarding paint finishes to existing and Heritage buildings.

6.5.11 Paint Finishes to Existing Buildings

Requirements:

- Paint systems for use on existing vermiculite ceilings must be water based, low VOC, non-toxic specialised vermiculite paint system that bonds, seals and retains the flame-retardant properties of the substrate.

6.5.12 Paint Finishes to Heritage Buildings

Requirements:

- Paint colours for external and internal application on Heritage Buildings must be a heritage appropriate colour scheme.
- New paint colour schemes for Heritage Buildings are required to be submitted to the Senior Project Director or equivalent Project Lead for consultation and approval as suitable from the DoE Heritage Team prior to commencement of any work.
- Paint Systems for external timber trim, windows and doors are to include an oil-based primer and minimum two coats of external weather grade gloss acrylic finish.

Requirements specific to the external surface materials of Heritage Buildings include:

- Painting is to be limited to previously painted surfaces.
- Unpainted external brickwork must not be painted
- External paint colour selections and finishes are to match existing
- If paint colours are to be changed for a Heritage Building or Heritage Item, the proposed new paint colours are required to be submitted to the Senior Project Director or equivalent Project Lead for consultation and approval as suitable from the DoE Heritage Team prior to commencement of any work.
- Damaged paintwork is to be inspected for moisture, contaminant, and salt damage prior to repainting. Where damage is found the source of the damage is to be addressed, and salts and moisture removed prior to repainting.
- Repainting is to ensure operable doors, and windows remain operable and are not over painted
- External timberwork is to be painted with an oil-based primer onto bare timber where exposed, and minimum two coats of weather resistant acrylic gloss finish.
- Existing ventilation openings and weep holes are not to be painted over.

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- Oil based, water repellent, graffiti repellent, consolidant or fully acrylic paint finishes are not to be applied to brickwork or stonework.

6.6 Structure

6.6.1 General

Requirements:

- The structure is to be designed and constructed in accordance with the design drawings and specifications, current applicable regulation and current written product manufacturer's recommendations.
- The structural repair/modification/remediation to Heritage Buildings is to be carried out by specialist consultants experienced in built heritage items including buildings.
- The structural design, where possible, are to minimise or eliminate constraints that make future repairs and modifications difficult. If future modifications are known at the time of design and construction, appropriate provisions must be considered.
- The structure is to comply with current applicable regulation.
- Exception to current editions: If statutory requirements reference other editions or standards, conform to those other editions or standards.
- If statutory requirements applicable to the maintenance or repair works reference other editions or standards, conform to those other editions or standards.
- The structural design is to consider both the short-term functional requirements and a realisation that schools usually have a long service life. Consequently, flexible structural solutions that allow for future adaptability to suit changing planning needs must be considered.
- Framed structures with large column free internal spaces are preferable to load bearing walls.
- Structural system selections are to offer value for money in a Whole of Life (WoL) framework.

The design solution is to be based on the following performance principles:

- Provide a system that is compatible with building form and function, and the architectural intent.
- Have long life span with high durability.
- Have low maintenance requirements and costs.
- Support the imposed loads without impairment of performance. The performance of the structure post-earthquake is required to achieve structural stability, but it is recognised that the post-earthquake functional performance may be impaired.
- Provide a foundation system that considers the site constraints and the geotechnical conditions nominated in the geotechnical report.
- Provide appropriate corrosion resistance considering the local climatic conditions, design life, and time to first maintenance. See also 6.4 for further information.
- Meet the sustainability objectives for the project, and have recycling potential at the end of usable life, and/or include recycled content.
- The maintenance requirements and methods of repair of the structure are to be considered during the design process. The structure is to consider future inspections and maintenance requirements.

6.6.2 Loads

Vertical Loads

Requirements:

- The minimum design loads are to be determined in accordance with AS/NZS 1170 parts 0 to 4.
- The terminology for the use of spaces is based on the Learning Unit/Hub space descriptions. This varies from definitions provided in AS/NZS 1170.1:2002 and is described in Table below.
- The design loads are to be clearly indicated on the design drawings.
- Specific project loading requirements are to be assessed in accordance with AS/NZS 1170.1:2002
- *For dance activities in Performing Arts Workshops a timber sprung floor is to be provided, this will also assist with the vibration performance requirements.

Requirements for Structural Provisions for Access Aids and Equipment:

- The roof/ceiling structure of selected Bath Rooms at SSP, SLH, and other nominated schools must be capable of supporting overhead rail-mounted electric-lifting hoists and overhead tracking rails.
- The construction of walls including accessible Bath Rooms are to, where appropriate, allow for the fixing and associated loads of grab rails, drop down handrails, and back rests.
- Selected spaces of SSP and SLH schools are to have a ceiling hook installed. Fix securely to the ceiling structure or concrete soffit a stainless-steel hook capable of supporting 300kg.

Table 6.6.1 Vertical Imposed Floor Loads

Learning Unit/Hub	Type of Activity (alignment with AS/NZS 1170.1)	Specific Uses	Requirement (Uniformly Distributed Actions / Concentrated Actions)
General Learning Space (GLS) **Support Learning Hub Wood + Metal GLS**	C1	Learning spaces	3 kPa / 2.7 kN
Administration Hub	B	Offices for General Use	3 kPa / 2.7 kN
Staff Hub	B	Offices for General Use	3 kPa / 2.7 kN
Library Hub	E	Reading spaces with book storage	4 kPa / 4.5 kN
Science Learning Hub	C1	Learning spaces	3 kPa / 2.7 kN
Visual Arts Learning Hub	C1	Learning spaces	3 kPa / 2.7 kN
Food + Textiles Learning Hub **OSCH** **Canteen**	B	Offices for General Use / Communal Kitchens	3 kPa / 2.7 kN

Health/PE Learning Hub*	C1	Learning spaces	3 kPa / 2.7 kN
Performing Arts Learning Hub (PE Fitness Laboratory excluded)	C1	Learning spaces	3 kPa / 2.7 kN
Wood + Metal Workshops (GLSs and Store Rooms excluded)	B	Workshops	5 kPa / 4.5 kN
Wood + Metal Storage	E	Storage	10.0 kPa / 7.0 kN
Gymnasium / Hall PE Fitness Laboratory	C4	Dance halls and studios, gymnasia	5 kPa / 3.6 kN
Other bulk materials storage / Kiln area (excluding bag storage or cabinetry area)	E	Storage	7.5 kPa / 7.0 kN
Student Amenities	A2	Toilet Areas	2.0 kPa / 1.8 kN
Stair External Circulation/Covered Walkway	C3	Stair / Corridor	4.0 kPa / 4.5 kN

Horizontal Loads

Requirements:

In additional to the loading requirements nominated in AS/NZS1170 Parts 0 to 4 allow for:

- Internal Wall Pressure
- Free Standing Walls
- Balustrade and Barrier Loading

Roof Loads

Requirements:

In addition to the loading requirements nominated in AS/NZS1170 Parts 0 to 4. allow for:

- All roof structures (with the exception of walkways) are to incorporate structure for the future addition of solar panels.
- A minimum live load of 3kPa for concrete roof elements, as a minimum loading to allow for access and maintenance of any future plant and equipment which may be added (for example, solar panels).
- All loading required for safe access and fall arrest systems.
- Accessible rooftops, including playgrounds, are to allow for the loading resulting from the buildup of all applied finishes; for rooftop playgrounds this may include a second floating slab supported from acoustic bearings.

Internal Wall Pressure

Requirements:

- Internal walls are to be designed for the greater of:
  - The effects of wind pressure resulting from a dominant opening (a single window/door left open or broken).
- A uniform pressure of 0.5kPa applied up to 1500mm above floor level.
- A point load of 0.5kN applied anywhere to the wall up to 1500 high. For stud walls with stud spacings of 450mm or less, this load can be shared between 2 adjacent studs.

Free Standing Walls (Internal and External)

Requirements:

- Freestanding Walls are to be designed for the barrier loads specified in AS/NZS1170.1. This requirement is to be maintained even if there is no change in level.

Balustrade and Barrier Loads

Requirements:

- Balustrade and barrier loading requirements are as nominated in AS/NZS1170.1, and AS/NZS1170.2
- Balustrade and barrier loading deflection requirements are as nominated in AS/NZS1170.0 Appendix C.

6.6.3 Wind Load

Requirements:

- Design for wind actions are to be based on a minimum Importance Level of 3. Use a higher Importance Level where required by regulation.
- The design drawings are to include details of the Terrain Category, Importance Level, Average Recurrence Interval, Regional Wind Speed, and any other design factors determined in accordance with AS/NZS 1170.2.

For internal wind pressures, the design is to assume a scenario where some of the windows/doors have been left open. The internal walls are to be designed for the effects of wind pressure resulting from a dominant opening (a single window/door left open or broken).

6.6.4 Earthquake Load

Requirements:

- The design drawings are to include details of the values adopted for the annual probability of exceedance, probability factor, hazard factor, site sub-soil class and the Earthquake Design Category (EDC) as determined in accordance with AS 1170.4.
- Ensure parts of buildings such as windows, ceiling systems, building services, and similar elements have sufficient stability to remain completely in place when subjected to either earthquake or wind loading.
- The design drawings are to provide earthquake design actions to enable fixings for non-structural components and services to be adequately designed and installed.

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6.6.5 Mine Subsidence

Requirements:

- Where the project is located within a Mine Subsidence Area, design the structures to comply with the requirements of the Mine Subsidence Board.
- The effects of Mine Subsidence induced ground movements are to be added to those due to the normal building movements arising from foundation settlement and seasonal moisture changes of the supporting soil.

Structures located in Mine Subsidence areas will require additional approval from the NSW Mine Subsidence Board. The approval conditions may put restrictions on the type of structure, the material used for the façade construction, and the spacing of articulation joints and building joints. Consultation with the relevant stakeholders is to be undertaken early in the design phase to reduce any potential re-work.

6.6.6 Deflection

Requirements:

- Maximum deflection limits are provided in the following Tables. Deflection limits not indicated are to be in accordance with AS/NZS 1170.0. Appendix C.
- Incremental deflection is defined as long-term deflection minus short-term deflection, and occurs after the addition or attachment of the finish, wall or partition elements
- Long-term creep, when present, needs to be included in assessing the long-term deflection of members.
- For Roof Systems, in addition to the requirements above, long-term deflections are to be controlled to prevent ponding and maintain falls to drainage outlets. Ensure ponding does not occur and the minimum pitch of roof is maintained for falls to drainage outlets.
- The deflection of structural elements supporting operable walls are to conform with the current written requirements of the manufacturer and must not exceed the lesser of 5mm or span/1000.
- Specific site requirements are to be reviewed on a project basis.

Table 6.6.2 Vertical Deflection Criteria for **Floors and Concrete Framed Roofs** - Maximum Deflection Limits

Type	Dead (G)	Incremental	Imposed ($\psi_S Q$)	**Long Term Dead + Imposed ($G+\psi_L Q$)**
Supporting non-masonry partitions	Span/360 25 mm max.	-	L/500	Span/300 30 mm max.
Supporting masonry partitions	Span/360 25 mm max.	Span/1000 or; Span/750 if masonry articulated	L/500	Span/360 25 mm max.
Compactus Areas	Span/360 25 mm max.	Span/750 10 mm max.	L/500	Span/360 25 mm max.

Table 6.6.3 Deflection Criteria for **Steel Framed and Timber Framed Roofs** - Maximum Deflection Limits

Type	Dead (G)	Imposed ($\psi_S Q$)	Wind	Long Term Dead + Imposed ($G+\psi_L Q$)
No ceilings with roof pitch > 30	Span/360	Span/250	Span/360	Span/300
No ceilings with roof pitch < 30	Span/500	Span/250	Span/360	Span/300
Lightweight ceilings with roof pitch > 3 degrees	Span/360 25 mm max.	Span/300	Span/360	Span/300
Lightweight ceilings with roof pitch < 3 degrees	Span/500	Span/300	Span/360	Span/300
Commercial plasterboard and acoustic ceilings	Span/500 25mm max.	Span/600	Span/600	Span/300

Table 6.6.4 Deflection Criteria for **Walls** – Maximum Deflection Limits

Type	Wind Serviceability Limits
Stud Framed Walls (general)	Span/500
Stud Framed Walls Supporting Masonry Veneer	Span/750
Stud Framed Walls Supporting Rendered Masonry Veneer	Span/1000

Mine Subsidence Deflection

Preamble:

Deflections in building structures, arising from mine subsidence are to be considered as additional to all other deflections caused by vertical and lateral loads, as well as by foundation movements caused by soil moisture variations.

Requirements:

- Rendered masonry and non-articulated masonry are to not be used in Mine Subsidence areas.
- Structural and non-structural elements are to have articulation joint spacing, and widths specified to suit the predicted ground movements.

Table 6.6.5 Maximum Deflection Criteria - Mine Subsidence

The deflections in the table are those due to mine subsidence which occur after the addition or attachment of walls or partition elements.

Item	Wall element	Maximum deflection
(i)	Non-Load bearing articulated face masonry	span/500

(ii)	Non-Load bearing face masonry veneer	span/300
(iii)	Non-Load bearing non-masonry	span/200

6.6.7 Floor Vibration

Preamble:

Typically, thin long-span post-tensioned concrete floors, lightweight steel and timber floors, walkways, and stairs are more susceptible to floor vibrations including people induced movements. Verification of the natural frequency and RF value of the nominated floor framing system are to be undertaken.

Requirements:

- The vibration acceptance criteria Response Factor (RF) Limit provided in the Table below are to be achieved.
- Where Playgrounds or Games Courts are located above learning units (for example a rooftop playground in a vertical school), an acoustic and vibration report are to be prepared by an appropriate consultant to determine occupancy comfort levels and mitigation strategies.

Table 6.6.6 Recommended Response Factor Limit

Learning Unit/Hub (Occupancy/Receiver)	Vibration Source	Number of Participants (Source)	RF Limit
General Learning Space Hub Support Learning Hub Library Hub Science Learning Hub Visual Arts Learning Hub Food + Textiles Learning Hub Health/PE Learning Hub Performing Arts Learning Hub Additional Learning Hubs Wood + Metal Technology Learning Hub External Circulation Student Amenities	Single walker in the same space	1	8
	Small groups of runners in the same space	1-3	60
	Rhythmic activities in a neighbouring space	30	8
	Rhythmic activities in the same space but separated (e.g. on the other side of the space)	30	16
Administration Hub Staff Hub OSCH Canteen	Single walker in the same space	1	8

	Unsynchronised groups of walkers (e.g. class moving as a group in corridors)	30	16
Gymnasium / Hall PE Fitness Laboratory	Rhythmic activities – passive bystanders/spectators	30	55-100
	Rhythmic activities – active participants	30	120-200
Stairs	Stairs – heavy use (public)	30	32

Note: A steel and concrete composite floor system are to be classified as a concrete floor.

6.6.8 Loads in Gymnasiums and Halls

Internal Wall Pressure

Requirements:

- Internal walls of the Gymnasium and Halls are to be designed for the greater of:
  - The effects of wind pressure resulting from a dominant opening (a single window/door left open or broken).
- A uniform pressure of 1.0kPa applied up to 1500mm above floor level.
- A point load of 1.0kN applied up to 1500mm above floor level. A point load of 0.5kN are to be applied anywhere to walls above 1500mm.
- The proposed wall lining is to be appropriate for the activities envisaged for the space.

Equipment

Requirements:

- Basketball: Design the roof/wall structure to support basketball frames and their lifting mechanism.
- Gymnastics: Design at least one roof beam to support the following live loads associated with gymnastics (impact effects have been included in these values):

Climbing Ropes

Requirements:

- 6 ropes spaced 750mm apart.
- Design live loads in accordance with Table.

Table 6.6.7 Designed Live Loads Gymnasium Equipment

	Vertical Load	Horizontal Load (any direction)
Any One Rope	5 kN	1 kN
6 Ropes Simultaneously	2 kN/rope	0.3 kN/rope

Roman Rings

Requirements:

- 2 pairs of Roman rings are to be provided.
- Rings in each pair spaced 560mm apart. The corresponding ring in each pair spaced 2300mm apart.
- Load on each ring 3 kN
- Design the beam(s) to support the most critical combination of the simultaneous loads of both the climbing ropes and roman rings.
- Lighting Bars and Stage Curtains: For halls and gymnasiums allow for the provision of lighting bars and stage curtains as required.

6.6.9 Building Movement

Preamble:

The material selected are to be based on the following design principles:

- Have long life span with high durability: Concrete design life 50 years minimum: Steel and Timber framed structures, a minimum of 15 years to first maintenance.
- Have low maintenance requirements and costs.
- Provide appropriate corrosion resistance, durability, and waterproofing. Meets the sustainability objectives for the project.

Requirements:

- The design should consider thermal effects, material stability (for example the dimensional changes in timber with seasonal events), drying shrinkage, deflection, and creep in the design of the structure.
- Where permanent and temporary building joints are proposed to minimise the effects of the above actions, the design is to allow for the articulation of applied finishes, facades, waterproofing, and the elimination of trip hazards.
- Provide expansion strip cover plates and/or dowels to minimise potential differential movements at joint transitions.
- A movement joint schedule is to be provided for all temporary and permanent building joints; this schedule is to document the expected movement of the joints and the required joint width.

Movement joints (both temporary and permanent) in concrete structures are to be located in areas of the structure that are able to be inspected and repaired. External joints are to be located at high points in the slab to ensure that where practical, the water drains away from the joint and not across the joint.

6.6.10 Concrete

Requirements:

Provide cast insitu and/or precast reinforced concrete:

- Conforming to the design details and performance criteria.
- Satisfying quality and inspection requirements.
- Compatible with documented applied finishes.
- Satisfying the requirements of section 2.1 Sustainability and Building Performance.

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— All new concrete are to have a minimum of 20% cement replacement, unless where deemed not feasible due to structural strength, durability or other considerations by the structural engineer.

Refer to:

Including but not limited to the following:

- 6 Buildings
- Other applicable sections within this document.

Formwork

Requirements:

- Formwork design certification: Submit a certification by a professional engineer experienced in formwork design verifying conformance of the design. The design and certification are to consider the construction sequence, propping and re-shoring requirements, stacking of materials, and all other relevant construction activities.
- Typical formed surfaces finishes have been provided in Table below. Specific project requirements are to be assessed by the project team.
- Class 1 finishes to formed surfaces are to only be used with the approval in writing from the Senior Project Director or equivalent Project Lead. Class 1 finish requires a higher degree of care, higher quality materials and comes with a cost premium.
- Collapsible polystyrene void formers are to be used. Cardboard void formers are not to be used without approval in writing from the Senior Project Director or equivalent Project Lead. Significant delays relating to wet weather have occurred due to the use of cardboard void formers.

Table 6.6.8 Maximum Formwork Dimensional Deviation Schedule

Formwork Class (To AS3610)	Deviation From Correct Position (Maximum)	Maximum Misalignment (Between Pours)	Maximum Misalignment (Across Joints)
1 or 1C	10mm	1mm	0mm
2 or 2C	15mm	2mm	2mm

Table 6.6.9 Typical Formed Finished Schedule

Concrete Element or Surface	Surface Finish Class to AS 3610.1	Formwork Lining Type	Bolt Hole Filling
Visibly exposed Columns, Beams, Stairs, Walls, and Slabs.	1 or 2	Plastic faced plywood to AS 3610 Table 3.3.1	Cement grout finished flush
Precast Typical.	2	To comply with AS 3610	Cement grout finished flush

Civil Engineering Works, Unexposed columns, beams, walls, stairs, and slab soffits	3	To comply with AS 3610 Table 3.3.1	Cement grout finished flush
Circular Columns (Exposed to View)	2	Round column formers with lining to achieve Class 2 finish	N/A
Circular Columns Concealed from a general view or to have a thickly applied finish	4	Steel spiral form duct	N/A
Coloured Circular Columns	2C	"Ezytube" with high gloss internal liner or equivalent	N/A

Concrete Insitu

Requirements:

Supply, design, and construct concrete in accordance with current Australian standards.

The documentation and/or specification for concrete elements are to include when required:

- Imposed actions used in the design including earthquake actions.
- Any constraint on construction assumed in the design.
- Class and grade designation of the concrete
- Any required properties of the concrete
- Exposure classification for durability
- The curing procedure
- Layout plans, sections and details. Show clearly on the drawings, all slab thicknesses, beams, sizes, reinforcement and reinforcement cover.
- Required design properties for post-tensioned tendons.
- Fire resistance level (FRL), if applicable.

Durability

Requirements:

- The design is to comply with a minimum 50-year design life, or higher if required by project specifications.
- Concrete elements located within or adjacent to the cavity for an external façade wall are to be designed as an external exposed element for durability and cover requirements.

Concrete Drying Shrinkage

Requirements:

- Testing to AS 1012.13 Methods of Testing Concrete - Determination of the Drying Shrinkage of Concrete.
- The maximum permissible drying shrinkage are to be as follows:

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Table 6.6.10 Drying Shrinkage Limits

Mix Type	Strength Grades (MPa)	Drying Shrinkage Limits
Columns/Walls/ Retaining walls	32, 40, 50, 65	700
RC slabs/beams	25, 32, 40	650
PT slabs/beams	32,40	650
Pads/strip footings inlcuding core bases	32,40	700
Piles	32, 40, 50, 65	700
Mass Concrete Blinding	20	750

Curing Compounds

Requirements:

Use appropriate curing compounds conforming with AS 3799. Do not use wax-based or chlorinated rubber-based curing compounds on surfaces forming substrates to finishes such as concrete toppings and cement-based render.

For liquid membrane-forming curing compounds, ensure the following:

- Certified test results for water retention to AS 3799 Appendix B for liquid membrane-forming compounds.
- Evidence of compatibility with concrete, and with applied finishes including toppings and render, if any, including methods of obtaining the required adhesion.
- For visually important surfaces, evidence that an acceptable final surface colour will be obtained.

Materials

Requirements:

- Coarse aggregate Types: State the source of the aggregate in proposed mix design documentation and on delivery dockets. Obtain approval in writing from the Senior Project Director or equivalent Project Lead before changing the source of the aggregate.
- Cement type: Portland cement to AS 3972
- Regulation: To AS 3600, AS3610.1 and all other current applicable regulation.

Testing

Requirements:

- Provide Project Assessment Strength Grade Sampling in accordance with AS 1012.
- Rejected concrete are to be removed from the site.
- Where testing is delayed due to remote site locations, provide a Specimen Store for temporary storage and provide details of the testing procedures for approval in writing from the Senior Project Director or equivalent Project Lead.

Specimen Store (Remote Site Concrete Testing)

- Required for remote sites where samples cannot be immediately transported to the testing laboratory.
- Construct the store prior to pouring of any permanent concrete on site.
- Purpose: For making and storing of test specimens
- Structure: Provide a level waterproof rigid floor and weatherproof walls and roof
- Store are to be a minimum 2500mm x 1800mm x 2400mm high internally. Provide the structure with a lockable door capable of giving complete protection to the test specimens.
- Storage Conditions: To AS 1012, Part 8, Clause 1.7 for Standard Temperature Zone.

Polymeric Film Underlay

Requirements:

Under slabs on the ground, including integral ground beams and footings, provide a vapour barrier or, in areas prone to rising dampness or salt attack, a damp-proofing membrane. Installation to AS 2870 clause 5.3.3.

Post-Tensioning Live Ends and Pan Pockets

Requirements:

- PT live end stressing pockets are not suitable in schools in exposed slab edges.
- Pan stressing is to be avoided in areas where the concrete finished surface is exposed to view or weather. PT pans create unsightly cracking and provide a weak point for water ingress.
- Where pans are unavoidable, the completion of the pan patching is to be inspected and approved for suitability and quality of finish by the Senior Project Director or equivalent Project Lead. The patching is required to be free from imperfections, level with the adjacent concrete, and not create a slip or trip hazard.

6.6.11 Concrete Falls

Requirements:

Surfaces exposed to rain, including wind driven rain, are to be documented and installed with falls to redirect the water to drainage outlets and/or away from building envelopes and prevent ponding

- **Minimum falls in suspended structural elements are required to be 1 in 80**. The long-term deflection of the structure (10 years) is to be considered and included when obtaining the minimum falls and the location of drainage outlets.
- **Exposed slab on grade elements is to be provided with minimum falls of 1 in 100**. In schools located in climate zones where ice can form, the minimum falls are to be increased to 1 in 80.
- If unintentional ponding occurs on the completed concrete surface, rectification is required to be undertaken.

6.6.12 Concrete Finishes

Requirements:

- Provide finishes to formed and unformed concrete surfaces.
- Formed surfaces: To AS 3610.1.
- Unformed surfaces flatness: Use a straightedge placed anywhere on the surface in any direction, for the documented class of finish.
- Class A finish is to be minimised on the projects to only include essential areas. This is due to the difficulty in achieving class A finish. Where the finish class is specified but not achieved, the concrete is to be rectified by grinding or the application of an applied finish

Table 6.6.11 Flatness Tolerance Class Table

Class	Measurement	Maximum Deviation (mm)
A	3 m straight edge	4
B	3 m straight edge	6
C	600 mm straight edge	6

Table 6.6.12 Typical Unformed Finishes Schedule

Location	Flatness Tolerance Class	Public Finish
Internal Slab on the ground	B	Steel trowel finish
Internal Suspended slab.	B	Steel trowel finish
External pavements and walkways. Internal and external ramps	B	Cove Float finish or Broom Finish
Base to all tiled and granolithic finishes	B	Float finish (alternately steel trowel then broom finish).
Car park slabs. Any external areas with membrane applied.	B	Float finish.
Areas to be vinyl finished. Stairs.	A	Steel trowel finish
Precast elements	A	Steel trowel finish equivalent to Class 2 Formed surface finish.

Refer to:

Including but not limited to the following:

- CCAA Data Sheet Tolerances for Concrete Surfaces.

  Typically applied finishes for each flatness tolerance class are:

  - A: Resilient finishes.
  - B: Unfinished (plant spaces), carpet, Floor tiles glued down, substrates for bituminous coatings.
  - C: Floor tiles on screed (scored finish)
- Applicable sections within this document.

6.6.13 Steel

Requirements:

- Supply, design, and install steelwork in accordance with current Australian standards.
- Structural steel: To AS 4100.
- Design, installation and testing of post-installed and cast-in fastenings: To AS 5216.
- Fabrication and erection: To AS5131

The documentation and/or specification for steel structures and elements are to include when required:

- Imposed actions used in the design including earthquake actions.

- Any constraint on construction assumed in the design.
- The service category (SC), Fabrication Category (FC) and Construction Category (CC) to AS/NZS 5131
- Grade and size of the steelwork sections
- Layout plans, sections and working details. Show clearly on the drawings, steel framing, member orientation and connection details including bolting and welding to enable shop drawings to be produced.
- Required finishes for durability.
- Fire resistance level (FRL), if applicable to structural members.

Materials

Requirements:

- Structural steel: To AS 4100.
- Light gauge cold formed steel structures: To AS/NZS 4600
- The use of Low-E steel and recycled steel are to be considered where structural objectives are maintained.
- All bolts (except for purlins) are to be minimum of M16-8.8/S. Use larger diameter bolts as the design requires. All bolts, nuts and washers are to be hot dipped galvanised. Holding down bolts (grade 4.6) may be black steel bolts if fully encased in concrete.
- Anchor connections to concrete are to be designed in accordance with AS5216. Where the design is based on a proprietary product, these products and design requirements are to be nominated on the design drawings.

Testing: required for all post-fixed anchors, minimum testing requirements of 5% of all anchors.

PURLINS

- Bolt fixings of purlins are to be in accordance with manufacturer's details.
- Do not hang any load from purlin flanges. Any hangers for ceilings and services etc. must be fixed to the web of purlins.
- Provide additional purlins as required for supporting services and trimming roof penetrations etc.
- Purlin members are not to have additional penetrations installed for services or ventilation.
- Bridging is to be installed in accordance with the manufacturer’s recommendations.

WELDING

- Welding electrodes, weld type and weld length are to be indicated on any drawings prepared for the project.
- All welds are to be shop welds. Site welding is not to be used, unless approved suitable in writing by the Senior Project Director or equivalent Project Lead. Where site welding is unavoidable, the methods of repair of any applied finish and corrosion protection are to be specified and included in the approval.

Execution

Requirements:

- Submit shop drawings and any supporting documentation providing the range of information required for the shop detailing documentation as described in AS/NZS 5131.
- Provide corrosion protection to the Structural Steel elements as follows:

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  - For 15 years to first maintenance, nominate corrosion protection for all structural steelwork whether external or internal, in accordance with the requirements of "AS 2312 Guide to the Protection of Structural Steel Against Atmospheric Corrosion by the Use of Protective Coatings".
  - For exposure classification C2 or higher use a galvanised system for all exposed external steelwork and those elements which are not easily accessible for future maintenance (e.g. columns in a wall). Based on this system, use further coating mass in terms of galvanising or painting to comply with the 15-year requirement, as necessary.
  - Notwithstanding any other requirements, all cold-formed structural steel (Purlins and Girts) are to be zinc coated with a minimum coating mass of 350g/m^2. Provide additional protection as the design exposure conditions require.
  - Provide protection to steelwork directly in contact with the ground, by providing encased concrete protection.
  - The requirements for galvanising structural elements are to not apply to temporary structures.
- All Stainless steel used are to be Grade 316 or Grade 304.
- Design all steelwork to ensure deflections are within acceptable limits.
- Set out purlins/battens accurately to the desired pitch. Maximum deviation permissible is 5mm over any 1200mm span below the decking line (line between eaves and ridge).
- Maximum vertical tolerance 2mm at abutting ends of purlins. The plane of the purlins is to be checked by and approved suitable in writing by the Senior Project Director or equivalent Project Lead prior to any roof sheets being fixed in place.
- Protect dissimilar metals to prevent corrosion.

6.6.14 Light Steel Frame

Requirements:

- Supply, design and install light steel framing in accordance with current Australian standards.
- Structural steel: To AS 4100.
- Cold formed steel structures: To AS/NZS 4600

The documentation and specification for light steel framing are to include when required:

- Imposed actions used in the design including earthquake actions.
- Any constraint on construction assumed in the design.
- Grade and size of the steel sections
- Layout plans, sections and working details. Show clearly on the drawings, steel framing, bracing, hold down points, member orientation and connection details including bolting and welding.
- Required finishes for durability.
- Fire resistance level (FRL), if applicable to structural members or build up (e.g. Fire Wall)

Corrosion Protection

Requirements:

- Further to 6 Corrosion and Electro-Chemical Reactions provide minimum corrosion protection to the Structural Steel elements as follows;
  - Purlins and Girts used in conjunction with structural steel framing: provide a minimum zinc coating mass of 350 g/m^2 (Z350). Provide additional protection as the design requires to suit the service conditions.

- For internal non load bearing partitions and ceilings: provide a minimum zinc coating mass of 275 g/m^2 (Z275).
- For light gauge steel trusses: provide a minimum zinc coating mass of 350 g/m^2 (Z350). Contractor is to demonstrate that the coating thickness is sufficient for the exposure environment. Provide additional costing mass where required due to the exposure classification.

Base Metal Thickness

Requirements:

- Minimum thickness of base metal of studs, tops hats and ceiling joists and noggings etc. is to be at least 0.75mm.
- Minimum thickness of base metal of purlin/girt sections to be at least 1.5mm.

Fixings

Requirements:

- Fixings of light steel framing members to each other, structural steel and/or concrete are to be designed in accordance with AS4600, AS 5216, and AS4100.
- Fixing of applied finishes and cladding to be in accordance with the manufacturer's details. Ensure that the proposed fixings, material section and fixing details are compatible.
- Ensure dissimilar metals corrosion is prevented.

Serviceability

Requirements:

- The framing deflections are to be limited to ensure compatibility with the finishes.

6.6.15 Timber Frame

Requirements:

- Supply, design, and construct timber in accordance with current regulation.
- Timber Structures : To AS 1720 and AS 1684
- Timber Roof Trusses: To AS 4440

The documentation and/or specification for timber framing are to include when required:

- Imposed actions used in the design including earthquake actions.
- Any constraint on construction assumed in the design.
- Grade, size and moisture content of the timber sections.
- Durability requirements and required finishes or treatment.
- Layout plans, sections and working details. Show clearly on the drawings, timber framing, bracing, hold down points, member orientation and connection details including bolting and fixings to supporting elements.
- Fire resistance level (FRL), if applicable to structural members.

The selected Structural timber is to;

- Be termite resistant or treated to be termite resistant to the appropriate hazard level.
- Be appropriate for the durability conditions and exposure environment
- Where required has had a preservative treatment applied
- Be sustainably sourced or plantation timber. Provide certification for the timber supplied.

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- Mass Timber: Obtain approval in writing from the Senior Project Director or equivalent Project Lead prior to designing any Mass Timber Structures.
- Natural durability classification to AS 5604 Table A1 (minimum): Durability class 2, or preservative treated timber of equivalent durability.
- Timber members that are not protected from weather exposure and associated moisture ingress to be durability Class 1 hardwood to AS 1720.2, unless the exposure is of a temporary or short-term nature. Protection does not include surface coatings.

Materials

Requirements:

- Timber to be Certified: All timbers.
- Certification to include: Species (all timbers)
- All timber is to be certified under at least one of the below three certification pathways, or is from a reclaimed source:
  - Forest Stewardship Council (FSC) certified
  - Programme for the Endorsement of Forest Certification (PEFC)
  - Responsible Wood in accordance with AS-NZS 4708:2021
- Structural timber branding: Brand all structural timber, structural plywood, and plywood Include the following data:
  - Stress grade.
  - Method of grading.
  - "Seasoned" or "s".
  - The certification mark of the quality assurance program.
- Submit a supplier's certificate showing that the timber complies with the specification including Source and Chain of Custody certification is to be submitted to the Senior Project Director or equivalent Project Lead for review and record.

Moisture Content

Requirements:

- Make milled or dressed products from timbers seasoned, when tested to AS 1080.1;
  - to within 3% of the equilibrium moisture content (EMC) appropriate to the timber and its intended conditions of use.
  - to not greater than 15% nor less than 10% moisture content; and
  - with no more than 3% difference between any two pieces in any one group.
- Submit evidence of moisture content to the Senior Project Director or equivalent Project Lead for review and record.

Termite Management

Generally, one of the following alternative termite resistant timber species or preservative treatments against termite attack is to be used for framing.

- Naturally termite resistant timbers to 3660.1 Appendix C
- Preservative treated timber to the applicable hazard class to AS1604.1.

Refer to:

Including but not limited to the following:

- 6 Vermin Control
- Other applicable sections within this document.

6.6.16 Wall Frame

Requirements:

- The wall studs are to be laterally supported at the base and at the top to withstand wind pressures, earthquake loads, and any other loads specified, and in accordance with the relevant Australian Standards.
- Provide additional support in the form of noggings, trimmers, fixing blocks for aluminium/steel door frames and aluminium windows, studs for support and fixing of lining, cladding, hardware, accessories and fittings.
- Maximum spacing of noggings: 1350 mm centres.
- In addition to other design loads, all wall framing is to be designed to support the following loads:
  - Up to 2 rows of 300mm wide shelves. Each row of shelves is to be capable of supporting a vertical load of 50kg/m length of the shelf.

6.6.17 Roof Frame

Requirements:

Design, Install and Construct Roof and Truss Framing:

- Conforming to the requirements of AS4600, AS4100, NASH-1 or NASH-2.
- Integrated into the building including coordination with all services.
- Compliant with the current applicable regulation where required to be smoke or fire-rated walls.
- Suitable for the fixing of linings, and cladding.
- Independently designed and certified by a registered structural engineer for the design and the erected framing in place.
- Design exposed bottom chords of roof trusses to carry a 1kN hanging load at any position. Where appropriate design roof trusses to also stabilise the tops of walls.

Required design and installation are to include:

- Production of shop drawings indicating all Roof bracing, Roof trusses and/or framing members including connection details between the roof framing and the connecting elements.
- Tie down details of trusses/members to support framing (Steel columns may be required due to geometrical constraints).
- Wall Bracing (when required)
- Tie down of trusses/members to wall framing and /or supporting structure.
- Certification is to be provided by a registered structural engineer that the design, fabrication, and installation of the light steel framing, bracing and hold down is structurally adequate for the required loading. Certification is to reference the relevant shop drawings and is to be provided prior to the fabrication of elements.
- The light steel framing manufacturer and installer are required to coordinate the load paths required for bracing and tie down from the roof trusses, through the wall framing to the supporting structure or slab. Details of all hold downs are to be provided with the shop drawings for the truss and wall framing for review prior to fabrication. Hold-down reactions and details are to be provided to the base building structural engineer for review.
- As-built documentation: Required for all roof and truss framing is to be submitted to the Senior Project Director or equivalent Project Lead for review and record.

6.7 Masonry

6.7.1 General

Preamble:

The term masonry is applicable to brickwork and blockwork, which may be within located the landscape, associated with external walls, or internal walls.

6.7.2 Masonry

Requirements:

Requirements within this section cover both structural and non-structural requirements in relation to the design, detailing and specification of masonry.

- Masonry must conform with the requirements of AS3700.

STRUCTURAL MASONRY

- The characteristic compressive strength of load bearing bricks: 20 MPa
- The characteristic compressive strength of concrete blocks: 15MPa, and non-loadbearing bricks:12 MPa minimum.
- The characteristic properties of the nominated masonry units are to be listed on the design drawings.
- Brick Growth: Design brickwork to consider the effects of dimensional changes due to variations in temperature, wetting and drying and long-term chemical changes associated with moisture.
- The 5 year Characteristic Expansion of bricks are not to exceed 0.8mm/m for which compliance certification is to be obtained from the brick supplier.

NON STRUCTURAL MASONRY

- An anti-graffiti coating is to be applied to brickwork only where required by the Senior Project Director or equivalent Project Lead.
- Brickwork must be in standard brick dimensions.
- Blockwork walls are to utilise 140mm and 190mm blocks.
- Masonry units are not to have a soft surface or to be of a porous nature where specified for use in areas likely to be subject to graffiti.
- Ensure that the specified masonry units are not silicone coated.

FINISHES

Note that the following Masonry finishes are restricted:

- Silicone coated bricks are not suitable in schools.
- Banded masonry can only be used with approval in writing from the Senior Project Director or equivalent Project Lead.
- Painted masonry is not suitable in schools on new buildings.
- Painting must not be conducted on unpainted brickwork.
- Bagged finish to masonry is not suitable in schools on new buildings.

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- Brickwork patterns which provide handholds or footholds, such as hit and miss brickwork, must not be used within 3000mm of finished ground level and requires approval in writing from the Senior Project Director or equivalent Project Lead.

6.7.3 Mortar to New Buildings

Requirements:

- Mortar required to AS37000 Table 11.1
- Mortar composition for new work is to be no leaner than 1:1:6 (M3). Where making good existing masonry, mortar strength should not exceed that of the adjacent masonry.
- Admixtures required to AS 3700 Clause 11.4.2.4.
- Plasticisers are not to be used as a substitute for lime.
- Premixed Mortar is not suitable to use in school facilities.
- Retempering of mortar: Prohibited. Discard any mortar that is not used within 90 minutes after adding cement.

Note: In hot dry climates a shorter interval for the discarding of mortar may be necessary.

6.7.4 Parts and Components

Requirements:

- **Bed Joint Reinforcement**: Nominate masonry mesh reinforcement in bed joints in the courses below the top and above the bottom of walls, below and above openings, and at every fifth course. Lap reinforcement around corners.
- **Drainage**: Design and document adequate drainage behind retaining walls at all levels where there is a possibility of hydrostatic pressures being built up, unless the walls have been designed and detailed for these pressures.
- **Capping:** Provide capping to all blockwork walls exposed to weather to avoid water stagnation at the top of the units.
- **Corrosion Protection to Built-in Components**:
  - Provide suitable corrosion protection for all metal items built into or in contact with masonry.
  - Steel products used in masonry are to have a corrosion resistance durability class rating of not less than R2 in accordance with AS2699 and AS3700. Provide a higher rating as the design requires for the service exposure conditions.
  - Steel lintels are to be galvanised with a minimum coating of 600g/m2. Provide additional coating thickness, protective coatings, or substitute with Stainless Steel as the design and AS2699 requires for the service exposure conditions.

6.7.5 Damp Proof Courses

Requirements:

- Provide a Damp Proof Course that complies with AS/NZS 2904.
- Polyethylene products are not suitable to be used in school facilities.

6.7.6 Flashings

Requirements:

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- Flashings, cappings, and junctions with adjacent façade materials including window and doors openings, roof structures are to be indicated on design drawings. Flashings are to be designed to allow for any expected building movements.
- Sealants will fail with time and the masonry flashings are to be detailed to ensure that the failure of a sealant does not adversely compromise the weatherproofing of the building.

6.7.7 Wall Ties

Requirements:

- Includes cavity ties, masonry veneer and flexible ties as appropriate to the service conditions and to the following minimum requirements:

  "Medium duty" for normal cavity construction and at abutments

  "Heavy duty" for wide cavities over 60 mm
- Stainless steel wall ties are to be used when the structure is within 10km of the coastline (Durability Class R3/R4). The minimum durability for any wall ties is Class R2.
- Durability to AS/NZS 2699.1

6.7.8 Expansion and Control Joints

Requirements:

- Determine the location of all joints in walls and show these clearly on the drawings. Provide joints at junctions of different materials, at locations of structural joints, and both vertically and horizontally as required for material movements.
- Where masonry extends vertically over multiple levels, provide a horizontal shelf angle at each level to support the masonry wall. The horizontal gap under the shelf angle is to be designed for all movements including brick growth, creep, slab deflection, and axial shortening of the structure.
- Joint sealant is to remain functional at the nominated openings. This will result in the joint width being larger than the expected maximum movement.
- Joint width, backing rods/fillers and sealants are to be specified in tabular form on the drawings/specification.

6.7.9 Samples

Requirements:

- Facework sample panels: Submit a sample panel in a suitable position for each type of facework including face or pointing mortar and a finished vertical control joint, as follows: Minimum size (face of panel): 1200 mm high x 1190 mm or closest unit module long.
- Incorporation into the works: An approved panel, if suitably located, may be suitable in schools to be incorporated in the works. Otherwise protect any approved sample panel from damage and retain until completion of brickwork, then remove all traces.
- Mortar samples: Construct two sample panels, 900 x 900 mm in stretcher bond using different selected shades of mortar. Footings: 2 Courses of 230 mm brickwork.

6.7.10 Documentation

Requirements:

The documentation and/or specification for masonry elements are to include when required:

- Imposed actions used in the design including earthquake actions.
- Any constraint on construction assumed in the design.

- Type, strength and coefficient of expansion of each masonry unit.
- Type and properties of the mortar mix.
- Exposure classification for durability.
- Fire resistance level (FRL), if applicable
- Layout plans, sections and working details. Show clearly on the drawings, masonry walls, joint locations, wall stiffeners, tie schedule, connection to concrete and steel elements, reinforcement and reinforcement cover.

6.7.11 Masonry in Heritage Buildings

Requirements:

- Stone selection, repair, repointing, and replacement requires a stonemason, heritage specialist advice and consultation with DoE Heritage in all instances.
- Historic stonework must be conserved and retained.
- Where replacement is required, partial or full replacement stone is to match original in size, profile, strength, porosity, colour, and finish. This must be undertaken by specialised stonemasons.
- Face brick work and face stonework must not be painted.
- No new penetrations through historic stonework are acceptable. Service and conduit pathways are to be located in unobtrusive areas and through non-significant parts of the building.
- Penetrations into historic brickwork are to be avoided, use existing conduit paths, be unobtrusive, and should ensure that once made the penetrations do not allow water ingress.
- Where original brickwork is being dismantled - salvage, clean, and store brick for future repair and reinstatement.
- Where special profile, or rare coloured bricks are present these must be protected from damage and retained for reinstatement.
- Where new bricks are required to patch or repair external facades, contact DoE Heritage to support brick-matching.
- New bricks within a Heritage Building must closely match original brick's type, profile, colour, strength and porosity.
- Prioritise use of original bricks on external visible faces, and place new bricks on interior facings or where least visible

6.7.12 Mortar in Heritage Buildings

Requirements:

- Mortar is to be selected and tooled to match the existing historic mortar colour composition and joint finish.
- Mortars for brickwork and stonework are to be softer than the masonry type, and sacrificial as a replaceable element within the façade as follows:
- Stonework – investigate original mortar type and mix and match to this. Max strength 1 Lime: 2-3 Sand
- Brickwork 1860 – 1900 – 1 Lime: 2-3 Sand
- Brickwork 1900 - 1950 – 1Cement: 2Lime: 6Sand
- Removal of defective mortar must not use mechanical machine tools, and must be done using handheld low impact tools

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- Mortar replacement and repair of whole Heritage Buildings must involve consultation with DoE Heritage
- Inappropriate modern cementitious mortar repairs to Historic Buildings must be investigated for removal and replacement. This work can only be carried out by specialist heritage brick and stone masons. Seek coordination from the Senior Project Director or equivalent Project Lead to consult with the DoE Heritage Team in resolving solutions for all mortar repairs.

6.8 External Cladding

6.8.1 General

Preamble:

Selection of appropriate surface finishes must consider the activities to be conducted in the area, be robust and low maintenance.

Requirements:

Key considerations in materials selection and detailing are:

- External materials are to be fire resistant, robust, economical, resist vandalism including arson and locally sourced.
- External cladding must meet the requirements for AS 5113.
- Materials that have a surface coating which can be scratched or damaged and cannot be repaired on site must not be used below 3000mm Above Finished Floor Level.
- External cladding materials must be pre-finished and be readily available commercial proprietary systems.
- External cladding systems must recladding systems must remain intact and waterproof under the local climatic conditions
- Termite resistant materials must be used.

The following products and finishes are not suitable in school facilities:

- AAC Cladding must not be used in school facilities.
- Hardwood planks must not be used in school projects due maintenance requirements except for repair of existing and heritage listed buildings which are already clad in hardwood.
- Vinyl, PVC and uPVC cladding must not be used in school projects due to durability issues.
- Timber Weatherboards must not be used in school projects, except for repair of existing and heritage listed buildings which are already clad in weatherboard.
- Aluminium composite cladding, sandwich or SIP panel systems with a combustible core must not be used.
- Facade systems featuring “ceramic textiles” based on interwoven steel wire mesh and enclosed in ceramic tiles are not to be used.
- External painting must only be used in areas not accessible to students or the public.
- Use of toxic or hazardous materials is not suitable in schools.

Refer to:

Including but not limited to the following:

- 2 Building Performance
- Other applicable sections within this document.

6.8.2 Impact Resistance of External Finishes

Requirements:

- External walls must be of impact resistant materials or build up, to a minimum height above ground level of 2100mm (door head height) within areas that are accessible to students. Materials which are impact resistant for the purposes of this requirement include the following:
  - Concrete
  - Masonry
  - Compressed Fibre Cement, where the specification and detail is confirmed by a Facade Engineer to be impact resistant.

6.8.3 External Wall Construction Details

Preamble:

Detailing of the design must be appropriate to the location and individual requirements of the project.

Requirements:

- Details and materials must allow for differential movement, thermal stress, ultraviolet degradation, trade tolerances and robust use.
- Materials and details must provide adequate means of dealing with vapour pressure, condensation, corrosion and thermal movement.
- Reliance on silicone sealant at junctions between structure and metal sheeting is not suitable in schools.
- Avoid structural struts or ledges in details that could provide bird perches or provide a handhold for climbing.
- Protruding features are not suitable in schools from finished ground level to 2100mm above ground level.
- Surfaces with sharp edges are not suitable in schools from finished ground level to 2100mm above ground level.

6.8.4 Compressed Fibre Cement

Requirements:

- Compressed Fibre Cement minimum thickness: 9mm.
- Compressed Fibre Cement must be through colour.
- Pre-finished Compressed Fibre Cement cladding which is not through colour may only be used from 3000mm Above Finished Floor Level.
- Compressed Fibre Cement cladding must not be used below 3000 Above Finished Floor Level on SSP School Types.
- Fasteners are not to be overdriven.

6.8.5 Existing Sheet Linings to Heritage Buildings

Preamble:

Asbestos sheet linings may be present as part of an early to mid 20thc heritage building.

Requirements:

- Where this is the case, the asbestos can be removed and replaced with a matching modern fibre cement material using the same pattern layout and trim detailing.

Refer to:

Including but not limited to the following:

- Applicable sections within this document.

6.8.6 Metal Cladding

Requirements:

- Metal cladding must be a proprietary rolled profile using the minimum BMT which meets all performance requirements.
- The ribs of steel wall sheeting systems must be run vertically to minimise dirt collection.
- Fixings, including fasteners and hole sizes, must be in accordance with the cladding supplier's tested systems and in accordance with any installation manuals prepared by the supplier.
- Include stiffening ribs in the metal cladding panel profile.
- Ensure adequate allowance is made for thermal or structural movement.
- Fasteners are not to be overtightened.
- Metal cladding must not be used below 2100mm Above Finished Floor Level.
- Metal cladding must not be used below 3000 Above Finished Floor Level on SSP School types.
- If metal panels are used under 2100mm Above Finished Floor Level the specification must be reviewed by a Facade Engineer to advise impact resistance.

6.8.7 Ventilated Facade Systems

Requirements:

- Terracotta and brick slip ventilated facade systems are to only be used with approval in writing from the Senior Project Director or equivalent Project Lead.
- Fixing methodology must be in accordance with the cladding supplier's tested systems and in accordance with any installation manuals prepared by the supplier.
- Terracotta and brick slip ventilated facade systems must not be used below 2100mm Above Finished Floor Level.
- Ventilated facade systems must not be used on SSP School types.

6.8.8 Concrete Facades

Requirements:

- Textured concrete façade finishes must not have sharp edges.
- Pigmented pre-cast concrete is to only be used with approval in writing from the Senior Project Director or equivalent Project Lead.
- Any exposed concrete facades or columns must be Class 2 Concrete.
- Exposed concrete structural elements, walls, and soffits are to be unpainted.
- Anti-graffiti coating is required up to 3000mm Above Finished Floor Level where concrete facades or columns form part of the site boundary or where concrete elements are identified as being at risk of vandalism by School Infrastructure's Security Unit.

6.8.9 Concrete Samples and Prototypes

Preamble:

To benchmark colour consistency test samples of concrete finishes must be produced for inclusion within the works.

Requirements:

- Concrete sample discs must be provided by each supplier demonstrating the various mixes and specified colour ranges.
- A 500mm x 500mm finished sample of each type of precast concrete finish are to be provided using the proposed formwork/moulds, proposed mix and ratios, colour oxides and final surface treatments.
- Laboratory samples of Class 1 (special class precast panels) and Class 2 (normal class) are to be provided to ensure the proposed mix will produce the desired colour and texture.
- The tonal range and colour control are to be within the scale defined in AS 3610.1 for the specified class of concrete.

6.8.10 Render

Plasterwork and Render to Existing Buildings

Requirements:

Render must not be used in the design of new school buildings.

Where render is used in the repair of existing facilities, the following requirements apply:

- The specified render must have test certification demonstrating compliance with AS1530.1.
- Rendered finish must be painted and colour matched to the surrounding existing render.

Plasterwork and Render to Heritage Buildings

Requirements:

- Historic original plasters and renders must be retained and repaired. These may include:
  - External stucco or splatterdash render
  - External set render
  - Internal set render
  - Internal plasterwork*
    - Lathe and plaster (may be present Victorian era teachers' residences)
    - Fibrous Plaster / Horse / goat hair – Early to mid-twentieth century
- Repair to historic plaster and renders must match the composition and application system of the original renders. Tradespersons who undertake this repair work must have experience with heritage plasters and renderers.
- The render materials composition is to be developed to be softer than the masonry substrate (similar to the mortars, as a sacrificial element) and not to contain high proportions of cement.
- Stucco and render finishes to masonry walls are to match the components of the original finish.

6.8.11 Timber Cladding

Requirements:

- Timber Weatherboards must not be used in school projects, except for repair of existing and Heritage Buildings which are already clad in weatherboard.
- Hardwood planks must not be used in school projects due maintenance requirements except for repair of existing Heritage Buildings which are already clad in hardwood.

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6.8.12 Timber Cladding to Heritage Buildings

- Timber framed and clad walls internally and externally are to retain their original profile, detail, and materials.
- Timber cladding and trim is to be repaired and replaced with matching milled timbers to match the profile of the original timbers using full timber components.
- Composite timber products such as laminated timbers, particle board, or MDF are not to be used to replace historic timberwork.

6.8.13 Soffits

Requirements:

Soffit finishes and heights are to be in accordance with the following Table.

Soffit finishes to heritage buildings, including slatted timber vented eaves and timber lining boards, are to be retained and repaired.

Table 6.8.1 Soffit Finishes by Space

Space Type	Space	Soffit Finishes*
TAS	Woodwork and Metalwork Ancillary Workspace	C8
Covered Outdoor Areas	Covered Outdoor Learning Areas and Covered Outdoor Eating Areas - standalone	C8
	Covered Outdoor Learning Areas and Covered Outdoor Eating Areas - under building with conditioned spaces above	C13**
	Covered Outdoor Learning Areas and Covered Outdoor Eating Areas - under building with unconditioned spaces above	C13**
External Circulation	External Circulation – under building with conditioned spaces above	C13**
	External Circulation – upper level with roof above	C13**
	External Circulation – under external circulation associated with buildings	C11**
	External Circulation – covered walkways	N/A
Outdoor Learning Spaces	Tiered Outdoor Learning Spaces - under building with conditioned spaces above	C13**
	Tiered Outdoor Learning Spaces - standalone	C8

*Soffit finishes must be reviewed by project Acoustic Consultant.

**Soffit finish C12 may be required in addition to the itemised finish.

Table 6.8.2 Soffit Finish Options

Code	Finish Type	Requirements

C8	Corrugated, Perforated Metal Soffit	Proprietary perforated and roll-formed corrugated steel zincalume sheet and purpose made accessories forming part of a system to AS 1562.1 Compliance: AS 2728, Category 3 or 4 as appropriate Minimum sheet thickness: 0.42 mm B.M.T Minimum corrugation depth: 6 mm.
C11	Concrete Soffit	Concrete to be Class 3 typically. Concrete to be Class 2 in areas specifically identified as being special features within the project Use of acoustic panels may be required for exposed concrete soffits.
C12	Acoustic Panels	Non-combustible sound-absorbing panel with hydrophobic polyester fibre base Fixing: Direct fix or suspended Thickness: To be determined by project Acoustic Consultant. Panel Size: 1200 x 2400mm (nominal) Specified product must be suitable for external application.
C13	Compressed Fibre Cement	Minimum thickness: 9mm. Compressed Fibre Cement must be through colour when used below 3000mm Above Finished Floor Level. Pre-finished Compressed Fibre Cement cladding which is not through colour may only be used from 3000mm Above Finished Floor Level.

Table 6.8.3 Covered Way and Circulation Soffit Height Dimensions

Element	Height
Covered Way (not attached to building)	Minimum 2700mm from Finished Floor Level to underside of roof eave/soffit
Circulation (attached to building)	Minimum 3250mm

6.9 Roof

6.9.1 General

Requirements:

- Roofs are to have a minimum **4 Degree** single pitched roof falling towards street side.
- Roofs are to cantilever over the walkway on the courtyard side of the building.
- The walkway side of the building is to have a roof which provides protection from rain for the top floor level of the building to a height of 2750mm from finished floor level.
- The profile metal roof material type is to be minimum **0.48 BMT** in a profile to suit the roof pitch.

- Downpipes are not suitable to be located on the walkway side of a building due to their risk as a climbable building component.
- All roofing must be designed and installed in accordance with current applicable regulation as well as the current written manufacturer's specifications.
- Roofing system selections are to offer value for money within a whole of life framework. Specification is to be based on the following performance criteria:
- Remain intact and waterproof under the local climatic conditions.
- Adequate means of managing vapour pressure, condensation, corrosion and thermal movement is to be included.
- All metal roof material, flashings, ridge cappings, gutters and similar must allow for thermal expansion.
- Roofing, accessories and fixings must be galvanically compatible.
- Sandwich or SIP panel systems with a combustible core must not be used in school facilities.
- Built up bituminous flat roofs are to not be used in school facilities.
- Glazed roofs are to not be used, in school facilities except for skylight systems positioned in areas which are not accessible to students.
- The use of hot rolled steel for roofing or guttering elements is restricted to special instances and requires approval in writing from the Senior Project Director or equivalent Project Lead.

6.9.2 Roof Form and Pitch

Requirements:

The overall performance of the roof form will impact the overall performance of the roof; therefore, the following is required:

- Roof forms are to minimise the building envelope (volume).
- The roof slope for metal roofing to buildings and COLAs is to be 4° minimum.
- The roof slope for covered ways may be less than 4°, but no less than the minimum falls stated within the manufacturer's specifications.
- To mitigate against risks of ponding, the specified roof sheeting must be suitable for use on a minimum pitch of at least 2° less than the designed roof pitch.

The following restrictions apply to the design of roofs:

- Roof forms resulting in box gutters are not suitable in schools.
- Valley gutters must be minimised.
- Concealed gutters behind parapet walls are not suitable in schools.
- Seek coordination from the Senior Project Director or equivalent Project Lead to consult with DoE Heritage if it is proposed that roof pitches or roof layouts of heritage buildings are proposed to be altered.

Worked Example:

For a 4° roof pitch the specified roof sheeting must be confirmed by the supplier as being suitable for use on a minimum pitch of at least 2°.

6.9.3 Roof Colour

Preamble:

The colour selected will impact thermal performance of the roofing. Light colours will reflect more of the sun's heat and darker colours absorb more of the sun's heat, which will be transferred into the roof structure.

Requirements:

- Building extensions with an area more than 100sqm are to comply with the SRI requirements outlined within Table below.
- Roof colour must be selected from the supplier's standard range.
- Building extensions with an area less than 100sqm may match the existing roof colour.
- Where subject to requirements associated with the approvals process, the SRI be amended to a higher value.
- Works associated with minor repair of existing roofs may match the existing finishes.
- Roof colour requirements do not apply to heritage buildings.

Table 6.9.1 Three-year Solar Reflectance Index (SRI) requirements

Roof Pitch	SRI
For roof pitch less than 15°	minimum SRI of 64
For roof pitch greater than 15°	minimum SRI of 34

6.9.4 Condensation

Preamble:

Condensation occurs when warm, humid air contacts cold metal decking, potentially damaging ceilings and insulation and promoting corrosion if not controlled.

Requirements:

- A vapour barrier must be provided within the roof build up.
- The vapour barrier must be sealed at all joints, wall junctions and ceiling penetrations.
- Seek confirmation from the project ESD consultant regarding position of the vapour barrier within the roof build up.

6.9.5 Roof Material Types

Table 6.9.2 Roof Types

Building Type	Roof Material Type	Code
All new and refurbished school buildings	Sheet Metal Roof	SM
Walkways	Sheet Metal Roof	SM
Trafficable Roofs **For Instance, Sports Courts**	Concrete Roof ~ by exception and approval in writing from	CR

	the Senior Project Director or equivalent Project Lead.	
Heritage Buildings	Match existing heritage roof.	SM, TR, SR

6.9.6 Sheet Metal Roof

Requirements:

- Sheet metal roofing is to be used for all new schools.
- Sheet metal roofing is to be used for buildings up to 3 storeys high.
- Sheet metal roofing is to be used for covered walkways and COLAs.
- All metal roofing must have a minimum BMT (Base metal thickness) of 0.48 mm.
- Tolerances: Sheet metal roofing, supporting members: To AS1562.1.
- Avoid the use of galvanically incompatible materials in contact with each other or where moisture can carry charged particles of one metal onto a more active metal, particularly in the roof and roof penetration design and installation.
- In atmospheric corrosion zones C4 and greater the metal roof sheeting specification must be approved in writing by the Senior Project Director or equivalent Project Lead.
- Workmanship associated with roof sheeting installation, care, storage, handling, cutting and installation all must be in accordance with the relevant Australian Standards and in accordance with the Manufacturer's recommendations.
- Include support for blanket insulation and safety mesh as required for safe working on roofs.
- Include insulation spacers on top of purlins.
- Insect, rodent and bird proofing to roof sheeting must be provided.
- A metal roof with metal purlins or metal battens, to which the ceiling lining is fixed directly underneath, must have a thermal break installed between the metal purlins or metal battens and the metal deck roofing.
- Roof fixing is to be in accordance with the Manufacturer's recommendations for the Site Wind category, considering the effect of negative pressure based on the roof form and the requirements of AS1562.1.
- Use only self-drilling and tapping screws to AS 3566 of the types, sizes, and spacings indicated in the roof manufacturer's technical data sheets.

Refer to:

Including but not limited to the following:

- 2 Building for Performance
- Other applicable sections within this document.

6.9.7 Roof Top Playgrounds or Sports Courts

Preamble:

Rooftop playgrounds and sports courts require approval in writing from the Senior Project Director or equivalent Project Lead during the Site Arrangement process. Such roofs will feature a concrete roof structure, a trafficable playground or sports surface, a membrane waterproofing system, and may require internal downpipes.

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It is imperative to include a dual concrete slab system when the noise or vibration generated from the playing of sports or other physical activity on the roof top needs to be largely isolated from learning or other quiet environments in the spaces below.

Following approval in writing from the Senior Project Director or equivalent Project Lead, the design of roof top playgrounds or sports courts must meet the following requirements.

Requirements:

- Minimum falls for drainage of 1:80 factoring in long term structural deflections.
- Functional review of the roof top, considering any sports or other activities being performed, must be undertaken by the project Acoustic Consultant and possibly other consultants to determine the acoustic performance requirements of the overall roof system and the upper floor ceiling void build up.
- A dual concrete slab system is to be considered. This involves an upper slab suspended above the structural roof slab by means of an isolation system using pads (or similar).
- Consideration of inspection and maintenance of the structural and waterproofing requirements of the roof structure are to be demonstrated.
- Review of the roof drainage system detailing, including waterproofing membrane systems, and detailed assessment by a specialist Waterproofing Consultant is required.
- Shade structures are to be provided to rooftop playgrounds aligned to the percentage of shade requirements outlined in EFSG Part B.
- Height associated with rooftop shading must be considered within building height assessments for approvals purposes.

Refer to:

Including but not limited to the following:

- 2.2 Acoustics.
- Other applicable sections within this document.

6.9.8 Rooftop Open Space

Note: **This Section is being created.**

Until this section is created please refer to other Parts of the EFSG, and seek direction from the Senior Project Director or equivalent Project Lead for requirements.

6.9.9 Flashings and Roof Accessories

Requirements:

- Roof flashings and similar accessories must provide water tightness.
- All copings, ridging pieces and similar are to be securely fixed and adequately supported to hold their shape. Spacing of fixings are to conform with the Manufacturer's recommendations.
- All roof penetrations to be certified and warranted by the roofing contractor for new installations.
- Sewer vents through metal roofs must be flashed with an up stand of similar material to the roof and fitted with a weathering apron.
- For penetrations less than 50mm use a proprietary penetration flashing (eg Dektite or similar). Only one cable or conduit per Dektite suitable in schools to maintain seal.
- Upstand of apron flashings to be 150mm minimum above the finished roof level, unless a greater dimension is required under AS4654.2 for membrane termination heights.

- Flashings to lap 150mm minimum.
- Slope flashings away from the upstand. Project side flashings over two ribs and lap flashing joints in the direction away from the prevailing wind.
- Provide for expansion and contraction at all flashings in accordance with the manufacturer's current written recommendations.
- Metal flashings must be coloured to match the roofing colour.
- Roofing and flashing materials and their fixings must be galvanically compatible.
- To avoid ponding, all flashings are to have a minimum fall of 1.5 Degrees.
- Flashings are to conform to AS/NZS 2179.1.
- Skylights must include pan flashings extending from the penetration to the ridge.

Table 6.9.3 Roof Flashing and Capping Schedule

Component	Material and Finish	Thickness and Grade	Profile and Size
Barge Capping	To match type of steel roof	0.55 BMT	To be determined by Hydraulic Engineer, Waterproofing Consultant or Architect
Ridge Capping	To match type of steel roof	0.55 BMT	To be determined by Hydraulic Engineer, Waterproofing Consultant or Architect
Apron Flashing	To match type of steel roof	0.55 BMT	To be determined by Hydraulic Engineer, Waterproofing Consultant or Architect
Valley Flashing	To match type of steel roof	0.55 BMT	To be determined by Hydraulic Engineer, Waterproofing Consultant or Architect
Pan Flashing	To match type of steel roof	0.55 BMT	To be determined by Hydraulic Engineer, Waterproofing Consultant or Architect

6.9.10 Roof Safety Mesh

Preamble:

Roof safety mesh must be provided to all roofs as required including covered walkways.

Requirements:

- Permanently fix safety mesh to all roofs and over the entire area to be roofed (including eaves). Safety mesh must remain in place after completion of building.
- Specify and install roof safety mesh to comply with AS/NZS 4389.
- Code of Practice: Must be in accordance with WorkCover's – Code of practice for Safe Work on Roofs. Refer to Safe Work on Roofs - Part 1.
- Other available methods as an alternative to safety mesh must not be used.

Refer to:

Including but not limited to the following:

- 2 Building for Performance
- Other applicable sections within this document.

6.9.11 Roof Drainage and Plumbing

Requirements:

Roof drainage systems must

- efficiently remove and prevent accumulation of rainwater
- direct water away from the building
- minimise ice build-up
- prevent water damage.

Refer to:

Including but not limited to the following:

- 2 Building for Performance
- 5 Outdoor Spaces
- 7 Services
- Other applicable sections within this document.

6.9.12 Roof Access for Maintenance

Preamble:

Safe access for the maintenance of roof surfaces, roof mounted equipment, gutters and down pipes must be provided within the design of the building.

Requirements:

- The method of roof maintenance and safety measures for servicing of roof-top plant and equipment, including ladders, ladder fixing points, walkways and handrails around roof zones, must be identified during the design process for Safety In Design discussion and be approved in writing by the Senior Project Director or equivalent project lead as well as the Asset Management Unit representative.

Refer to:

Including but not limited to the following:

- 2 Building for Performance
- Other applicable sections within this document.

6.9.13 Plant Enclosures on Concrete Slabs

Preamble:

Service plant enclosures can be located on the upper storey of school buildings or on concrete roofs that are associated with rooftop playgrounds where the following conditions are met:

Requirements:

- Plant must be open to the air.
- The plant enclosure must have a UV stable trafficable roof membrane system. The system and falls must comply with AS 4654.1 and AS 4654.2.
- The storey or rooftop must be accessible via a staircase.
- Access to plant equipment must comply with AS1657.

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6.9.14 Roof Mounted Services

Requirements:

Allow for the provision of Solar Panels on the roof based on the requirements outlined within 2.1 Sustainability and Building Performance and 7.2.22 Solar .

Refer to:

Including but not limited to the following:

- 7 Services
- Other applicable sections within this document.

6.9.15 Roofs within Bushfire Prone Areas

Requirements:

Additional requirements in accordance with current applicable regulation are required for roofs within Bushfire Prone Areas.

6.9.16 Roofs to Heritage Buildings

Preamble:

Existing roofs to Heritage Buildings typically have a steeper pitch than other roof types. The pitch is often between 25 - 40 degrees. New work in heritage contexts may require steeper roof pitches than in other locations.

Requirements:

- Corrugated galvanised steel roofing may be used on Heritage Buildings to replace Colorbond roofing to return a building to an earlier roof material.
- Galvanised Roofing and roofing accessories must be minimum z600 grade
- Existing Colorbond roofs can be replaced with like-for-like Colorbond at Heritage Items.
- Slate, terracotta tile or galvanised corrugated iron roofs must not be replaced with products with a Colorbond finish.
- Tiled roofing is to be retained, repaired and replaced with glazed terracotta tiles where remaining.
- Use traditional roofing accessories that are applicable to the existing roof material and type, including malleable/lead flashings and copper or galvanised steel gutters and downpipes, and the like.
- Slate roofing has an 80 to 100-year life span and should therefore be very carefully selected to and constructed to match the original detailing and quality/ functionality of finish.
- Slate roofing is to be retained, repaired and replaced with matching slate roofing where remaining.
- For slate roofing, use traditional roofing accessories including lead flashings and copper or galvanised gutters and downpipes.
- Roof anchor systems are not able to be provided for Slate roofing systems without specialist design.
- Heritage Slate roofing expert and lead worker required for all slate roof work.

Slate Roofing Supply

Preamble:

Slate roofing supply has generally a long lead time as all slate is imported.

Requirements:

Requirements for specification of replacement slate for a slate roof are:

- Slate must be matched to original or sympathetic quarry source in all instances. DoE Heritage must be consulted well in advance of ordering slate for roof replacement works.
- Only the following slate sources must be used for NSW Public Schools roof works:
  - Welsh Penrhyn Slate
  - Welsh Cwt-Y-Bugail Slate
  - Vermont Green slate

Roof Repair or Replacement

Preamble:

Roof repairs and replacements are to be informed by a detailed roof inspection in the first instance to determine the extent of repair required and to identify the source of any roof leaks, blockages, or deterioration. Roof replacements are likely to reveal structural, framing and trim joinery issues that will also require repairs - allowance should always be made for a carpentry component or other structural works in the scoping of the project.

Requirements:

- For Heritage Items, replacement or repair of existing slate, terracotta tile, galvanised corrugated iron and lead flashings must be carried out in consultation with DoE Heritage officers.
- Roof repairs and replacements are to retain in place all original features, roof structure and ventilation systems.
- Roofs should only be fully replaced when the roof has been determined to be end of life, no longer functioning and beyond repair.
- New replacement materials must be like for like and are to match the original materials in profile, colour and material performance. Acceptable roof replacement materials include:
  - Slate roofing (where this is a known current or previous roofing)
  - Terracotta Tiles (where this is a known current or previous roofing)
  - Galvanised Corrugated iron – Z600 Galvanised Iron
  - Lead flashings
  - Galvanised, steel, or copper downpipes and gutters.
- Replacement roofing materials are to match the historic original roofing, or a suitable material contemporary to the age of the building.
- Replacement due to the expiry of the nominated warranty period of a roof is not a reason to replace a roof on a Heritage Building if there is no evidence of water ingress or damage.
- Specialist trades are required for replacement of slate roofing and any work with lead flashing.

6.10 Doors

6.10.1 General

Preamble:

Doors must be long-lasting, offer security, safety under human impact, thermal performance, acoustic performance as well as control ventilation. They must be commercial grade integrated systems that include flexible options and configurations.

Frame, leaf and hardware must be appropriate to the function of the door and the use of the space to which the door is providing access.

Door Types in Schools include:

- Hinged Swing Doors
- Sliding Doors
- Roller Doors and Shutters
- Hangar Doors for Halls
- Operable Walls
- Access Panels
- Door Screens

Requirements:

The following are applicable requirements to all Door Types in Schools.

- Commercial grade systems must be used.
- All glazed doors must comply with current relevant and applicable regulation.
- Use of automatic doors require approval in writing from the Senior Project Director or equivalent Project Lead prior to commencement or any work.
- Where external doors are the main entrance to buildings, they must have full height glazing with mid rails. Door head height may be between 2100mm and 2700mm high.
- Door head height of typical doors must be 2100mm. Highlight glazing may be included above to align with the window system.
- Glazed framed doors which are directly adjacent to windows must be supplied and installed in frames to match the adjacent window frame.
- All edges and external corners of door leafs and their frames including all cut sections must have radius (rounded) corners.
- Aluminium door leafs and their frames must have a minimum wall thickness of 2mm.
- Mid rails are required for all glazed doors. Mid rail position is to align to the height and requirements for an opaque contrasting line, also known as a visual indicator strip, in accordance with AS1428.1.
- For any other existing buildings any new openings must be designed to align with existing building features such as existing door and window heights.
- Doors in pupil accessible areas are subject to extensive wear and tear. The frame, door leaf and hardware must be robust.
- Glazing to doors must be Laminated Safety Glass, minimum 6.38mm thick.
- Door stile width is to be 150 - 200mm.
- The lower perimeters of glazing are set to avoid the footrest of a wheelchair contacting the glass. Glazing in joinery or flush doors are to be as follows: The lower edge of the glazing are to be not less than 300mm or not more than 1000mm above the bottom edge of the door.
- The upper edge of the glazing are to be not less than 1600mm above the bottom edge of the door. Top rail minimum height 60mm to allow for mounting of door closers.
- Mid-rails are required to all glazed doors to reduce glazing size and costs of replacement. Mid rail position must be aligned to the heights outlined under AS1428.1 regarding visual indicator strips.
- Include weather drop seals to bottom rails of external doors.
- Weather bars at thresholds are to have a maximum height of 3mm.
- Threshold steps must be avoided to allow access for wheelchairs and trolleys.

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- Frameless glass door systems are not accepted.
- Pivot doors are not suitable, as they can cause severe injury to fingers.
- Select the frame, leaf, and hardware based on the door's function and the space it serves.
- Mechanical assembly must not be used.
- Where required, weather moulds must be formed from 1.4 mm steel sheet as detailed for external doors. Fix to frames on site to suit reveal openings.
- Existing timber door frames may be replaced like-for-like unless fire requirements apply.
- The finish to aluminium components and their frames are to be:
  - Preferred Finish | **Clear Anodised Finish**
    Thickness of anodised finish to be in accordance with current regulation.
  - Alternative Finish | **Powdercoat finish**
    Not suitable unless approval is provided in writing from the Senior Project Director or equivalent Project Lead.

Refer to:

Including but not limited to the following:

- AS 1428.1 Design for access and mobility
- AS 2047 Windows and external glazed doors in buildings
- AS 1170.2 Wind actions
- AS 1231 Aluminium and aluminium alloys
- 6 Buildings
- 7 Services
- Other applicable sections within this document.

6.10.2 Hinged Swing Doors

Hinged Swing Door Frames

In addition to Requirements in 6.10.1 General within this section, the following are requirements for Hinged Swing Door Frames in Schools.

- The minimum sheet steel thickness for door frames is as follows:
  - Generally: 1.4mm
  - Fire rated door sets: 1.5mm
  - Category "E" and "D" security doors: 2.5mm.

Hinged Swing Door Leafs

In addition to Requirements in 6.10.1 General within this section, the following are requirements for Hinged Swing Door Leafs in Schools.

- All doors must be fitted with a full-length overlapping cover strip at the meeting edges of the door leaves. Strip must be applied by window/door sub-contractor to maintain warranties.

Solid core door leafs must align with one of the following specifications:

DOOR LEAF | Flush door – Laminated Veneered Lumber

Type: Laminated veneer solid internal/external door.

Thickness: 40mm (nominal)

Veneer layers: Radiata Pine species, nominal thickness between 0.5 and 0.85mm. Moisture content (nominal): 4 to12%

Bonding: Glue veneers using MUF or UF in the lay-up with 2 veneers used as cross band. Type “A” or “B” to AS /NZS 2271

Strips: Hardwood edge strip glued with XPVA to give required panel width. Butt jointed or finger jointed for the required length then edge glued as above.

Finishing: Sanded to a 120-grit finish undertaken by the manufacturer prior to delivery.

DOOR LEAF | Flush door – MDF

The flush medium density fibreboard (MDF) door described below is suitable for internal use in dry locations only.

Type: Laminated medium density fibreboard (MDF) internal door. 40mm thick (nominal) solid flush door comprising a single 32mm core sheet of MDF with 3mm thick MDF sheet laminated to both faces of the core. Provide 0.5mm paint grade veneer to both faces of the door.

Glue line: “B” Bond

Edge Strip: Hardwood edge-glued to give required panel width

Marking: In addition to the requirements of AS 2688 - 1.10 the construction of the flush door are to be marked (LA). See AS 2688 1.10 (d).

Restriction: Do not use for external locations or internal wet locations.

DOOR LEAF | Flush Door – Blockboard Core

Type: Flush blockboard core internal/external door. Core plate of timber strips laid edge to edge, fully bonded to each other and to facings each side no less than two sheets of timber veneer.

Thickness: 40mm

Blockboard core: To AS 2688 – Section 5

Sanding: Cross band veneer pressed to core plate and flush sanded to minimise core plate show through before pressing face veneer.

Internal locations: Paint quality 3mm plywood.

External locations: Paint quality external grade 4mm plywood with A bond glue line.

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Face veneer: Close grain face veneers must be used to enable a high-quality paint finish to be achieved.

Vision Panels in Door Leafs

In addition to Requirements in 6.10.1 General within this section, the following are requirements for Vision Panels in Door Leafs in Schools.

- Vision panels are required for doors to habitable spaces and corridors unless an adjacent window is provided.
- The bottom edge of vision panels must be located at 1000mm Above Finished Floor Level, with the glazed aperture measuring at least 800 x 100mm.
- Vision panel glazing is to be minimum 6.38mm laminated safety glass or meet AS 1288, whichever is greater.

Ventilation in Door Leafs

In addition to Requirements in 6.10.1 General within this section, the following are requirements for Ventilation in Door Leafs in Schools.

Where permanent ventilation openings are required, the suitable solutions in Schools are:

- Door undercuts (bottom seals not required)
- High level louvres
- Ceiling grilles

Low level louvres or door grilles are not suitable in Schools. They have a significant risk of damage or vandalism.

6.10.3 Sliding Doors

Preamble:

These provisions apply to the Sliding Doors associated with General Learning Spaces and similar spaces within Schools.

Requirements:

In addition to Requirements in 6.10.1 General within this section, the following are requirements for Sliding Doors in Schools.

- Within new School buildings, the clear height of sliding door openings are to be 2400mm
- Within new buildings, the clear height of sliding door openings are to be 2400mm.
- All sliding doors are to close with a reduced speed using a damping system.
- All door handle positions must comply with AS1428.1 unless the Sliding Door Type is identified as not required to comply with AS1428.
- Force required at all door handles must comply with AS1428.1.
- Limiting stops must be provided to all sliding doors.
- Sliding doors must slide from a top hung track.
- A bottom track with a guide is to be provided, with the top surface of the track flush with the top surface of the adjacent carpet finish.
- Disengagement of sliding door panels from their track is not a suitable outcome and will not be accepted.

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- Sliding doors alone must not be relied upon for natural ventilation.
- Each individual sliding door panel are to be no heavier than 300kilograms in weight.
- All internal glazing panels for sliding door panels are to be clear and transparent.
- If disruptions are an issue between adjacent spaces, obscure film can be applied to the glazed panels of sliding doors in the following locations:
  - The full extent of the lower level glazed panel below the midrail.
  - A total of 400mm in height above the midrail, 400mm in height below the midrail and the full width of a glazed panel.
  - A clear and transparent space in the upper section of the sliding door glazed panel for a teacher to maintain a line of sight and be able to view between adjacent spaces is to be maintained.
- A decorative art decal or film on glazed panels of sliding doors is suitable to be applied. It provides an opportunity for Connecting with Country or school specific reference. The decorative art decal or film is suitable to be:
  - a total of 400mm in height above the midrail, 400mm in height below the midrail and the full width of a glazed panel.
  - located along the central horizontal portion of each glazed panel of a sliding or fixed section of a sliding door. Refer to drawings in Part C of the EFSG.
- All sliding glazed doors between spaces, are required to have a tested acoustic rating of **Rw39**.

Table 6.10.1 Sliding Door Types

Refer to EFSG Part C for Location

Sliding Door Type	Description	Code
Type 1	Three Panel Aluminium Framed Glazed Sliding Door - Two Sliding Doors Panels - One Fixed Panel Sliding panels 'park' in alignment with fixed panel. This Sliding Door Type is required to comply with regulation with relation to universal accessibility, including AS1428.	DOR-412
Type 2	Single Panel Aluminium Framed Glazed Sliding Door Sliding panel 'parks' within cavity of adjacent framed wall. This Sliding Door Type is not required to comply with regulation with relation to universal accessibility, including AS1428.	DOR-511
Type 3	Single Panel Aluminium Framed Glazed Sliding Door Sliding panel 'parks' within cavity of adjacent framed wall. This Sliding Door Type is required to comply with regulation with relation to universal accessibility, including AS1428.	DOR-511

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Type 4	Four Panel Aluminium Framed Glazed Sliding Door - Two Sliding Doors Panels - Two Fixed Panels Sliding panels 'park' in alignment with fixed panels each side. This Sliding Door Type is required to comply with regulation with relation to universal accessibility, including AS1428.	DOR-611

6.10.4 Roller Doors and Shutters

External Roller Shutters

In addition to Requirements in 6.10.1 General within this section, the following are requirements for External Roller Shutters in Schools.

- Roller shutters/grilles must be of security design and are to fit the threshold closely.
- Wind lock end clips and guides to retain the curtain.
- Maximum width: To be reviewed based on wind load.
- Drum deflection: Not more than 1/360 of the drum's span.
- The roller shutter must be capable of being locked in the fully closed position.

Internal Roller Shutters

In addition to Requirements in 6.10.1 General within this section, the following are requirements for Internal Roller Shutters in Schools.

- Roller shutters must be provided to the staff side of reception sliding glazing associated with the Entry Vestibule.
- Roller shutters/grilles must be of security design and are to fit the counter.
- The roller grille must be capable of being locked in the fully closed position and at partly opened positions of nominally 200mm intervals.

6.10.5 Hangar Doors for Halls

Preamble:

Hangar Doors are to be provided to Gymnasiums and Halls to connect with adjacent Covered Learning Areas.

Hangar Doors are to be a proprietary system comprising a door with two off, linked horizontal panels hinged together inclusive of the necessary operating gear, hardware and accessories.

Requirements:

In addition to Requirements in 6.10.1 General within this section, the following are requirements for Hangar Doors in Schools.

- The door frame to be of an all-welded construction.
- The doors are to be weather lapped at the horizontal joints and fitted with rollers running on inside tracks that guide the doors.
- Side tracks: Fabricated from minimum 3.0 mild steel finished equal to door structure.

- Link arms and linkages: Fabricated from minimum 10.0 mild steel finished equal to door structure.
- Counterbalancing: door panel are connected to the counterweight base on cable system.
- Cable Safety Factor: 6:1 (minimum).
- Hangar doors of over 7000mm wide have increased structural requirements, so must be approved suitable for incorporation in writing by the Senior Project Director or equivalent Project Lead prior to commencement of any work.
- Seals:
  - Brush seals or ValuPrene Rubber seal to surround of door
  - Proprietary rubber seals to hinge line with nominal gap of 30mm between top and bottom door leaf

Metal type is to be in accordance with the following options:

HANGAR DOOR | Metal Type Option 1

100% marine grade solid aluminium panel.

Non-combustible to AS1530.1.

Material minimum thickness: 1.6 mm

Maximum door size: 5000mm wide x 3200 high

HANGAR DOOR | Metal Type Option 2

Steel Material with Grade C4500 / C350 minimum thickness: 1.6 mm

RHS Frame
Material minimum thickness: 1.6 mm

Maximum door size: 7000mm wide x 4000 high

Finishes and Lining Requirements

- Lower panels are to be clad in aluminium to a minimum height of 760mm
- Finish: External cladding panel surface factory prefinished both sides in powdercoat from a standard range.
- Panel thickness: 3mm minimum.
- Frame Finish: Powdercoat
- Glazing: Laminated safety glass 6.38mm

Hangar Door Motor Requirements

- Power requirements: 415-volt 3 phase power with neutral, terminated at a power isolating switch where required by the Supply Authority, is required adjacent to the operating side of the doorway opening.
- Controls: Supply a control station for installation with dead-man control and location fixing are 1m Above Finished Floor Level and 1m distance range to the door

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Hangar Door Safety Requirements

- Conceal the motor/counterweight mechanism with a matching cover panel to prevent damage and finger entrapment. Cover is to be minimum 0.48 BMT colorbond sheet and provide service ability from Finished Floor Level to door opening height only.
- Provide door operation safety zone markings on floor to each sidetrack. The marked safety zones.
- The safety zone markings are to be of sufficient distance to prevent people from reaching the track mechanism. Minimum distance from track to line marking: 800mm.
- A safety sign is to be provided adjacent each door.

6.10.6 Operable Walls

Requirements:

In addition to Requirements in 6.10.1 General within this section, the following are requirements for Operable Walls in Schools.

- Folding operable walls must have pinboard finishes.
- Folding door panel size: Equal sized panels not more than 1200 mm wide.
- Suspension system: Overhead structural support with an adjustable track support system all in accordance with manufacturer's recommendations.
- Floors are to be level in the path of the partition with a tolerance of no more than what is suitable in schools by the manufacturer in any direction.
- Jambs are to be plumb. The maximum variation in opening width is to be no more than is suitable in schools or as approved suitable in writing by the Senior Project Director or equivalent Project Lead for each instance. Track are to be adjusted and levelled at installation. Provide sufficient clearance at track ends to permit future adjustments of track without damage to material adjacent to track or partition.
- Accordion doors are not suitable in Schools.
- Accordian doors may be used to replace existing accordian doors with approval in writing from the Senior Project Director or equivalent Project Lead prior to commencement of any work.

6.10.7 Access Panels

Access Panels in Walls

Access panels in walls are only to be provided in spaces unable to be accessed by students and where provided must be vandal proof and heavy duty.

Access Panels in Ceilings

Access must be provided to services and equipment located in the space above the ceiling.

- Access hatches must have a screwdriver-operable latch
- Typical sizes are 450m x 450mm or 600mm x 600mm, however ensure the access panels enables access to meet the requirements for maintenance to suit the required systems.
- Ceiling access panels must have a finish to match the associated ceiling and have a surface that is flush with the ceiling.
- Fire and acoustic ratings of access panels must match the surrounding ceiling.
- Access panels are to be labelled according to the services they provide access to, for example "FCU-##."

6.10.8 Door Screens

Insect Screens for Doors

In addition to Requirements in 6.10.1 General within this section, the following are requirements for Insect Screens to Doors in Schools.

An Insect Screen can double as a Security Screen.

- Insect screens must be installed internally and facilitate easy removal and reinstallation to enable convenient cleaning and maintenance.
- Insect screen mesh must be securely fitted within the frames.
- Frames are to be aluminium extruded sections with channels for high grade security mesh fixing.
- Frame finish and colour: To match window frame finish unless otherwise specified.
- Mesh Finish: Black
- Mesh Type:
  - Below 2100 Above Finished Floor Level: Aluminium or Stainless Steel
  - Above 2100 Above Finished Floor Level: Fibreglass or Plastic
  - Within SSPs: Stainless Steel to whole window
  - Within Bushfire zones: In accordance with AS 3959
- Mesh aperture sizing must be reviewed against the natural ventilation provision required.

Table 6.10.2 Insect Screen Location

Space	Opening Type	Type
Canteen	Door	Screen door with metal framed mesh
Food Technology	Door	Screen door with metal framed mesh
SSP Lifeskills Kitchen	Door	Screen door with metal framed mesh

Security Screens for Doors

Security screens or grilles are required to all windows of Security Category C or higher, as outlined within 6 Building Security for further information.

A Security Screen can double as an Insect Screen.

- Metal screen frame must be fixed to the building structure with tamper resistant fasteners.
- Mesh aperture sizing must be provided for review against natural ventilation provision required.
- Stainless steel security window grilles.

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6.10.9 Door Hardware

Note: **This Section is being updated.**

Until the updated Section is published, the requirements below and on the following pages of content unchanged from EFSG 2025 are to apply.

In addition to Requirements in 6.10.1 General within this section, the following are requirements for Door Hardware in Schools.

- Hinges: Recess frames for screw fixing hinges to 150 x 45 x 6 mm thick backing plates fully welded to frames at hinge points. Drill and tap backing plates to suit machine thread screws for hinges.
- For door leaf widths over 1000 mm wide, reinforce the top hinge backing plate with 250 x 40 x 5 mm M.S. plate and spacers all fully welded to backing plate and frame.
- Doorstops must be included to all hinged glazed doors.
- Provide hold open devices where doors may be kept open for extended periods.
- Seals: Provide purpose made proprietary seals to meet requirements for weather, draught, smoke and acoustic sealing. Seals must not hinder the normal operation of the door. Door closers must be able to close the door at normal latching speeds and for the doors to latch effectively without being obstructed by the seal.
- Proprietary acoustic seals tested to AS 1191, AS 1045 and AS/NZS ISO 717.1 must be included to doors and door surrounds where required to meet requirements for weather, draught, smoke and acoustic sealing.
- Seals must not hinder the normal operation of the door.
- Door closers must be adjustable to enable the door to be closed at normal latching speeds and for the doors to latch effectively without being obstructed by the seal.
- Door handles are to be clearly identified by colour with luminance contrast to their background of not less than 30%.

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0455 Door Hardware

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.

Until an updated version is published, the requirements set out below are to continue to apply.01

General Specification

In accordance with current NATSPEC except as follows:

1.1 Aim

The aim of this specification section is to have uniformity of quality for the products being supplied in accordance with the Education Facilities Standards and Guidelines.

GUIDE NOTE: Delete the relevant NATSPEC Building Template clauses and include the following:

1.2 Cross references

All products utilised must conform to current building code requirements; Building Codes of Australia (NCC) and all relevant Australian Standards.

1.3 Interpretations

General: For the purposes of this work section the abbreviations and definitions given below apply.

Table 01: Abbreviations and definitions

Code	Term	Definition / Notes
KD	Keyed to differ	Each lock has a unique key which will operate that lock only.
KA	Keyed alike	All locks in the group will pass the same key, but that key will not operate any locks outside the group.
MK	Master keyed	The master key will operate all the locks in the MK group, in addition to their KD or KA keys.
Finishes		
SSS	Satin Stainless Steel	No. 4 finish to be used
SCP	Satin Chrome Plate	Fine Linished, then first quality copper, nickel and chrome plating
SA	Satin Anodised	25 microns thickness min.
SAL	Satin Aluminium Lacquer	
SCDP	Satin Chrome Display Pack	
SNP	Satin Nickel Plate	

1.4 Submissions

Materials and components:

Key control system: Submit details of the proprietary key control security system proposed by the lock manufacturer for locks required to accept a group key (master etc or existing).

Key schedule: Submit the Keying Schedule and factory registration details for approval prior to supply of the key system.

Locksets test report: Submit test reports to AS 4145.2 as specified.

1.5 Uniformity

GUIDE NOTE: Product uniformity facilitates more cost effective and convenient long-term maintenance.

Uniformity:

DoE prefer that locks, lock furniture and new key systems have a common brand of manufacture.

02 Product Specification

In accordance with current NATSPEC except as follows:

2.1 Materials

Metal finishes: Electroplated coatings

Chromium plating on metals: To AS 1192. Service condition number 3 unless otherwise specified. Surface finish as scheduled.

Chromium plating on plastic: To AS 1406. Service condition number 3 unless otherwise specified. Surface finish as scheduled.

Cadmium plating on threaded components: To AS 1192. Service condition number 3 unless otherwise specified.

Stainless Steel: To AS 1449 -Type 304. Hardware are to have exposed edges linished to remove sharp edges and burrs.

All hardware to be satin chrome plated or stainless steel with satin finish unless otherwise specified. All Hardware is to conform to AS 4145.2 Table 3.7 Corrosion resistance category C6.

GUIDE NOTE: Door hardware items as nominated hereunder. Finish SCP unless stated otherwise.

2.2 General requirements

Door hardware, supply and fitting

All door hardware must be supplied by suppliers listed on the buy.nsw Supplier Hub or to an equivalent quality and agreed with the Department in writing.

Refer to Figure A1.1 ‘Climate zones for thermal designs’ in the NCC for location and Zone codes. It is to be noted that different climatic Zones have specific requirements for Doors and Door Hardware.

All Stainless-Steel products must be of 304 Grade minimum.

Product manufacturers are liable for any product supplied that is not of the quality specified or has the incorrect technical information to comply with this worksection.

Non-compliant products must be replaced within the set time period at the manufacturer’s cost. Failure to comply with the above may result in removal from the suppliers list for any future work.

Building contractors are liable for any incorrectly fitted product.

Replacement of the item is to be performed at the building contractor’s cost within the set time period allowed for the breech. Failure to comply may result in removal from the contractors list for any future work.

Hardware sets packaging

Package hardware items in individual sets in readiness for installation on each door as scheduled. Each set are to be complete with all necessary fixing instructions, templates and fixing screws. Individually label the contents of each set to indicate door and location information.

Place each individual hardware set in separate heavy-duty clear polythene bags and seal against ingress of dust and water. Attach tags to the outside of each bag identifying door and location information ready for installation.

CONTENT UNCHANGED FROM EFSG 2025

Permanent product marking requirements

Compliance reference mark is to be approximately 3mm depending on available space. This mark is to be of a permanent nature and visible on faceplate, hinges and Cylinders.

Hardware Selection

Requirement: Comply with the Hardware Selection Schedule. Door Hardware Selection, Door Hardware Appendix

Compliance legislation

All door furniture must comply with the current NCC (Building Code of Australia) Section D2.

All Door handles are to be levers and comply with the current AS 1428.1, Design for access and mobility- section 13.5 Door Controls.

2.3 Hinges

GUIDE NOTE: Interfold (Quick fix) hinges must not to be selected for school application.

All hinges and pins to be of 304 grade stainless steel. All hinges are to have compliance markings.

Number of hinges

Two Hinges per Leaf:

- Doors under 25 mm thick not exceeding 1500 mm high or 720 mm wide (eg. solid cupboard doors)
- Toilet/Shower cubicle doors
- Internal doors and screen doors over 25 mm thick not exceeding any of the following:
- Height 2100 mm, width 720 mm, weight 35 kg

Three Hinges per Leaf:

- Doors over 25 mm thick exceeding any of the following:
- Height 2040 mm, width 720 mm, weight 35 kg.
- Aluminium framed doors.
- Doors less than 25 mm thick exceeding 1500 mm high or 720 mm wide.

Wide throw hinges: Wide throw butt hinges to clear reveals must be avoided where possible due to associated maintenance problems.

Table 02: Cupboard hinges

Flush fitting doors suitable for blockboard core or 15 mm minimum thickness solid timber edge strip doors.

Height (mm)	Width (mm)	Thickness (mm)	Hinges	Size (mm)
760	450	20	1 pair	70
2100	450	20	1 1/2 pair	70
1500	600	20	1 pair	70
2100	600	20	1 1/2 pair	70
1500	900	35	1 pair	85
2100	900	35	1 1/2 pair	85

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Table 03: Particle board door hardware

Overlay Doors	Description
Suitable for particle board doors without solid timber edge strips	All metal concealed hinge, screw fixed 3-way adjustment without self-closing mechanism, minimum 1700 opening.

Notes:

- Fixing screws also stainless steel
- 100 x 100 fixed pin hinges with 6mm backing plate for hinge fixing are to be used on doors that are required to open 180 deg with a maximum reveal (opening side) of 25mm.
- Install hinges with undercut stainless screws

Table 04: Types of hinges

Type	Location
Brass butts with Bronze / SS bushes	High traffic areas
Heavy duty butts with sintered lube bushes	Door leaves over 1000 mm wide, fire doors and doors fitted with door closers
Stainless steel butts	Steel frame / timber or fire door
Brass butts foundation access door	Low Traffic Areas
Aluminium Butts	Aluminium Frame / Aluminium Door Clear anodised to match frame. Install hinges with undercut stainless-steel screws.
Stainless Steel Spring Hinges	Timber door / Terrazzo Partitions
Pivot Hinge	Gate hinge – steel with grease nipple (Capacity assumes 2 hinges per leaf – add 25% capacity for 3 hinges)

2.4 Keying

Cylinders

All cylinders are preferred by DoE to be of a non-restricted key type and must comply with to security level Sc8 in AS4145.2, Table 3.3, in the following parts:

- Resistance to picking
- Impressioning
- Bumping
- Drilling

Where DoE requests a restricted master key system it must be a factory built and fully transferable system. The manufacturer, at no cost to the school, is responsible for all electronic records. The transfer of systems is to take no longer than 7 working days from receiving an official letter from the school wishing to make a transfer.

Identification

CONTENT UNCHANGED FROM EFSG 2025

All cylinders are to be marked with the manufacturers branding and SS 455 on the face of the cylinder.

Stamping

All keys and key groups must be Code Stamped as scheduled. Code stamp keys and lock cylinders are to be stored in a secure location.

Labelling

Provide plastic key tags correctly labelled with door number and area description. Attach with split rings a separate tag for each lock and hand over to the Senior Project Director or equivalent Project Lead at completion of the work. Ensure that the school name is included on the separate key tags for the additional two sets of keys specified in **Keying - Number of Keys** section below.

Records

Provide two copies of the Master Key Schedule and factory registration details indicating both new and existing Master Key codes, lock catalogue codes, door numbers and key quantities supplied. Factory Master Key Schedule to include lock manufacturers' keying reference details for future maintenance of the Master Key system.

The two copies of the Master Key Schedule and factory registration details to be handed to the Senior Project Director or equivalent Project Lead i.e. One for the School Principal. One for Security Service Unit

Master keying

Master key locks and padlocks distributed to appropriate groups as scheduled. Where an existing master key system is in working operation and has similar existing master key coding, key the new work to the existing appropriate coding to avoid multiple coding with similar functions. All Master Keying and coding details are to be recorded by the manufacturer in an electronic format.

Keying Schedule: Prepare the Factory Master Key Schedule and submit to the Senior Project Director or equivalent Project Lead for approval prior to supply of the keying system.

Delivery - master keys

Arrange for the manufacturer or supplier to deliver direct to the Senior Project Director or equivalent Project Lead. The Authorised person will acknowledge receipt directly to the hardware supplier.

All other keys: Deliver to the Authorised person on practical completion.

Key codes

Code KA "E": Keyed alike group PW "E", Lockwood cylinders.

Number of keys

Provide keys as set out in Table 05.

Table 05: Key number schedule

Key	Code	Number
Master Keys (existing)	MK	Nil
Master Keys (new)	MK	4 keys per code
Key to differ	KD	2 keys per code
Key to differ (not MK)	KD	4 keys per code
Key alike	KA	6 keys (total) 1 or 2 locks

CONTENT UNCHANGED FROM EFSG 2025

Key alike	KA	10 keys (total) 3 to 10 locks
Key alike	KA	20 keys (total) 11 to 40 locks

GUIDE NOTE: Existing key alike supplies are included when determining above key quantities for existing systems.

Key quantities supplied by the Contractor to be checked against Master Key Schedule key quantities.

All keys, including Master Keys, to be handed over to the Senior Project Director or equivalent Project Lead.

The Principal must retain Two Master Keys, plus two keys per code for designated non-mastered locks for the Schools Security Service Unit.

Key control

Construction keyed cylinders are to be used during construction period, with the master key system to be installed after works are complete.

The Senior Project Director or equivalent Project Lead may provide written approval for use of specific keys, under the master key system after installation of the master keyed system.

Where such approval is received, establish a key control register for recording and coding of keys issued, person accountable, date issued and returned.

Return all keys to the Senior Project Director or equivalent Project Lead when directed.

No keys of the master key system are to be duplicated or replaced without the appropriate written authority from the Senior Project Director or equivalent Project Lead.

Re-key cylinders for any keys not returned and completely re-key all cylinders for any master key not returned. Ensure that the complete master key system still operates as originally designed and provide specified number of replacement keys, all with code stampings.

Key code schedule

Locks must be master keyed in MK code groups as specified. (Locks must NOT be Grand Master Keyed).

GUIDE NOTE: Keying system details are dependent upon school types. Refer to EFSG stakeholder for keying schedules.

2.5 Locks and latches

GUIDE NOTE: Delete Mechanical locksets in NATSPEC building template and include the following.

Mechanical locksets (mandatory)

Standard: To selected parts of AS 4145.2 to meet the following:

Table 06: Mechanical locksets

Section	Clause	Requirement
3.4	Durability designation (Table 3.2)	D8
3.5	Cylinder Security (Table 3.3)	Sc8
3.6	Physical Security (Table 3.4)	S7
3.7	Keying Security (Table 3.6)	K5 -Key Control level 1

Marking: Permanent product marking confirming compliance with the Department of Finance and Services requirements must be undertaken by the manufacturer. The permanent mark must be located on the lockset and to be easily identified when the lockset is installed. Marking of packaging or catalogues without marking the product is not acceptable.

Compliance testing (mandatory)

Full work testing of mechanical locksets must be undertaken at least every five years. Test results are to be made available on request with a maximum lead time of 60 days from request date, from either the current Governing Body or the building contractor performing the works. Failure to conform with the request in the specified time period will result in removal of the product from this Specification.

The first full work testing of the proprietary mechanical locksets nominated in the EFSG Specification Guide must be undertaken and completed by the 30th June 2011 or the manufacturer must provide proof that these tests have been performed within the timeframe nominated in the relevant Australian Standard.

Re-testing must be undertaken five years from the previous test.

The manufacturers/suppliers of the proprietary mechanical locksets are to arrange and pay all costs relating to the testing. Failure to conform will result in the removal of the product from this Specification. The Governing Body has the right to remove all the manufacturer's products if continued non-compliance occurs.

Full work test to AS 4145.2 confirming compliance to the specified durability, cylinder security, physical security levels and compliance with the permanent product marking requirements must be provided.

An independent lock expert must perform the testing of the mechanical locksets, as approved by the Governing Body.

Locksets test report: Provide the latest test reports (see below) prepared by a facilitator in a controlled NATA calibrated testing facility in accordance with AS 4145.2.

Hand one copy of the latest test reports to the Department's Authorised person.

Note: Onsite compliance auditing will be undertaken intermittently.

For fire doors, submit evidence of compliance with the Standard to AS 1905 Part 1 and NCC Spec C3.4.

GUIDE NOTE: Delete locks and latches schedule section in NATSPEC Building Template and include the following

2.6 Door hardware items

Flush bolts

General: Where door leaves exceed 2100mm in height and bolts are fitted, the top bolt should have an extended shoot bolt to allow a maximum operable height of 1800mm from the floor. Provide top angle plates for open out doors and floor sockets or plates for bottom bolts.

General: Flush bolts generally should only be used for aluminium doors and should only be fitted to the door edge and not face fitted. The top bolt are to be extended as for barrel bolts, when required. Flush bolts should not be used for timber doors, skeleton bolts are preferred.

Handles

Requirement: Where pull handles are fitted to external doors, the outside pull handle are to be specified as being "with concealed fixing externally".

Table 07: Handles schedule

Handle	Requirement

CONTENT UNCHANGED FROM EFSG 2025

Latch Handle (Timber Doors)	Minimum: 100 x 13 mm pull on 200 x 45 x 2mm thick end plate (rounded or 10mm radius corners) with cylinder hole at top. Finish: Satin chrome plated on brass or satin finish stainless steel.
Pull Handle (Roller grille)	Minimum: 125mm x 12mm satin chrome plated on brass or satin finish stainless steel pull with 4 fixing holes (2 pairs each end) for screw fixing.

GUIDE NOTES:

Check with each company proprietor to confirm that they can provide the above lockset test report. If the test report cannot be supplied do not include the applicable proprietary items in the project specification.

Refer to **Table 08: Door hardware** schedule and list of hardware items for each set. Refer application guide for door hardware sets for specific location with door types.

Documentation should only include items applicable to the door hardware sets for each project. Doors over 50mm maximum thickness requires extended cylinders and/or spindles and furniture screws.

Table 08: Door hardware schedule

Type	Notes
Public Mortice Lock	Add rebate code to lock number for rebated forend. Set to egress unless specific requirement connecting door dual cylinders are required. For connecting space door, substitute two-cylinder model.
Mortice Cylinder Anti-Lockout Vestibule Lockset (Disabled Toilet and Self-Help Toilet)	For connecting space door, substitute two-cylinder model
Dual Cylinder Mortice Escape Lockset (Switch spaces)	Bottom cylinder key alike PW "E" and top cylinder keyed to local authorities' requirements. Requirement: Lock to plant space doors to have key alike PW "E".
Rim Cylinder Nightlatch	Ducts / Fire doors (Electrical / Mechanical Services)
Padbolt with Padlock/shackle protection	Security Cupboards, Gates and Roller Shutters.
Padbolt – Heavy Duty (Compound Gates)	Requirement: Provide additional floor sockets or wall angle strikes to allow gates to be also locked in the open position
Padbolt with Padlock protection (Security Stores, Gates and Roller Shutters)	For steel roller shutters – weld padbolt to internal side of bottom rail and bolt retainer to track.

	For installation to aluminium roller shutters, weld padbolt to internal side of track - to enable the bolt shoot to immobilise door curtain.
Padlock	Boron Shackle Omit padlock plates where gate latch incorporates padlock locking
Lock Bolt Shield	Lock bolt protector for open out doors.
2-point Horizontal Locking Bar (Security "D")	Requirement: Doors opening out, add "Opening Out" to Model Number.
Cylinder Rim Nightlatch	For single leaf doors opening out, add RBS to lock number. For two leaves opening out, add RBP to lock number
Kick Plate	Satin Stainless Steel 200 mm high x door width x 1.2 mm countersunk screw fixed at 150 mm maximum centres. Height of kick plate may be altered to suit glazed door bottom rail.
Push Plate	Satin Stainless Steel 250 x 200 x 2 mm thick (nominal). Form hole in plate for lock or turn-snib to align push/pull plates, if required. Width of push plate may be altered to suit door stile width.

Door stops and door holders

General: Door stop and holders to be provided for all external entry/exit opening out doors to allow doors to be held open and to limit door travel where damage can be caused to doors, walls, frames or door hardware.

Provide steel bollards with protective hood for installation of all door stops and holders as shown on drawing.

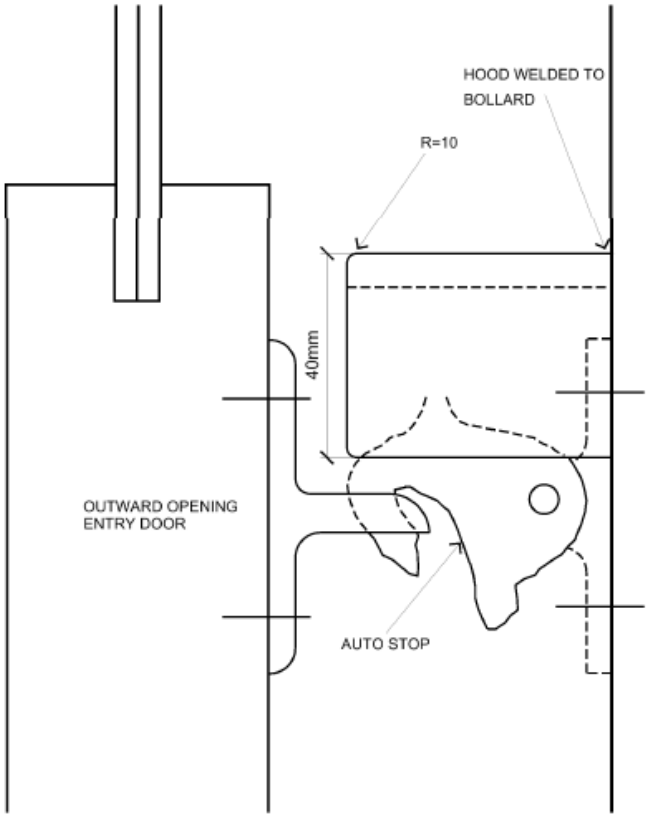
GUIDE NOTE: Include the appropriate drawing number.

Refer drawing:

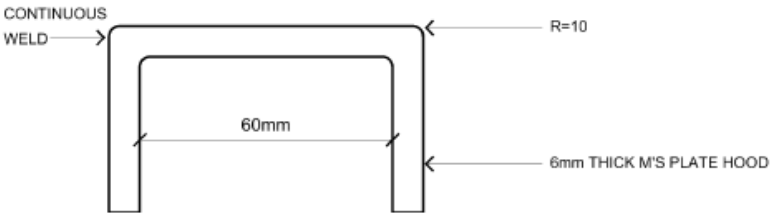
Figure 01: Hood for Bollard with Auto-Stop

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NOTES
1 Applicable to all external opening out doors, except for
2 Plant Room doors. Complete unit to be hot dipped galvanised after fabrication



DOOR STOP AND HOLDER LOCATED AT BOTTOM RAIL



FRONT ELEVATION OF HOOD

Installation: Where doors can open approx. 180d locate bollard as close as practical to the face of the wall.

Table 09: Door stop/holder schedule

Type	Notes
Door Stop and Holder	Bollard/Rail Fixing: Refer to drawing in Figure 1 above. Requirement: For external opening outdoors
Floor Stop with Hook	Requirement: For opening in doors. Locate to avoid trip hazard.
Floor Stop – Type A	Requirement: For floor finishes other than carpet.
Floor Stop – Type B	Requirement: For carpet floor finishes.
Wall Stop	Requirement: Wall fixed.
Overhead Door Stay	Requirement: Maximum 90d opening out external services doors.

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Cabin Hook	For Cam action open outdoors (180d).

Panic exit devices

Requirement: Approved panic exit devices are to be specified for egress doors to all multi-purpose spaces, communal areas, etc. Also refer to floor ferrule requirements.

Panic exit devices to incorporate key operated lock cylinders to lock push bar depressed (cylinder dogging) for unlocked entry.

To avoid external manipulation of these devices, door frames should have rebate forming stops, pairs of timber doors should have rebated meeting edges and pairs of aluminium doors should have a cover meeting stile to second closing door leaf.

Door suites to be “Superline” or “Shopfront” profile. Incorporate an integral cover strip stile for self-latch locks or panic bolts.

Panic exit devices should not be specified in conjunction with centre hung pivoted doors as they do not allow rebate forming stops to be fitted to door frames.

Doors should open 180d (nominal) with a door stop and holders fitted to bollards to provide positive hold open anchorage. Door frames are to be positioned flush with the external wall surface. If this cannot be achieved position the bollards to allow maximum door swing. Refer to section 6.10 Doors within this document.

Door closers should only be fitted to the first opening leaf of a pair of doors and door stops A.B.S. fitted to each leaf. Pull handles also, should only be fitted to the first opening leaf of a pair of doors, except when a dogged exit device is fitted to the inactive leaf (on non-fire rated doors) in which case both leaves will have pull handles fitted

Table 10: Panic exit devices schedule

Type	Notes
Panic Exit Device (Timber Door - Single Leaf)	Requirement: Where key entry is not required omit night latch cylinder. Cylinder dogging (CD) to be Keyed Alike (MK) to entry key.
Panic Exit Device (Aluminium door - with mid rail - two leaves)	Requirement: Where key entry is not required omit night latch cylinder. Cylinder dogging (CD) to be Keyed Alike (MK) to entry key. Refer DSTA aluminium door details drawing 2/19. Where two leaf door set is over 2100 mm high, add top rod extension to panic exit device, (nominate door height for device.)

2.7 Door controllers

General

Door controllers specified unless noted: Use cam action door closers, automatic door operators, Closers are to have the following:

Adjustable spring strength not to be used with a spring strength over EN3

Delayed action feature for door including entries and all areas designed for access by people with disabilities.

CONTENT UNCHANGED FROM EFSG 2025

Automated Controllers to be used where required entries are designed for access by people with disabilities in accordance with Access the Premise Standard.

Construction: Surface mounted design with slimline body for minimum wall clearance installation.

Standards: To EN1154 pending AS4145 part 5 upon release.

Door control to be successfully type-tested and in full compliance to EN1154. Test reports and/or certificates to be made available upon request.

Marking: The product (each door closer) must be marked to identify conformance to EN1154.

Closer adjustment: Separate inbuilt control valves to adjust door closing speed, latching speed, backcheck cushion, closer strength and delayed action (closing time).

Adjust door closer latching speed and closer speed allowing doors to close without slamming. Depending on door closer application, adjust spring strength, backcheck and delayed action closing time, to assist access for people with disabilities.

Closer installation and adjustment details:

The manufacturer must provide clearly labelled precise closer installation instructions with corresponding graphics.

The manufacturer must provide clearly labelled precise closer adjustment instructions with corresponding graphics.

Size: A4

Hand one copy to the Senior Project Director or equivalent Project Lead

Or

Closer adjustment instructions to be shown on the inside of the cover box or body of the closer.

Door closers should not be installed externally where applicable. For open outdoors, drop plates are required for aluminium glazed door installations. Relevant fire certificates are required

Fire rated door closers

General: Use closers tested and certified for use as components of fire door assemblies to AS/NZS 1905.1 – Part 1: Fire resistant doorsets.

Table 11: Door closer schedule

Type	Description
Door Closers	Pull side door fitted - maximum door opening 180d for flush wall doorset.
Door Closers	Push side invert frame fitted – maximum door opening 180d.
Door Closer: (pneumatic)	Flyscreen doors
Door sequence selector	Aluminium or stainless steel.

- Bolts

General: Where door leaves exceed 2100mm in height and bolts are fitted, the top bolt should have an extended shoot bolt to allow a maximum operable height of 1800mm from the floor. Provide top angle plates for open out doors and floor sockets or plates for bottom bolts.

Table 12: Barrel bolt schedule

Type	Description

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Barrel Bolt-Cupboards	Extruded brass body and 6mm diameter brass shoot bolt with ferrule or keeper plate
Barrel Bolt –Stable Door	Extruded Brass Body and 10mm diameter shoot bolt with not-slip clutching bolt travel. 150 mm minimum barrel bolt length

Sockets

Table 13: Sockets schedule

Type	Description
	Brass or Aluminium Alloy 6061, 40 mm long x 3 mm wall thickness with internal diameter to closely match the bolt shank diameter. Drill floor and grout in flush with the finished floor finish.
Carpeted Floor Alternative (Not to be used for external doors)	Brass or Aluminium Alloy 6061, 20 mm long x 3 mm wall thickness with solid closed base, flanged top and internal diameter to closely match the bolt shank diameter. Drill and countersink base to receive 30 mm x 5 mm diameter long thread stainless steel screw and drill and fix to floor through carpet with lead plug.
Timber Floor Alternative (Non-carpeted floors only)	Brass or stainless steel 40 mm x 25 mm x 1.2 mm thick flat plate with two fixings to suit countersink wood screws and centre drill hole to closely match bolt shank diameter. Fix to timber floor with two 25 mm x 3 mm wood screws, finish and material to match flat plate.

03 Execution Specification

In accordance with current NATSPEC except as follows:

3.1 Installation

Handing

Determine on site, prior to supply, the correct handing of hardware.

Hinges

Steel frame fixing: Recess flush and screw fix to a 150 mm x 45 mm x 6 mm mild steel reinforcing plate, welded to the back of the frame at each hinge point. Drill and tap the plate to receive stainless steel machine thread screws to suit hinges.

Aluminium frame fixing: Slot aluminium broad butt hinges into sections and fix with eight machine thread screws per hinge. Alternatively face fix SS broad butt hinges to aluminium frame with stainless steel machine screw fixing to backing plates secured at each hinge fixing point

Table 14: Mounting height schedule

Furniture item	Height from finished floor (mm)
Locksets and Latch sets:	1000

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Centreline of door furniture spindle, or of keyway if no furniture	
Panic Exit Device:	1000
Crossbar	
Pull Handle (Aluminium Doors)	Mount centrally above lock
Deadlock:	1100
Centre of cylinder where pull handle/push plate is also fitted	

Note: All installations to comply with AS 1428.1 and the Building Code of Australia.

Table 15: Door Hardware requirements to space types

Space(s)	Door Hardware description
A	Public Mortice Lock, Cylinder both sides
B, C, D, E, F, G(IR)	Public Mortice Lock, Cylinder
	External Plain Plate with Cylinder Hole
	Internal Plain Plate with Cylinder Hole
A, B, C, D, E, F, G(IR)	External Plain Plate Lever Handle with Cylinder Hole
A	Internal Plain Plate Lever handle with cylinder hole
C, D, E, G(IR)	Internal Plain Plate Lever handle
B, F	Internal Plain plate lever handle and turnsnib to lock and unlock external handle.
B(IR), C, G, L	Cam Action Door Closer/ Automated Door Closer
L	Panic Exit Device
A, B, D, E(IR), F	Door Stop
C, E(IR)	Door Stop with Holder
E	2 Point Horizontal Locking Bar
G	Push and Pull Plates
M	Pull Handle
H	Indicator Set
J	Padlock with Padlock Protection (Padlock plates and shackle protector used as required)

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K	Nightlatch
K	Overhead Door Stay
C(IR)	Lock Bolt Shield (as required)
M	Mortise Roller Bolt
N	Dual Entry Lock

(IR) = If required

Table 16: Door Hardware Type locations

Type	Location/Space
A	Connecting door between General Learning Spaces and Workshops/ Laboratories, Library and Senior Study, Entrances
B	Animal Space, Plant Space, Agriculture Covered Area, Botany/Zoology, Clerical, Printing, Workspace, Executive, Clinic, First Aid, Community Clinic, Corridors, Kitchenette, Library Office/Workspace (PS), Careers Adviser, System Administrator, Principal, Deputy Principal, Home Base/Practical Activities Area, Home Base Store, Interview, Interview/Office, Interview/Meeting, Kiln Space (PS), Kiln Space (HS), Kitchens and Laboratories, Learning Spaces Generally, Laundry, Lecture Theatre, Library, Practice, Preparation, Kitchen - Preparation, Tea Space, Visitor's Office, Workshops, Staff Space, Sick Bay, Staff Space Annexe, Staff Study, Staff Lounge, Science Laboratory, Preparation - Science, Stage to Backstage, Staff Toilets and Air Lock Entry, Seminar, Senior Study, Special Programs Space
C	Chemical Store
D	Pantry – Semi-Commercial, Pantry – Domestic, Wood and Metal Materials Store, Project Store, P.E. Store, Large Equipment Store, Outdoor Equipment Store, Chair Store, Performance Store (PS), Movement Studio Store, Stage Control Cupboard, Sound Cupboard, Shed Workshop, Bulk Store (HS), Cleaning Supplies Store, Cleaning Distributed Store, Dust Extraction, General Store, Shared Withdrawals
E	GLS Store, Apparatus Store, Visual Arts Store, Pottery Store, Dark Room, Performance Store (HS), Fitness Store, Kitchen - Store, Multimedia Store, Lecture Theatre Store, Computer Store, Communications Space, KLA Resource Store, Special Programs Store, Sports Store, Sport Equipment Store, Control Space, Security Store (PS), Administration Store (HS), Preparation/Printing, Duplicating (own space), Bulk Store (General Assistant, PS), Archive Store, Multimedia Studio, Library Admin (HS), Computer Learning Space, Canteen
F	Under Stage Storage, Switch Room, Mechanical equipment Space, Lift Motor Space, L.P.G. Storage, Canteen Office/Store (stable door with barrel bolt), Evaporating Cooling Unit (ECU)
G	Student Shower/Change/Toilets (Air Lock Entry), Vending Machines, Access Toilet, Access Shower/Toilet, Staff Shower, Laundry to Change, Stage, Stage/Platform Access, Access Lift Lobby, E.I. Homebase to Shower/Toilet Access Shower/Toilet/Change/ Laundry

CONTENT UNCHANGED FROM EFSG 2025

H	Staff Toilets, Student Toilets, Clinic Toilets, (fully enclosed cubicle), Staff/Student Toilet/Shower (Cubicles)
J	Garden Store, Swimming Pool Fence for Outdoor Learning/Play Enclosure, Boundary Fence Gate, Zone Fence Gate, Compound/Security Gates, Games Court (HS)
K	Electrical Distribution Board, Service Duct
L	Exits for Communal Hall, Gymnasium, Movement Studio, Stair Exit, Library Exit, Corridor Exit
M	Fire Hose Reel
N	Switch Room, spaces where power industry access is required

3.2 Completion

Product warranties

Refer to separate schedules for manufacturer's items.

To be read in conjunction with plans and space technical data.

Corridor double door leaf meeting edges non-rebated.

Omit lock if egress is required from the locked side (where required).

Omit lockset for internal spaces not required to be locked and substitute mortice latchset.

Omit deadlock for internal air lock doors.

Non-combustible construction, smoke seals, RHS galv. sill for bottom seal where required.

Door leaves to have aluminium meeting edges with/without overlapping cover strip. (Where req.)

Canteen servery door frame to be positioned flush with the external wall surface to allow doors to open back against walls. Where adjoining door leaves overlap when open 100 x 150mm stainless steel heavy duty wide throw butt hinges are required for one leaf. For overlapping door leaves omit one door stop and holder. Skeleton bolts, door stop, hinge bolts, pull handle with roses (active leaf internal side)

6.10.10 Doors in Heritage Buildings

Preamble:

Existing Doors in Heritage Buildings are predominantly constructed in timber, however may also be constructed with steel components.

Existing Doors in Heritage Buildings may require rectification or restoration work that requires the skillset of specialist contractors.

For instance, existing timber doors in Heritage Buildings will often require custom repair and / or reconstruction that may require the skillset and therefore engagement of timber joinery and / or carpentry organisations who specialise in this skillset. available in most areas of NSW.

Requirements:

- Repair of the door components must be prioritised before any option to fully replace is implemented.
- Doors for external locations are to be solid core, external grade weatherproof, timber doors and frames which match original details and do not include veneers, engineered and reconstituted wood products.
- For new doors or new components in existing doors, all surfaces including concealed and enclosed surfaces are to be fully paint primed prior to installation.
- Historic operating systems need to be checked and maintained including hinging mechanisms, latches, awning arms and winders, sash chords and weights.
- Ensure existing doors are maintained and / or repaired to enable them to be operated easily by teaching staff with average strength.

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6.11 Windows

6.11.1 General

Preamble:

Windows must be long-lasting, offer security, safety under human impact, thermal performance, acoustic performance as well as control ventilation. They must be commercial grade integrated systems that include flexible options and configurations.

Frame, leaf and hardware must be appropriate to the function of the window and the use of the space.

Window Types in Schools include:

- Awning Windows
- Sliding Windows
- Double Hung Windows
- Fixed Windows
- Louvres
- Roof Windows and Skylights
- Window Screens

The following Window Types are not suitable to be included in Schools:

- Lapped sash windows
- Casement sash windows
- Pivot sash windows.

Requirements:

The following are applicable requirements to all Window Types in Schools.

- Commercial grade systems must be used.
- All glazed doors must comply with current relevant and applicable regulation.
- All edges and external corners of windows and their frames including all cut sections must have radius (rounded) corners.
- Aluminium windows and their frames must have a minimum wall thickness of 2mm.
- Mid rails are required for all full height glazed windows. Mid rail position is to align to the height and requirements for an opaque contrasting line, also known as a visual indicator strip, in accordance with AS1428.1.
- For any other existing buildings any new openings must be designed to align with existing building features such as existing door and window heights.
- Glazing in all external windows, sidelights and fanlights are to be minimum 6.38mm laminated safety glass or in accordance with AS 1288, whichever is greater.
- Sashes with any dimension exceeding 1200mm in any width or height must have two latch points of contact to each sash.
- Sashes and louvres require mechanical and/or electrical remote controls where the sill or transom line is 2100mm or more above the floor.

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- A remote-control manufacturer is to be consulted to provide the most efficient and economical method of control. Where possible, all windows in a space should have a single control. Not more than 8 sashes may be served by any one regulator.
- Windows must be designed to permit the installation of blinds to the internal side that cover the full extent of the glazing.
- The finish to aluminium components and their frames are to be:
  - Preferred Finish | **Clear Anodised Finish**
    Thickness of anodised finish to be in accordance with current regulation.
  - Alternative Finish | **Powdercoat finish**
    Not suitable unless approved in writing is provided from the Senior Project Director or equivalent Project Lead.

Refer to:

Including but not limited to the following:

- AS 1428.1 Design for access and mobility
- AS 2047 Windows and external glazed doors in buildings
- AS 1170.2 Wind actions
- AS 1231 Aluminium and aluminium alloys
- For maintenance and repair of heritage windows refer to Section 6.11.10
- Other applicable sections within this document.

6.11.2 Awning Windows

Requirements:

In addition to Requirements in 6.11.1 General within this section, the following are requirements for Awning Windows in Schools.

- Awning sashes are suitable to be included in Schools.
- Where opening onto walkways or circulation spaces, awning sashes must only be used from 2100mm Above Finished Floor Level.

6.11.3 Sliding Windows

Requirements:

In addition to Requirements in 6.11.1 General within this section, the following are requirements for Sliding Windows in Schools.

- Sliding sashes are suitable to be included in Schools where the window sill is within 1300mm of the external ground level (including external walkways).
- Special carriages (e.g. double bogey) must not be used with sliding sashes.

6.11.4 Double Hung Windows

Requirements:

In addition to Requirements in 6.11.1 General within this section, the following are requirements for Double Hung Windows in Schools.

- Double hung sashes are suitable to be included in Schools.
- Double hung sashes must not be used where located above joinery or benches, unless within an existing building.

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6.11.5 Fixed Windows

Requirements:

In addition to Requirements in 6.11.1 General within this section, the following are requirements for Fixed Windows in Schools.

- All solid panels below 2100mm Above Finished Floor Level must be impact resistant, durable, and of pre-finished materials.
- Prefinished material must be Aluminium of 0.5mm minimum thickness attached to both sides of a minimum 13mm backing.
- Solid and spandrel panels including backing must be deemed to be non-combustible when tested to AS 1530.1.

Worked Example:

The spandrel design for schools shown in EFSG Part C is based on the following assumptions and parameters for a typical General Learning Space.

700mm high fire rated wall.

200mm slab to achieve overall 900mm between ceiling and floor level above.

Preferred finish of the façade to be Compressed Fibre Cement Sheet for robust performance.

The sill height may be adjusted to meet the requirements of current applicable regulation.

Other materials and colours may be considered provided the solution is robust, compliant with current regulation and meet budget requirements.

6.11.6 Louvres

Operable Louvres

In addition to Requirements in 6.11.1 General within this section, the following are requirements for Operable Louvres in Schools.

Operable glazed louvre systems may only be used with approval in writing from the Senior Project Director or equivalent Project Lead, where the following conditions apply:

- Replacement of existing glazed louvres.
- Replacement of existing windows where calculations have determined that glazed louvres are required to meet natural ventilation or daylight requirements.

If approved for inclusion, glazed louvres must meet the following requirements:

- Glazed louvre blades must be fully framed by aluminium extrusions mitred at each corner and incorporated into the surrounding aluminium window suite.
- Louvres must seal when closed to avoid infiltrations and air leakage.
- Operable louvres must be protected by wide eaves or a covered way to reduce exposure to strong prevailing winds and rain.
- Where used below 2100mm Above Finished Floor Level, the edge of the louvre blade must not project beyond the window frame.

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- When fully open, vertical gaps between louvre blades must be no more than 125mm to avoid risk of entrapment and comply with barrier requirements where applicable.
- Provide weather seals to head, sill, and sides.
- Vertical glazed louvres are not suitable in Schools.
- Operable louvres must not be used on facades which are exposed to strong prevailing winds and rain.
- Glazed louvres must not be used on external walls that are identified in writing by the Senior Project Director or equivalent Project Lead as being vulnerable to vandalism.

Fixed Louvres

In addition to Requirements in 6.11.1 General within this section, the following are requirements for Fixed Louvres in Schools.

- Except for fixed louvres which are accompanied by an associated operable component, fixed louvres must only be used for the following applications:
  - Non-habitable areas such as Toilet areas
  - Plant spaces
  - To the building façade where required for mechanical services
- To the building façade where used with an associated operable component.
- Where fixed louvres form part of the building façade, vermin mesh must be fixed to the internal face of the louvre with proprietary clips.
- Louvre blades must be robust and either short or reinforced to prevent separation. For spans over 1000mm, stiffening channels must be attached to each blade, at centres determined by the supplier.
- Use insulated blanking panels where fixed louvres exceed mechanical needs in a façade system. These panels must meet non-combustibility standards.
- Fixed louvres for ventilation must not be used within SSP and SLH Toilets and Change Spaces.
- Mechanical louvres are to be located above low ceiling zones based on the adopted mechanical system. The area of the mechanical louvre may be sized to suit site specific environmental conditions. The extent for specialist spaces to be derived from area of rooms in association with the mechanical consultant on a project basis.

Worked Example:

The louvre design for schools shown in EFSG Part C is based on the following assumptions and parameters for a typical General Learning Space.

The following is placed here for information only:

Min 4.3m^2 to achieve 6.25% of room area ventilated area

Insulated door panel behind to achieve performance criteria equivalent to external wall.

Glass louvres not permitted due to maintenance issues.

The fixed louvre area may increase in dimensions to suit the site specific environmental conditions.

The area of a mechanical louvre may be sized to suit the site specific environmental conditions.

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6.11.7 Roof Windows and Skylights

Preamble:

Skylights or solar tubes may be used to provide additional natural daylight or to reduce the need for artificial lighting.

Requirements:

- Effects of glare on internal environments must be assessed.
- Skylights or solar tubes must not exceed 5% of the floor area of the space or space served.
- Glazing to skylights must be safety laminated glass.
- Safety mesh is not required to skylights and solar tubes (custom or proprietary) that have been designed to withstand maintenance load. Otherwise, safety mesh conforming to AS 4389 must be provided.
- Clear prismatic diffuser panels are to be included at ceiling level at the opening for skylights.
- Skylights and solar tubes must not be located directly above ceiling fans to avoid potential strobing effects.
- Toughened glass must not be used within skylights.
- Skylights and solar tubes must not be installed on rooftop playgrounds or be easily accessible from a trafficable surface (i.e. walkways).

Skylights and solar tubes must not be used in facilities located in bushfire protection areas.

6.11.8 Window Screens

Insect Screens for Windows

In addition to Requirements in 6.11.1 General within this section, the following are requirements for Insect Screens to Windows in Schools.

- Insect screens must be installed internally and facilitate easy removal and reinstallation to enable convenient cleaning and maintenance.
- Insect screen mesh must be securely fitted within the frames.
- Frames are to be aluminium extruded sections with channels for high grade security mesh fixing.
- Frame finish and colour: To match window frame finish unless otherwise specified.
- Mesh Finish: Black
- Mesh Type:
  - Below 2100 Above Finished Floor Level: Aluminium or Steel
  - Above 2100Above Finished Floor Level: Fibreglass or Plastic
  - Within SSPs: Stainless steel to whole window
  - Within Bushfire zones: In accordance with AS 3959
- Mesh aperture sizing must be reviewed against the natural ventilation provision required.

Table 6.11.1 Insect Screen Location

Space	Opening Type	Screen Type
Biology Learning Spaces	Window	Metal Framed Mesh
Canteen	Servery	Flyscreen Roller Blind

Food Technology	Window	Metal Framed Mesh
SSP Lifeskills Kitchen	Servery	Flyscreen Roller Blind

Security Screens for Windows

In addition to Requirements in 6.11.1 General within this section, the following are requirements for Security Screens to Windows in Schools.

Security screens or grilles are required to all windows of Security **Category C or higher**.

- Metal security grille/screen and frame must be fixed to the building structure with tamper resistant fasteners.
- Mesh aperture sizing must be provided for review against natural ventilation provision required.
- Stainless steel security window grilles.

6.11.9 Window Hardware

Requirements:

In addition to Requirements in 6.11.1 General within this section, the following are requirements for Window Hardware in Schools.

- Where windows require key operated locks, sample window locks must be submitted to the Senior Project Director or equivalent Project Lead for approval.
- Master key and key alike locks as directed.

6.11.10 Windows in Heritage Buildings

Preamble:

Existing windows in Heritage Buildings are predominantly constructed in timber with glazed panels, however may also be constructed in steel with glazed panels.

Existing windows in Heritage Buildings may require rectification or restoration work that requires the skillset of specialist contractors.

For instance, existing timber windows in Heritage Buildings will often require custom repair and / or reconstruction that may require the skillset and therefore engagement of timber joinery and / or carpentry organisations who specialise in this skillset. available in most areas of NSW.

Requirements:

- Repair of historic steel framed windows requires specialist restoration skills. Seek coordination from the Senior Project Director or equivalent Project Lead to consult with the DoE Heritage Team to establish a solution prior to commencement of any work.
- Repair of the window components must be prioritised before any option to fully replace is implemented.
- For new windows or new components in existing windows, all surfaces including concealed and enclosed surfaces are to be fully paint primed prior to installation.
- Historic operating systems need to be checked and maintained including hinging mechanisms, latches, awning arms and winders, sash chords and weights.
- Ensure existing windows are maintained and / or repaired to enable them to be operated easily by teaching staff with average strength.
- Aluminium windows must not be used to replace non-aluminium windows at heritage items.
- Colorbond or metal plates must not be placed over external timber windowsills.

- Windowpanes in windows must not be used to contain air conditioning units, or exhaust fans.

6.12 Glazing

6.12.1 General

Preamble:

All glazed elements and associated performance must in general be in accordance with the overall sustainability requirements. Specifically, they must be in accordance with the relevant sustainability requirements for

- Building envelope thermal performance
- Airtightness
- Upfront Carbon Reduction
- Responsible Finishes and
- Health and Wellbeing - Daylighting

Requirements:

- Glazing and its requirements must comply with AS1288 and all other current applicable regulation.
- Daylight measures are to be calculated in accordance with current applicable regulation. For instance, a minimum glazed area of 8.2 metres^2 is required to a typical General Learning Space to achieve daylight requirements in accordance with current applicable regulation at the time of publication of this document.
- Laminated safety glass must be used for all internal and external glazing.
- Low level glazing (below 1000mm Above Finished Floor Level) must be fixed (not openable), fully framed Grade A safety glass in accordance with current applicable regulation.
- Single glazing is typically suitable for openings such as windows and doors in school building facilities. However double glazing may be used in the external façade if required to meet the conditions of the site.
- Double glazing may be used internally where required to meet acoustic performance requirements.
- Thermally broken double glazing may be used externally where required to meet the current requirements of regulation or Greenstar requirements.
- Internal glazing beads must be provided to all new framed glazing systems.

6.12.2 Replacement Glazing

Requirements:

- Where laminated safety glass is used to replace ordinary annealed glass, upgrade the sash/window assembly as required to enable the sash to operate correctly. (e.g. increased sash counterbalances/weights for double hung or vertical sliding windows to compensate for heavier safety glass).
- Thickness: Minimum thickness 6mm and in accordance with current AS1288.

6.12.3 Mirrors

Requirements:

- Material: Grade A safety glass, complying with AS 2208, and backed by a reflective vinyl film.
- Thickness: Minimum thickness 6mm and in accordance with current AS1288.

- Mirror frames: Provide a clear anodised aluminium frame around the perimeter.
- Vertical joints between mirrors panels are to have splayed edges and a 3mm joint for expansion, filled with clear silicone.
- Mirrors within Student Toilets are to be polished stainless steel instead of glazed –

Refer to:

Including but not limited to the following:

- 8 Furniture, Fixtures and Equipment
- Other applicable sections within this document.

6.12.4 Protective Screens

Preamble:

Polycarbonate type glazing sheet are to be used as protective screens within the following learning spaces:

- Wood Technology Bays
- Metal Technology Bays
- Control Space in Movement Complex

Requirements:

- Type: UVP high impact clear polycarbonate.
- Thickness: 6mm minimum.
- Frames of polycarbonate must not be mitred.
- Polycarbonate must have mar-resistant finish.
- Polycarbonate must not be used as part of the façade of a building.
- Polycarbonate may be used within the external wall of a single storey school building if approval is provided in writing by the Senior Project Director or equivalent Project Lead prior to commencement of any work.
- Square wired glass must not be included in Schools.
- Toughened glass must not be used in schools unless approval is provided in writing by the Senior Project Director or equivalent Project Lead.
- Glazed shower screens are not suitable to be included in Schools.
- Frameless silicone jointed glazing in external locations is not suitable to be included in schools.

6.12.5 Glazing in Heritage Buildings

Preamble:

Glazing to heritage buildings is often required to fit within existing timber or steel framing profiles. Heritage glazing can include:

- Low thickness glazing to suit timber and putty glazing bar arrangements
- Small section glazing panes
- Coloured or patterned glass including lead lighting

Requirements:

- Replacement glazing is to be selected to enable the existing framing and glazing bars and glazing system to be retained.

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- 4mm laminated glazing can be used to replace glazing where required to meet the safety standards in timber / putty glazing bar arrangements
- Where security, fire safe, and other safety glass cannot be installed into heritage frames without rebuilding the frames, an alternate solution such as secondary glazing are to be considered.
- Sound proofing for heritage glazing is to be provided by secondary glazing systems and not by replacing the glass within original frames.
- Replacement coloured or patterned glass must match original colour / pattern and is not to be replaced with clear glazing. Lead light repairs are to be carried out by specialist glaziers.
- Silicone must not to be used for repairing / replacing putties and refixing glazing into glazing bars.

6.13 Insulation and Membranes

6.13.1 General

Requirements:

INSULATION

- Local environmental conditions – determine whether the insulation is predominantly needed to keep heat in or out (or both).
- Comply with acoustic requirements outlined within the project Acoustic Report.
- Installation of insulation must be in accordance with the manufacturer's instructions.
- Insulation and membranes must be non-combustible and compliant with current applicable regulation.
- Insulation must not obstruct any required ventilation clearances.
- All insulation materials and associated performance must in general be in accordance with the overall sustainability requirements. Specifically, they must be in accordance with the relevant project level sustainability requirements for Building envelope thermal performance, Upfront Carbon Reduction and Health and Wellbeing – Acoustic Quality.
- The conditioned envelope are to be illustrated on building plans.
- Urea formaldehyde foam cavity insulation must not be used in School facilities.

MEMBRANES

- All sarking must be a vapour-permeable wind-tight membrane, properly lapped and taped to inhibit all wind penetration.
- Tape membrane along all edges with window and door frames, floor slabs, and roof sheeting.
- Tape membrane tightly around any services penetrations (e.g. ducts, cables).
- Install membrane before any damp proof course.
- The vapour barrier position within the roof or wall build up must be advised by the project ESD or Facade Consultant.
- Confirm the site's climate zone and the vapour barrier position with the supplier or a condensation expert. Document the advice in the design report.
- Waterproofing membranes must have a total volatile organic compound (VOC) content of no more than 250g/L.

Refer to:

Including but not limited to the following:

- 2 Building Performance

- Other applicable sections within this document.

6.13.2 External Wall Insulation

Requirements:

In addition to Requirements in 6.13.1 General within this section, the following are requirements for External Wall Insulation in Schools.

- Where external walls form part of the thermal envelope, the insulation must comply with the requirements outlined by the project ESD Consultant.
- Insulation within external walls must comply with acoustic requirements outlined by the project Acoustic Consultant when considered within the whole wall build up.

6.13.3 Internal Wall Insulation

Requirements:

In addition to Requirements in 6.13.1 General within this section, the following are requirements for Internal Wall Insulation in Schools.

- Insulation within internal walls must comply with acoustic requirements outlined by the project Acoustic Consultant when considered within the whole wall build up.
- Where internal walls form the barrier between conditioned and unconditioned spaces, insulation must meet the thermal requirements outlined by the project ESD Consultant in addition to acoustic requirements.

6.13.4 Ceiling Insulation

Requirements:

In addition to Requirements in 6.13.1 General within this section, the following are requirements for Ceiling Insulation in Schools.

- Where associated with perforated ceiling systems, or where otherwise visible, acoustic blankets must be black fabric faced.
- Glass wool must not be used in ceilings.

6.13.5 Roof Insulation

Requirements:

In addition to Requirements in 6.13.1 General within this section, the following are requirements for Roof Insulation in Schools.

- One layer of aluminium double-sided foil laid under bulk insulation, is to be installed against the underside of the roof sheeting by means of wire stretched tightly over the purlins. Foil must be reinforced, anti-glare, fire-retardant type, suitable for the location and the intended function, properly lapped and taped to inhibit all air movement.
- Roof spacers must be included within the metal roof build up to avoid compression of the insulation.
- Insulation must be provided to COLA roofs.
- Installation must be in accordance with the manufacturer's written specifications and instructions for installation.

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6.13.6 Air Tightness

Applicability:

Applicable to all types of work in all school types, with the exception of refurbishment type work that has:

- a construction value less than $10 million dollars excluding Goods and Services Tax, and
- a Gross Floor Area less than 1000m^2

And for the new building fabric only in cases where refurbishment work has:

- a construction value greater than $10 million dollars excluding Goods and Services Tax, and
- a Gross Floor Area greater than 1000m^2

Heritage Buildings: Not Required.

Requirements:

- Building envelope are to be designed for air-tightness by including air barrier continuity documented on building plans, sections and details, be tested in accordance with AS/NZS ISO 9972.2015 or ASTM E1186-17 as appropriate, and are to achieve a maximum air permeability target of <4 $m^3.h^{-1}.m^{-2}$ @ 50 Pa in alignment with Green Star Building Credit 3 - Verification and Handover.
- Originally designed natural ventilation systems in heritage buildings to walls, floor ceilings and roof ventilation systems in historic school buildings are to be retained where that part of the building is being retained.

Refer to:

Including but not limited to the following:

- Green Star Building Credit 3 - Verification and Handover for detailed requirements
- Applicable sections within this document.

6.13.7 Under Floor Membranes

Requirements:

Provide a full vapour barrier to the top of the slab, under the timber flooring build-up in addition to vapour barrier which are required under the concrete slab.

- Thickness: 0.15mm
- Type: High impact resistant polythene.
- Do not commence fixing until the moisture content of the concrete slab is less than 6% when tested to AS 1884.
- Lap 150 mm and seal the laps with pressure sensitive tape.
- Turn up vapour barrier at the perimeter of the flooring system.
- Cut and tape to drainage outlets (where required).

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6.14 Flooring

6.14.1 General

Preamble:

Flooring is one of the largest surface areas in learning environments, therefore the choice of floor finishes will greatly influence both the visual and acoustic qualities of the space.

Requirements:

- Flooring and associated finishes must in general be in accordance with the overall sustainability requirements. Specifically, they must be in accordance with the relevant project level sustainability requirements for Upfront Carbon Reduction and Responsible Finishes.
- Low-VOC products: At least 95% of all internally applied paints, adhesives, sealants, and carpets are required to be within the stipulated 'Total Volatile Organic Compounds (TVOC) Limits'. Refer to Table 6.10.1 Carpet VOC Limits.
- Low-formaldehyde engineered wood products: At least 95% of all building's engineered wood products are required to be within the specified formaldehyde emission limits.
- Designers must select floor surface finishes aligned with the activities taking place in the spaces.
- High durability, low maintenance floor finishes are required within areas accessible to students.
- Provide compliance where necessary with critical radiant flux requirements in accordance with current applicable regulation.
- Masonite must not be used.
- Flooring systems containing silica must not be used.
- Direct stick flooring finishes must not be applied to Heritage timber floors.

Table 6.14.1 Carpet VOC Limits

Compliance Option	Test Protocol	Limits
ASTM D5116	ASTM D5116 - Total VOC limit*	limit* 0.5mg/m2 per hour
ASTM D5116	ASTM D5116 - 4-PC (4-Phenylcyclohexene)*	0.05mg/m2 per hour
ISO 16000 / EN 13419	ISO 16000 / EN 13419 - TVOC at three days	0.5 mg/m2 per hour
ISO 10580 / ISO/TC 219 (Document N238)	ISO 10580 / ISO/TC 219 (Document N238) - TVOC at 24 hours	0.5mg/m2 per hour

* mg/m^2hr may also be represented as $mg/m^2/hr$

6.14.2 Floor Types

Table 6.14.2 Flooring Types by Space

	Spaces	Flooring Type*
Learning Spaces	General Learning Spaces, Multi-Purpose Spaces, Library, Special Programs Spaces, Senior Study, Computer Learning Space, Seminar Spaces,	CP01***
	SSP GLS, SSP Library, Sensory Space	CP01***
	Learning Commons, STEM Space	RS01**
Hall / Gymnasium	Gymnasium, Communal Hall, Movement Studio	TF01
	Stage	TF02
	Control Space, Sound Cupboard, Multimedia Studio (recording space)	CP01***
Administration and Staff	Entry Vestibule, Reception Areas, Administration, Offices, Interview Spaces, Meeting Spaces, Library Office, Staff Lounges	CP01***
	Staff Kitchenettes	RS01**
Canteen and Food	Canteen	RFL-101
	Food and Hospitality Learning Spaces, SSP Lifeskills Kitchen	RS01**
Science	Science Laboratories, Science Preparation,	RS02
	Botany / Zoology Space	CF01
Visual Arts	Visual Arts Workshop / Visual Arts GLS, Dark Room	RS01**
	Kiln	CF01
TAS	Wood / Metal Workshop / TAS Learning Spaces	RS01
	Welding Bay, TAS Outdoor Workshop	CF01
PE Fitness	PE Fitness Laboratories	RS05
	PE Fitness GLS	CP01***
Performing Arts	Performing Arts Workshop, Multimedia Workshop	CP01***
Lecture	Lecture Theatre	CP03
Agriculture	Agriculture Indoor Areas	CF01
Wet Areas	Toilets, Laundries, Change Spaces and Showers	TL01

	Clinic, Sick Bay, Utility Space, First Aid	RS01**
Circulation	Internal corridors, stairwells, circulation	CP01
Storage	Learning Space Storage, Administration Storage, Library Storage, Canteen Store, Pantries	RS01
	Bulk Store, Garden Store, Chemical Store Room, Hall and Gymnasium Storage	CF01
	Cleaner's Stores	TL01
	TAS and Visual Arts Project Store Rooms, Science Apparatus Storage	CF01
Services	BCR, Main Communications Space	RS04
	Distribution Board Cupboard	TBC
	Main Switchboard Space / Cupboard	TBC
	Dust Extraction Space	TBC

*Flooring finishes must be reviewed by an Acoustic Consultant.

**If RS01 is determined by an Acoustic Consultant to be acoustically inadequate then RS03 must be specified.

***CP02 may be specified instead of CP01 where the conditions under CP02 within Table are met.

Table 6.14.3 Flooring Type Requirements

Code	Flooring Type	Requirements
CP01	Carpet Tile – Padded	ACCS Grade: Commercial / Contract Extra Heavy Duty (4 Stars) with cushion backing Stairs: Suitability for use on stairs is required Pile Composition: 100% nylon Pile Finish: low-profile loop construction Pile Mass: Minimum – 542g / m2 Pile Height: Minimum 2.5mm. Maximum pile height must comply with AS1428.1 Total Thickness: 6-8mm Dimensions: Plank Format 1000 x 250mm or square format 500 x 500 mm Machine Gauge: Minimum 1/10th gauge Dimensional Stability: Less than 0.2% variation Public Backing: Spun bonded polypropylene or polyester Secondary Backing: Cushion back – 3.2mm +/- 0.1 mm thickness 100% recyclable PET, manufactured from minimum 90% recycled PET content

		Recycled material content: Minimum 40% total recyclable content by total weight
CP02	Carpet Tile – Non-Padded	The secondary padded backing to carpet tiles (as noted under CP01) may be omitted and the total thickness reduced if the affected space or space meets the following conditions: The project Acoustic Consultant has determined the padded backing is not required within the affected space or space for acoustic purposes, and Students do not sit on the floor within the room or space.
CP03	Broadloom Carpet	Pile Finish: low-profile loop construction Pile Height: 4 - 5mm to AS 2111.5/6/7. Pile Mass: 1627 grams/m2 +/- 5% to AS 2111.11 Dimensions: Standard broadloom width 3660 +/-1.5% to AS 2111.15
CP04	Marine Grade Carpet	TBC
RS01	Sheet Vinyl	Vinyl flooring must have a clear upper surface treatment incorporated during manufacture and be guaranteed for at least five years Thickness: Minimum 2mm
RS02	Sheet Vinyl – Chemical Resistant	Thickness: Minimum 2mm Vinyl flooring must have a clear upper surface treatment incorporated during manufacture and be guaranteed for at least five years Vinyl used within Science Laboratories and ancillary Science spaces must be tested in accordance with ASTM F925-02 and ISO 26986.
RS03	Sheet Vinyl - Foam Backed	Provide a degree of resilience and impact noise absorption – extent to be determined by the project Acoustic Consultant. Vinyl flooring must have a clear upper surface treatment incorporated during manufacture and guaranteed for at least five years. Thickness: To be determined by acoustic requirements.
RS04	Sheet Vinyl – Anti-Static	Anti-static vinyl sheet flooring must only be used in specific locations where the requirements nominate anti-static flooring. It must not be used in any other locations. Thickness: Minimum 2mm Project Electrical Engineer must review the manufacturer's data sheets for the specified product.
RS05	Rubber Fitness Flooring	Wear layer minimum thickness: 8mm Thickness of the underlay acoustic system to be confirmed by the project Acoustic Consultant and reviewed with the project Structural Engineer. For use in PE Fitness Laboratories only

TF01	Sprung Timber Flooring	Proprietary sprung timber flooring system with integral finish. To be used in Halls, Gymnasiums and Movements Studios.
TF02	Timber Flooring	Timber flooring is to be used to stages within halls and gymnasiums. The flooring species and board size is to match the adjacent Hall or Gymnasium. Edge board to have at least 30% contrast in colour to stage floor colour. Applies to the edge of stage or raised platform and their steps.
TL01	Ceramic Floor Tiling	Refer to section 6.17 Tiling within this document.
CF01	Concrete Floor Finish	Trowelled Concrete floor with epoxy applied finish.

CP01, CP02 - Carpet Tile Performance

Preamble:

Carpet tiles must be specified to areas nominated within Table above to provide a soft warm surface, where students can work, sit, sprawl and move.

Requirements:

- Provide comfort for students undertaking floor-based activities. Carpet tiles must feel soft, not feel scratchy
- Carpets must be graded by the ACCS. Specification and installation must comply with AS 2454 and AS 2455.1
- Any pad, backing or cushioning are to provide a firm surface
- Carpet tiles must be patterned and use threads of varying colours to assist in concealing stains.
- Environmental / Green Accreditation: A certification recognised by the GNCC that will provide optimal credits under the GNCC Green Star rating scheme
- Fixing Method: Tiles must be full stick. If more than 2mm cupping is apparent after 3 months, contractor must replace installation at no cost to the department
- Adhesive: Water based, low odour, release type adhesive.
- VOC: Carpet adhesives must have a total volatile organic compound (VOC) content of no more than 50g/L.
- Treatments: Electrostatic protection Comply with AATCC 134 less than 3.5Kv at 21 degrees
- Contact adhesive must not be used.

CP03 - Broadloom Carpet Performance

Preamble:

Broadloom carpet is to be used only with amphitheatre seating applicable to the Lecture Theatre Learning Unit.

Requirements:

- Carpets must be graded by the ACCS. Specification and installation must comply with AS 2454, AS 2455.1, AS2455.2, and the manufacturer's instructions.
- A pad, backing or cushioning are to be included and are to provide a firm surface.
- Fixing Method: Dual bond or direct stick. The broadloom carpet is to be securely attached

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- Seaming Method: Seams and cross joints must have seam adhesive applied to both edges
- Avoid cross joins in doorways where possible. If a cross join occurs at a doorway, locate the join directly below the closed door
- A power stretcher must be used in all areas where a conventional installation method is used
- Environmental / Green Accreditation: A certification recognised by the GNCC that will provide optimal credits under the GNCC Green Star rating scheme.
- Indoor Air Quality: Low VOC
- Broadloom carpet in high traffic areas are to be free of cross joins. Do not use carpet infill strips in doorways.

RS - Resilient Flooring Performance

Preamble:

Selections of resilient floor finishes must be water resistant, easy to clean and durable and based on the following performance criteria.

Requirements:

- Provide appropriate functionality for the location and use of the area including:
  - Acoustic suitability to expected background and activity noise levels
  - Slip resistance based on spatial function in accordance with HB 197, HB 198 and AS/NZS complying with both the pendulum test and ramp test.
- The designer is to provide a drawing for each area of resilient flooring showing the location of proposed joints and the laying direction. For homogeneous products, the nominated colours and patterns are to permeate this thickness
- For heterogeneous products, the nominated colours and patterns are to permeate at least 0.7mm of this thickness
- Resilient flooring is to be in sheet form and fully heat welded on installation to AS/NZS 1884. If the floor finish cannot be heat welded, cold weld by applying the recommended adhesive to both edges.
- All joints must be sealed to prevent moisture penetration.
- A matching coved skirting must be provided with all resilient flooring finishes
- Vinyl flooring is to have a clear upper surface treatment incorporated during manufacture.
- Resilient flooring must be laid prior to adjacent carpet
- Within Dark Rooms, Science Laboratories and Science Prep spaces, chemical resistant resilient flooring must be specified.
- Maximum deviation from a 3 m straightedge laid in any direction on the floor surface: 3 mm.

Sprung Timber Flooring Performance

Preamble:

Timber sprung flooring for use within Movement Studios, Halls and Gymnasiums: Allow for basketball, badminton, gymnastics, dancing, creative movement, school socials, seating movement and wet weather shelter.

Requirements:

- Timber and plywood of the entire floor build up and framing must be treated to prevent attack by termites to the applicable hazard class to AS1604.1 or be naturally termite resistant hardwood timbers to Australian Standard (AS) 3660.1 Appendix C. Refer to 0
- Vapour barrier: Required to the top of the slab and underside of the flooring build up.

- Expansion Joints: Minimum 10mm clear of walls or any upstands. Consult with the installer/supplier of the strip flooring to determine the number of expansion joints required.
- Timber flooring systems must have a total volatile organic compound (VOC) content of no more than 100g/L.
- One and two pack performance coatings for floors must have a total volatile organic compound (VOC) content of no more than 140g/L.
- Aligned to FIBA requirements, Timber flooring must have a slip rating of P3 tested in accordance with AS 4586.
- Sprung timber flooring must achieve a friction level between 0.4–0.6 tested in accordance with AS 4663.
- Sprung timber flooring must achieve a minimum Janka Hardness Rating of 5.5 or Moderately Hard.
- Ensure that external grades fall away from the building at any possible water ingress points.
- Timber flooring must not be used in spaces where evaporative coo ling systems are installed.

6.14.3 Change between Floor Finishes

Preamble:

Care and consideration to change between floor finishes to ensure a safe and smooth transition, while assisting with ease of ongoing maintenance.

Requirements:

- Heavy duty edge stripping or threshold cover plates appropriate to the flooring type are required at junctions with differing floor finishes or finishes of a different thickness.
- Resilient flooring: Exposed edges must be covered.
- Timber flooring: Threshold cover plates must allow for expansion and contraction of the flooring.
- Carpet and carpet tile: Exposed edges of carpet are to be fastened to the floor surface and are to have a trim along the entire length of any carpet edge
- Doorways: At doors locate the junctions directly below the closed door leaf.
- Trim Material: Extruded aluminium.
- Carpet edge trim is to create no ridge on the floor surface higher than 3mm

6.14.4 Skirtings

Preamble:

Skirtings are required to provide a neat finish between the wall and the floor, protecting the walls from damage and concealing any gaps or imperfections.

Requirements:

Where noted in drawings and Data Sheets in EFSG Part C, cove floor finish to wall or extend wall finish full height from floor.

In other circumstances, refer to the table below for specific skirting types.

Table 6.14.4 Skirting Types

Code	Skirting Type	Requirements
SK01	Aluminium Skirting	Height: 100mm minimum

		Thickness: 1.6mm minimum Finish: Clear anodised aluminium To be used with carpet
SK02	Ducted Skirting	Height: To be determined by Electrical Engineer's requirements. Depth: To be determined by Electrical Engineer's requirements. Finish: Clear anodised aluminium or to match existing. Restrictions: Ducted skirting must only be used within existing buildings Permission is required from School Infrastructure, Department of Education for use of ducted skirting within new buildings.
SK03	Timber Skirting for Sprung Timber Flooring	Timber skirting to be part of the flooring system or recommended by the sprung timber flooring system manufacturer. Finish: Same timber species as the selected flooring material. Skirting must include a rubber seal at junction with the floor for waterproofing and be slotted for ventilation of the sub-floor space Fixing: Screw fix skirting to enable removal for service maintenance.

6.14.5 Flooring in Heritage Buildings

Preamble:

Flooring in Heritage buildings may include:

- Timber boarded flooring
- Timber parquetry flooring
- Polished or painted concrete render flooring
- Terrazzo flooring.
- Tile flooring

Requirements:

- Timber boarded flooring must be retained and repaired to match, to enable future reinstatement of polished flooring even where resilient or carpet floor finishes are proposed on top
- Sub floor voids under timber floors are to be retained and maintained to ensure sufficient sub floor ventilation
- Provide in-floor inspection panels in timber floors to enable maintenance inspection of timber sub-floor areas
- Parquetry flooring must be retained and repaired to match existing by specialist parquetry trades
- Repair of terrazzo flooring must be carried out by specialist Terrazzo trades

- Consult with DoE Heritage prior to making proposals to remove existing timber flooring which is in poor condition.
- Carpet and vinyl flooring over timber boarded or parquetry flooring is not to be adhesive fixed and is to enable the carpet or resilient finish to be removed in future without damaging the timber flooring.
- Timber boarded flooring is not to be replaced with concrete or composite flooring panels.

6.15 Internal Lining

6.15.1 General

Requirements:

Provide appropriate functionality for the location and use of the area including the following requirements:

- Wall linings and associated finishes must in general be in accordance with the overall sustainability requirements. Specifically, they must be in accordance with the relevant project level sustainability requirements for Upfront Carbon Reduction, Responsible Finishes.
- Low-VOC products: At least 95% of all internally applied paints, adhesives, sealants, and carpets are required to be within the stipulated 'Total Volatile Organic Compounds (TVOC) Limits'.
- Pinboards and acoustic treatments are to also comply with TVOC limits nominated for carpets.
- Low-formaldehyde engineered wood products: At least 95% of all building's engineered wood products are required to be within the specified formaldehyde emission limits.
- Acoustic suitability of wall lining products must be advised by the project Acoustic Consultant.
- Where not nominated, fire resistance requirements are to be in accordance with current applicable regulation.
- Plasterboard requirements:
  - The plasterboard must comply with AS/NZS 2588.
  - Joints must be flush.
  - Plasterboard which is impact, moisture or fire resistant must be identifiable by either coloured face paper or stamps on the back.
  - Painted finish, site applied.
- Fibre cement of 9mm thickness must be used under wall tiles within wet areas including splashbacks. Refer to 6.17
- Impact resistance may be achieved through use of the following wall types or linings:
  - Impact resistant plasterboard
  - Masonry (brick / block)
  - Concrete
- Plywood products with intumescent coatings which are required to be maintained and reapplied are not accepted.
- Standard MDF board must not be used as a wallboard lining or backing/ substrate.
- Do not use organic fibreboard as a pinboard wall lining.
- Do not conceal tundishes/valves/access panels etc with wall linings such as pinboards and whiteboards.
- Do not route services through pinboards.

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6.15.2 Wall Lining Types

Requirements:

The following tables describe wall lining types.

Table 6.15.1 Wall Lining Types by Space*

	Spaces	Wall Lining Type
Learning Spaces	General Learning Spaces, Learning Commons, Multi-Purpose Spaces, Library, Special Programs Spaces, Senior Study, Computer Learning Space, Seminar Spaces,	PB02**
	All SSP Learning Spaces	PB02 (double layers)**, CF02 or BR01
	SSP Lifeskills Kitchen	PB03 (double layers)**, CF02 or BR01
Hall / Gymnasium	Gymnasium, Communal Hall, Movement Studio	WT01 and WT02
	Stage	PB02**
	Control Space, Sound Cupboard	PB02**
	Multimedia Studio (recording space)	Refer Acoustic Consultant
Administration and Staff	Entry Vestibule, Reception Areas	PB02**
	Administration, Offices, Interview Spaces, Meeting Spaces, Library Office, Staff Lounges	PB01 (FC01 and TL02 to splashbacks)**
	Staff Kitchenettes	PB02 (FC01 and TL02 to splashbacks)**
Canteen and Food	Canteen and Canteen Store	Solid wall construction in accordance with AS4674
	Food and Hospitality Learning Spaces,	PB03**
Science	Science Laboratories, Science Preparation	PB02 (FC01 and TL02 to splashbacks)**
	Botany / Zoology Space	PB02 (FC01 and TL02 to splashbacks)**
Visual Arts	Visual Arts Workshop / Visual Arts GLS, Dark Room	PB02 (FC01 and TL02 to splashbacks)**
	Kiln	PB05**
TAS	Wood / Metal Workshop / TAS Learning Spaces	FC01**
	Welding Bay	FC01

	TAS Wood and Metal Ancillary Workspace	External Wall Finish
PE Fitness	PE Fitness Laboratories	PB02**
	PE Fitness GLS	PB02**
Performing Arts	Performing Arts Workshop, Multimedia Workshop	PB02**
Lecture	Lecture Theatre	PB02**
Agriculture	Agriculture Indoor Areas	CF02 / BR01
Wet Areas	Toilets, Laundries, Change Spaces and Showers	FC01 (with TL02)
	Clinic, Sick Bay, Utility Space, First Aid	PB02 (FC01 and TL02 to splashbacks)**
Circulation	Internal corridors, stairwells, circulation	PB02**
Storage	Learning Space Storage, Administration Storage, Library Storage, Pantries	PB02
	Bulk Store, Garden Store, Chemical Store Room, Hall and Gymnasium Storage	PB05
	Cleaner's Stores	FC01
	TAS and Visual Arts Project Store Rooms, Science Apparatus Storage	PB02
Services	BCR, Main Communications Space	Fire Rated wall
	Distribution Board Cupboard	Fire Rated wall
	Main Switchboard Space / Cupboard	Fire Rated wall
	Dust Extraction Space	Fire Rated wall

* Fire Rating requirements in accordance with current applicable regulation.

**Pinboard, whiteboard and acoustic wall linings are required

Table 6.15.2 Wall Lining Types by Code

Lining Code	Finish	Requirements
PB01	Plasterboard	Minimum thickness: 13mm Edge finish: Recessed Sheet mass minimum: 8.5kg/m2
PB02	Impact Resistant Plasterboard	Minimum thickness: 13mm Sheet mass minimum: 10.5 kg/m2

		Edge finish: Recessed
PB03	Moisture Resistant Plasterboard	Minimum thickness: 13mm Edge finish: Recessed Sheet mass minimum: 9.8kg/m2
PB04	Fire Resistant Plasterboard	Fire-rated plasterboard thickness and quantity of layers must be determined by project specific fire-rating requirements. Edge finish: Recessed Sheet mass minimum: 9.8kg/m2
PB05	Fire and Impact Resistant Plasterboard	Fire-rated plasterboard thickness and quantity of layers must be determined by project specific fire-rating requirements. Edge finish: Recessed Sheet mass minimum: 12.5kg/m2
FC01	Fibre Cement	Minimum thickness: 9mm Use Fibre Cement under wall tiles within sanitary areas Sheet mass minimum: 14kg/m2
WT01	Plywood and Blockboard	Compliance: AS 2270 and AS 1604.1 Minimum thickness of 12mm
WT02	Perforated Plywood	Compliance: AS 2270 and AS 1604.1 Minimum thickness of 12mm Extent of perforations to be determined by NRC requirements
BR01	Masonry Wall	Refer to 6.8 External Cladding within this document.
CF02	Concrete Wall	Concrete to be Class 2 where visible. Concrete to be Class 3 where within non-habitable spaces, such as store rooms.
TL02	Wall Tiles	Refer to 6.17 Tiling within this document.

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6.15.3 Wall Security

Requirements:

Include one of the following options where additional security is required to designated spaces.

Option 1 | Wall security mesh

Open Area: 85%

Nominal Size of Mesh: LWM:100 mm	SWM:	50 mm
Nominal Strand Size: Width: 4.0 mm	Thick:	2.0 mm

Weight: 2.5 kg/sqm

Installation are to be in accordance with the manufacturer's recommendations.

Option 2 | Proprietary zincalume steel sheet permanently bonded to fibre cement sheeting.

Intruder resistance: To AS 3555.1 - Level 6

Fibre cement sheeting thickness (minimum): 9mm

Zincalume steel sheet thickness (minimum): 1mm

Laminating: The bonding of the steel sheet product to the fibre cement must be undertaken by the manufacturer under factory-controlled conditions. Bonding of the materials must not be undertaken on site.

Installation is to be in accordance with the manufacturer's current written recommendations.

6.15.4 Pinboard Wall Lining

Preamble:

Pinboard wall lining is required within all Learning, Administration and Staff spaces.

Requirements:

- Pinboard surface: Pinnable, hook and loop (Velcro) receptive surface.
- Thickness: Nominally 12 mm (except where the project Acoustic Consultant requires a thicker panel to achieve NRC ratings)
- NRC requirements: in accordance with project Acoustic Consultant advice.
- Installation method: Direct fix or in accordance with manufacturer's recommendation.
- Trim: A proprietary aluminium angle to the perimeter edges of the pinboard system. T-extrusion at butt joints where required. Trims may be anodised or powdercoated.
- Pinboard heights are to typically be from the top of skirting to door head height.
- For existing buildings, pinboard heights and widths are to typically align with existing building features such as doors, windows, dado rails, etc.
- For heritage buildings, pinboards are not to be direct stick fixed to the substrate.

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6.15.5 Acoustic Wall Lining

Requirements:

- Semi-rigid panel of compressed polyester felt.
- Surface: Smooth
- Thickness: Nominal 12 mm (unless NRC ratings require a thicker panel)
- NRC requirements: in accordance with project Acoustic Consultant advice.
- Installation method: Direct fix or in accordance with manufacturer's recommendation.
- Trim: A proprietary aluminium angle to the perimeter edges of the acoustic wall system. Anodised or powdercoated.
- Acoustic panels with smooth surfaces must not be used where pinnable surfaces are required. Refer to clause 6.8.6 for pinnable surfaces.

6.15.6 Whiteboards

Preamble:

Whiteboard is required within all Learning, Administration and Staff spaces. The main whiteboard within a space is to meet the following requirements:

Requirements:

- Surface: Ceramic Steel Enamel Whiteboard
- Substrate: MDF MR E0
- Trim: An aluminium angle to the perimeter edges of the pinboard system. Anodised or powdercoated.
- Minimum width: 1500mm
- Where whiteboard is used as a joinery finish and is supplementary to the main whiteboard magnetic laminate may be used.

6.15.7 Wall Linings in Heritage Buildings

Preamble:

Heritage Linings include:

- Rendered finishes with dado beading
- Timber boarded linings
- Pressed metal
- Painted brickwork

Requirements:

- Historic internal linings including plasters and renders must be retained in-situ and repaired to match where required.
- No new fixtures are to be added to pressed metal linings.
- Repairs are to match the composition of the original renders.
- Where present, inappropriate modern cementitious renders are to be removed.
- Where pinboards, acoustic panels and wall fixings are to be placed on heritage wall linings they are to be fixed in a reversible manner including:
  - minimal required screw fixings not to exceed the depth of repairable render
  - fixed to a false frame utilising minimal screw fixings

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  - fixed into mortar joints where identifiable
  - Smaller fixings for pinboard are encouraged to minimise permanent damage to heritage items.
- Pinboards and wall fixtures must not be attached to heritage wall linings using adhesive fixings.
- Cementitious renders are to be avoided.

6.16 Ceilings

6.16.1 General

Preamble:

Ceiling finishes must provide value for money within a Whole of Life framework. Refer to 1.2 Whole of Life .

Requirements:

Provide appropriate functionality for the location and use of the area including the following requirements:

- Ceiling linings and associated finishes must in general be in accordance with the overall sustainability requirements. Specifically, they must be in accordance with the relevant project level sustainability requirements for Upfront Carbon Reduction, Responsible Finishes, and Health and Wellbeing - Exposure to Toxins.
- Low-VOC products: At least 95% of all internally applied paints, adhesives, sealants, and carpets are required to be within the stipulated 'Total Volatile Organic Compounds (TVOC) Limits'. Pinboards, acoustic treatments, and internal blinds are to also comply with TVOC limits nominated for carpets.
- Low-formaldehyde engineered wood products: At least 95% of all building's engineered wood products are required to be within the specified formaldehyde emission limits.
- Acoustic suitability of ceiling products must be advised by the project Acoustic Consultant.
- Ceiling finish and acoustic blanket must meet non-combustibility requirements in accordance with regulation.
  - Plasterboard requirements:
  - The plasterboard must comply with AS/NZS 2588.
  - Joints must be flush.
  - Plasterboard which is impact, moisture or fire resistant must be identifiable by either coloured face paper or stamps on the back.
  - Painted finish, site applied.
- Design for seismic conditions.
- Installation of all ceiling systems are to be in accordance with the manufacturer's recommendations.
- Pre-finished ceiling products must use a colour from the supplier's standard range.
- Perforated ceiling systems must not be used for ceiling finishes located beneath rooftop playgrounds or rooftop sports courts.
- Ceiling tiles must not be used in areas used for food preparation.

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- Plywood products with intumescent coatings which are required to be maintained and reapplied must not be used.
- Curved ceiling forms are not suitable in schools.

Refer to:

Including but not limited to the following:

- 6 Buildings
- Other applicable sections within this document.

6.16.2 Ceiling Heights

Requirements:

Ceiling heights within new buildings are to be in accordance with the list and table below unless an increased ceiling height is required by current applicable regulation.

Basketball: **7000mm** - FIBA Guide to Basketball Facilities

Netball: **8300mm** - Netball Australia National Facilities Policy

Badminton: **9000mm** - Badminton World Federation Statutes

Volleyball: **8000mm**

Table 6.16.1 Ceiling Height Dimensions

Minimum Ceiling Height	Space / Space
2450mm	Cleaner, services*, and storage spaces < 10m2
2600mm	Internal corridors for staff and admin spaces
2750mm	BCR
2450mm	Toilets, Accessible Toilets, and Change Spaces
2750mm	Typical ceiling height
2750mm	General Learning Spaces and Learning Commons
4000mm clear	Movement Studio
4200mm min	Hydrotherapy Pools
TBC	COLA – Pre-School
TBC	COLA – Public School and School for Specific Purpose
TBC	COLA - High School
5600mm	School Hall – Public School
8800mm**	School Hall – High School
4200mm	School Hall Stage – Public School
6750mm	School Hall Stage – High School

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*Unless a higher ceiling height is required by current applicable regulation.

** Sporting governing body heights for courts require the following ceiling heights:

6.16.3 Ceiling Types

Table 6.16.2 Ceiling Types by Space*

	Spaces	Ceiling Type*
Learning Spaces	General Learning Spaces, Multi-Purpose Spaces, Library, Special Programs Spaces, Senior Study, Computer Learning Space, Seminar Spaces, Sensory Space	CL07
	Learning Commons, STEM Space	CL05
Hall / Gymnasium	Gymnasium, Communal Hall, Movement Studio	CL09 and CL10
	Stage	CL09 and CL10
	Control Space, Sound Cupboard, Multimedia Studio (recording space)	CL07
Administration and Staff	Entry Vestibule, Reception Areas, Administration, Offices, Interview Spaces, Meeting Spaces, Library Office, Staff Lounges	CL07
Food	Canteen	CL03
	Food and Hospitality Learning Spaces	CL03
	Staff Kitchenettes	CL07
Science	Science Laboratories, Science Preparation	CL07
	Botany / Zoology Space	CL01
Visual Arts	Visual Arts Workshop / Visual Arts GLS	CL07
	Kiln	CL06
	Dark Room	CL01
TAS	Wood / Metal Workshop / TAS Learning Spaces	CL08
	Welding Bay	CL08
PE Fitness	PE Fitness Laboratories and PE Fitness GLS	CL07
Performing Arts	Performing Arts Workshop, Multimedia Workshop	CL07
Lecture	Lecture Theatre	CL05
Agriculture	Agriculture Indoor Areas	N/A
Wet Areas	Toilets, Laundries, Change Spaces and Showers	CL06

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	Clinic, Sick Bay, Utility Space, First Aid	CL03
Circulation	Internal corridors, stairwells, circulation	CL05
Storage	Learning Space Storage, Administration Storage and Library Storage	CL01
	Canteen Store, Pantries	CL03
	Bulk Store, Garden Store, Chemical Store Room	CL02
	Hall and Gymnasium Storage	CL02
	Cleaner's Stores	CL03
	TAS and Visual Arts Project Store Rooms, Science Apparatus Storage	CL02
Services	BCR, Main Communications Space	TBC
	Distribution Board Cupboard	TBC
	Main Switchboard Space / Cupboard	TBC
	Dust Extraction Space	TBC

*Ceiling finishes must be reviewed by project Acoustic Consultant.

Table 6.16.3 Ceiling Finishes

Code	Ceiling Type	Requirements
CL01	Flush Plasterboard	Minimum thickness: 13mm Perimeter detail: 10mm shadow angle trim at wall to ceiling junctions, or square set.
CL02	Flush Impact Resistant Plasterboard	Impact resistant: To withstand a high degree of “soft body impact”. Minimum thickness: 13mm Ceiling and wall junctions: 10mm shadow angle trim, or square set.
CL03	Moisture Resistant Plasterboard	Minimum thickness: 13mm Ceiling and wall junctions: square set. Requirement: Additional supports, flashings, trims, and sealants must be installed as required for waterproofing.
CL04	Fire Resistant Plasterboard	Fire-rated plasterboard thickness and quantity of layers must be determined by project specific fire-rating requirements. Fire-rated plasterboard must be a certified system. Ceiling and wall junctions: Square set, and a non-hardening fire-rated sealant compatible with the materials

		and documented fire-resistance level must be used to seal junctions.
CL05	Perforated Plasterboard	Minimum thickness: 12mm Ceiling and wall junctions: 10mm shadow angle trim, or square set.
CL06	Fibre Cement	Minimum thickness: 9mm Ceiling and wall junctions: Square set.
CL07	Ceiling Tiles - Acoustic Mineral Fibre Tile Ceiling	Non-combustible proprietary acoustic impervious ceiling panels. Panel size (nominal): 1200 x 600mm Minimum thickness: 19mm. Requirement: Cut edges must be resealed with an impervious edge sealer. One labelled access tile per serviced zone (e.g. “FCU-##”) Ceiling tile clips are not required by default; project-specific Safety in Design and manufacturer’s instructions are to govern use (e.g. high-wind situations).
CL08	Corrugated, Perforated Metal Ceiling	Proprietary perforated and roll-formed corrugated steel zincalume sheet and purpose made accessories forming part of a system to AS 1562.1. Compliance: AS 2728, Category 3 or 4 as appropriate. Minimum sheet thickness: 0.42 mm B.M.T. Minimum corrugation depth: 6 mm.
CL09	Plywood Ceiling	Minimum thickness: 12mm Compliance: AS 2270 and AS 1604.1 Requirement: External plywood minimum of structural grade plywood with A Grade face veneer
CL10	Perforated Plywood	Minimum thickness: 12mm Compliance: AS 2270 and AS 1604.1 Requirement: External plywood minimum of structural grade plywood with A Grade face veneer
CF03	Concrete Soffit	Concrete to be Class 2 where visible. Concrete to be Class 3 where within non-habitable spaces, such as store rooms

6.16.4 Wall Junction Trims

Requirements:

- Wall trims to Corrugated, Perforated Metal Ceiling Linings are to be folded steel angles. Colour finish to match the main background colour of the ceiling panels, fixed to walls at 600mm centres.

- Fill gaps between the wall and shadow angle trims at wall-ceiling junctions with a paintable flexible sealant.

6.16.5 Suspension and Fixing Systems

Requirements:

- Where ceiling is below a roof, the suspension system must be attached to the long face of purlins.
- For perforated systems, the furring/fixing system must be as follows: Proprietary black matt finished universal carrier rails or furring system.
- Ceiling suspension systems: A proprietary corrosion resistant grid suspension system installed in accordance with the manufacturer's instructions. Provide accessories and trim to complete installation.
- Ceiling clips for ceiling tiles must be evenly configured in accordance with the manufacturer's instructions.

6.16.6 Ceiling Services

Requirements:

- Light fittings to corrugated metal ceilings must be either ceiling mounted or suspended.
- Where ceiling tiles are provided, Light Fittings are to be grid-integrated.
- Where integrated with the ceiling finish, provide openings for, and fit the ceiling system up to, service elements such as light fittings and ventilation grilles.
- Where motorised plant is located above perforated ceilings this must be reviewed by the Project Acoustic Consultant.
- Services associated with concrete soffits must be surface mounted or suspended.

6.16.7 Ceiling Security

Requirements:

Where additional security is required to designated ceilings as outlined within 6 Building Security, the following system is required.

- Use Proprietary parallel interlocking steel structural panel system
  - Thickness: 1mm
  - Galvanized finish
  - Installation is to be in accordance with the manufacturer's current written recommendations.
- and framed walls are not to the underside of a structural slab.

6.16.8 Ceiling Mounted Equipment

Requirements:

Equipment that require dedicated structure and coordination with structural and services engineers includes but is not limited to the following:

- Ceiling fans
- Supports for swings within SLH and SSPs
- Hoist tracks within SLH and SSPs
- Ceiling hoists and supports for sports and gymnasium equipment
- Electric radiant heaters where included within halls or gymnasiums

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- Structural support for stage lighting and stage curtains
- Additional framing and support for AV equipment such as projectors and speakers.

Refer to:

Including but not limited to the following:

- 8 Fitout, Furniture and Equipment
- 7 Services
- Other applicable sections within document.

6.16.9 Ceilings in Heritage Buildings

Preamble:

Heritage ceilings include:

- Timber boarded ceilings
- Pressed metal ceilings
- Lath and plaster including moulded plaster decorations and roses.
- Fibrous plaster
- AFC Sheeting with Battens.

Most historic learning space ceilings through to the 1960's also include passive ventilation grilles connected to roof top cowls that are part of the original building ventilation system.

Requirements:

- Retain original ceiling systems and repair like for like using traditional repair methodology
- Specialist plaster repairs must be carried out by plaster repairers with heritage conservation experience.
- Retain remaining original ceiling grilles in-situ so that they remain able to be reinstated to the original ventilation system.
- Retain original ceiling patterning, trim and battening layout, including any detailing
- Where asbestos or fibrous plaster is to be removed the ceiling must be reinstated with sheet linings, trims and batten layouts to visually match the original material appearance. Refer to 2.6 for further requirements associated with asbestos removal
- Acoustic panels and ceiling fixtures are not to be adhesive fixed to heritage ceilings.
- No additional fixtures are to be added to pressed metal ceilings.

6.17 Tiling

6.17.1 General

Requirements:

The design, specification and installation of tiling must meet the following requirements:

- The manufacturer or technical representative of the tile adhesive must develop a specification for the tiling system which includes adhesive, grout, sealants and secondary membrane (where required) based on the following considerations:
  - Specific requirements of each tiled area

  - Service conditions when in use
  - Substrate
  - Dimensions of the tiles
  - Selection of adhesives
  - Installation constraints
- Tiles and grout must be water resistant and impervious.
- Tiles must be vitrified tiles with a porosity of less than 0.5% water absorption.
- Tiles must provide appropriate functionality for the location and use of the area.
- Low-VOC products: At least 95% of all internally applied paints, adhesives, sealants, and carpets are required to be within the stipulated 'Total Volatile Organic Compounds (TVOC) Limits'.
- Drains must be protected prior to the installation of tiles.
- Efflorescence must be controlled as part of the installation of tiles.
- Tile layout and installation must allow for expansion joints where tiles are located on structural elements. Tiling layout are to coincide with control joint locations in structure.
- Tile layout is to be of a uniform design.
- Gloss tiles are not accepted due to the impact of glare on accessibility.
- Unglazed tiles are not accepted.
- Vitrified floor tiles must not be sealed.
- Use of alternating highly contrasting colours within tile layouts is not suitable in schools.

6.17.2 Substrate

Requirements:

- Framed walls in toilets or showers areas are to be lined with 9 mm fibre cement sheeting with flush joint finish.
- Where blockwork is a substrate for tiled walls a cement-based render must be applied to create a flat and uniformly porous surface. Render must be allowed to cure prior to tiling.
- Use of moisture resistant plasterboard under tiling is not suitable in Schools.

6.17.3 Wall Tiles

Requirements:

- Tiles must be included to all wet area walls and must extend to nominally 2100mm Above Finished Floor Level.
- Tiling must be included to the full wall behind cleaner's sinks.
- Allow for expansion joints where tiles are located on structural elements.
- Wall tiles must be a minimum size of 200x200mm.
- Where wall tiles are used within the Canteen, they must be of a smooth impervious finish, white coloured, large format (nominal 300x600mm), and adhered to a solid wall construction.

6.17.4 Splashbacks

Requirements:

- Splashbacks must be included to all sinks and troughs to a height of 450 to 600mm above the benchtop.

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6.17.5 Floor Tiles

Preamble:

Tiled pedestrian surfaces must be stable, safe and minimise risk of slipping or tripping due to slippery or uneven surfaces.

Requirements:

Floor tiles must have the following characteristics:

- Floor tiles must provide at least the level of slip resistance advised within HB 197 and HB 198 for the space function.
  - Floor tiles in wet and semi-wet areas are to pass an approved accelerated wear test.
  - Floor tiles must comply with both the pendulum test and ramp test.
  - Wet Areas containing showers must comply with the pendulum test, wet barefoot test, and ramp test.
- Tile minimum thickness: 10mm
- Floor tiles must be a minimum size of 200x200mm.
- Floor tiles must be flush with adjacent surfaces unless a stepped level change is indicated or required.
- Allow for >10 mm wide full depth expansion gap at perimeters.
- Allow for >6 mm wide full depth intermediate expansion gaps.
- Floor tiles are to have epoxy grout.
- Include a coved skirting tile to all walls match the flooring.
- Tiles in wet areas must be laid to falls ranging from a maximum of 1:50 to a minimum of 1:80.
- Falls to floor tiles within accessible showers must comply with AS1428.1.

6.17.6 Grout

Requirements:

- Grout is to typically be light-grey or darker.
- Grout to tiles within food prep areas including Canteens and Food Technology spaces are to be white.
- Epoxy grout is to be used with all floor tiles
- Epoxy grout is to be used with wall tiles where the following conditions apply:
  - For 1000mm to either side of urinals and for 1000mm above urinals
  - Within “airline style” single occupancy Toilets to the splash zone adjacent and behind the pan, and to the wall with the sink.

6.17.7 Tiling in Heritage Buildings

Requirements:

- Where new tiles are required to be applied to significant heritage finishes, tiles are to be applied to new and appropriate wall sheeting placed on new framing over the heritage wall to protect the original wall finish.
- New floor and wall tile colour and patterns to replace historic tiles are to be reviewed and approved suitable in writing by the Senior Project Director or equivalent Project Lead who will

consult with the DoE Heritage Team to determine best methodology, as even innocuous floor tiles at Heritage Items may be of heritage significance.

6.18 Circulation Spaces

6.18.1 General

Preamble

The Department of Education (DoE) has requirements over and above the minimum standards of the current applicable regulation, designed to enhance the functionality and safety of walkways and egress.

Stairs, ramps and balustrades must not be designed in isolation to adjacent new and existing buildings. Designers must assess the potential for balustrades, facade elements and landscape items to be used to gain access to roofs and eliminate risks as part of a Safety In Design process.

6.18.2 Walkways

Requirements:

Walkways are typically classified as a Main Circulation Space in Schools. As such, requirements in Section 3 apply in addition to the requirements listed below.

- Walkway to be a minimum **2100mm clear width**.
- Exposed concrete with coved finish for floor surface finish with required slip rating.
- Walkway to achieve minimum **1:80 fall**.
- Walkway to drain to drain away from internal spaces and have a drainage solution to carry water away from the building.
- Ensure an accessible transition is created between the walkway and internal space.
- Pavers on pedestals for walkways are not suitable.

6.18.3 Stairs

Requirements:

Stairs are typically classified as a Main Circulation Space in Schools. As such, requirements in Section 3 apply in addition to the requirements listed below.

- Stairs to be a **minimum 2100mm clear width** between handrails for all new stairs.
- Stairs to be a **minimum 2100mm clear width** between handrails for all new stairs within existing buildings where practical. If this clear width is unable to be achieved in existing buildings, the clear width must not be less than requirements for current applicable regulation.
- Double handrails are required to both sides of stairs.
- Full height perforated screen is required to the full perimeter of stairs and their associated spaces, such as landings and similar.
- Stairs are to be located to minimize blocking light into nearby learning and teaching spaces.
- Each flight of stairs must have a **minimum of 3 risers and a maximum of 14 risers.**
- Within existing buildings the height of stair risers for new stairs is to be 156mm (+/– 10-mm).
- Within new buildings the height of stair risers for new stairs are to be nominal 156mm (+/– 10mm) for both Public School and High School.
- Stair going dimension for new stairs in a Public School or High School are to be 285mm.

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- Provide luminance contrast, non-slip proprietary nosing, in accordance with AS1428.1, fixed to each tread.
- Location and orientation of stairs may vary to suit project specific constraints or requirements.
- The materials for cladding stairs are to meet the requirements for durability and location, such as for marine environments.

6.18.4 Ramps

Requirements:

All ramps (internal and external) are to provide landings at intervals as follows:

Table 6.18.1 Ramp Landing Intervals

Ramp Gradient	Ramp Length to Landing Interval
1:14	6 metres
1:15	7.6 metres
1:16	9 metres in accordance with current AS 1428.1
1:17	9 metres in accordance with current AS 1428.1
1:18	9 metres in accordance with current AS 1428.1
1:19	9 metres in accordance with current AS 1428.1

Access to Podiums and stage areas are to comply with the following:

- Ramped access with an unobstructed clear width of 1000mm are to be provided to form a continuous accessible path of travel to the podium or stage
- A circulation space of dimensions 2270 x 1740mm is to be provided to ramps for a wheelchair user to make a 90–180-degree turn, including at ramp landings.
- The stage area is to allow for wheelchair turning circulation of 2250 x 2250mm.
- All facilities on the podium are to be usable by a seated person.
- The edge of the stage are to include a colour contrasting strip providing luminance contrast of at least 30 LRV points.

6.18.5 Ramps to Heritage Buildings

Requirements:

- Ramps are to be light weight construction, reversible and are not to block sub floor vents and air flow to Heritage Buildings.
- New ramps and integration measures are to be designed to be removable in the future without impacting the heritage materials of the building.
- Concrete ramps must not be used to attach to Heritage Buildings.

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6.18.6 Lifts

Note: **This Section is being updated.**

Until the updated Section is published, the requirements below and on the following pages of content unchanged from EFSG 2025 are to apply.

Preamble:

This section outlines the requirements for Lifts in schools.

Requirements:

- Provide one lift per 14 bays of a school building.
- Lifts are to be located centrally within the length of the walkway side, subject to connection between buildings.
- Lifts are to be located to minimize blocking light into nearby learning and teaching spaces.
- Lifts are to be located to meet the requirements of the expansion strategy for the school.
- For urban schools, the number and placement of lifts should be assessed by the project team to suits specific project requirements.

CONTENT UNCHANGED FROM EFSG 2025

2011 Lifts Design and Install

STATUS: This Section includes content unchanged from EFSG 2025.

It is retained for continuity and completeness until further development in future EFSG versions. Until an updated version is published, the requirements set out below are to continue to apply.

00 Design Reference

0.01 Main Considerations

Lift services are to be installed in education buildings generally that are greater than two floors. The Public functions for buildings up to 4 storeys high are to provide disability access, conveyance of heavy or bulky goods and facilitate non-emergency pedestrian flows within the building. For buildings that are over 4 floors in height, the lift services will be used for mass student and staff vertical movements.

This design standard outlines the minimum functional, installation and technical requirements for a new or refurbished vertical transportation installations.

The lift designer must use these standards as the minimum DoE requirements for the system design, it is incumbent upon the designer to ensure that the design satisfies site specific operational, logistical and performance requirements and meets DoE's transportation objective for the facility.

Where the designer considers that an alternate equipment type is preferred to the equipment type specified in the design standard, the designer will advise the principal of the functional, performance or cost benefit that will be achieved through the use of the alternate equipment type.

In determining the most appropriate equipment types and control systems for a particular installation, the designer shall consider the long-term energy efficiency, maintenance implications, operational efficiency and life cycle costs as well as the initial capital costs.

Compliance with Codes, Standards and Legislation

All new installations and lift modernisations must comply Australian Standards (AS) and British Standards European Norm Standards (BS EN), including:

- National Construction Code (NCC) - current edition at the time
- AS 1735.1 – General requirements.
- AS 1735.4 – Service lifts: power operated.
- AS 1735.11 – Fire-rated landing doors.
- AS 1735.12 – Facilities for persons with disabilities.
- AS1735.14 – Low-rise platforms for passengers.
- AS 1428 – Design for access and mobility; part two: enhanced and additional requirements - buildings and facilities.
- BS EN 81-20 – Passenger and goods passenger lifts.

Lift Type

All lifts are to be Machine Space Less (MRL). Unless prior approval in writing from the Senior Project Director or equivalent Project Lead, no lifts are to be of the geared, hydraulic, screw drive or cantilevered type.

All drives are to be high efficiency Variable Voltage, Variable Frequency.

Regenerative drives are not mandatory, however, if they are proven beneficial and appropriate for a particular installation, regenerative drives will be encouraged.

A detailed list of how many lifts of the same type and model and in particular with the same control system that have been installed over the past 5 years is required to be supplied by intended

installers in order to be considered at the time of tender. The list is to show the address of the lift installations and if the original manufacturer or installer is now maintaining the lift. Preference are to be given to well established lift systems that have a proven track record of reliability and ease of maintenance.

Prequalify Requirements

Only a competent, well-established, lift contractor with at least 10 years local lift installation experience shall complete lift installations or modernisations.

The lift contractor shall have the ability to maintain the school campus in compliance with the maintenance agreement, this includes access to replacement materials and resources to provide continuous operations.

Minimum Requirements for Person with Disabilities

All new installations and lift modernisations at any of NSW DoE campus are to provide access for persons with disabilities in compliance with AS1428 and A1735.12.

Where compliance with AS1428 and/or AS1735.12 cannot be achieved, prior approval in writing via Governance processes by the NSW DoE Secretariat are to be provided, and demonstration that the lift(s) are to still comply with at least the Building Code of Australia (NCC) requirement for Facilities for People with Disabilities Clause E3.6.

All lift car control buttons are to comply with AS1735.12 Clauses 8.3 Tactile Information and Clause 8.4 Shape of Characters.

All passenger lifts must have lift car audio (voice, not just a sound) position indication regardless of how many floors are served.

Unless prior approval in writing via the approved Governance process is provided from NSW DoE Secretariat the following lifts shall not be used for the access of people with disabilities:

- AS1735.7 – Stairway Lifts
- AS1735.15 – Low rise passenger lifts – Non-automatically controlled
- AS1735.16 – Lifts for persons with limited mobility – Restricted use – Automatically controlled
- AS1735.17 – Lifts for persons with limited mobility – Restricted use – Water-drive
- AS1735.18 – Passenger Lifts for Private Residence

Passenger Lifts

Passenger lift cars are to have a minimum size of 1400mm wide by 2000mm deep. Unless prior approval in writing via Governance processes is provided by the NSW DoE Secretariat, no passenger lift car are to be smaller than this size. Car sizes may be larger than this as required to suit code requirements and lift traffic studies.

Door openings must comply with AS1735.12.

Dual access doors (enter one side and exist the other) are to be considered on a project specific basis.

Stretcher and Emergency Lifts

Provision shall be made for the use of stretchers and emergency lifts as detailed in the current NCC, clause E3.2.

Guaranteed Life

All new lift installations and modernisations should have operational life and product support guarantee of minimum 25 years. The designer shall develop the system to accommodate any foreseeable increase in demand/usage so that the system remains functional and effective throughout the operational life.

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0.02 Architectural Considerations

Lift Grouping

Where multiple lifts are specified, they are to be grouped to maximise operational and energy efficiency. The objective is to meet peak demands and minimise waiting times.

Lift Numbering

All lifts are to be numbered consecutively and integrate with any existing lift installation numbering. Each lift door should have the Department's Asset Management System (AMS) door number identifier.

Water Ingress

Architects, engineers and lift designers must ensure that all lift doors, landing fixtures and controller cabinets are protected from wind driven rain and water runoff.

Refer to section 6.6 Structure and section 6.18.6 Lifts within this document for information on the lift pit requirements.

Passenger Lift Car Finishes

The finishes must comply with the following requirements.

Table 6.18.2 Passenger Lift Car Finishes

Item	Detail
Side walls and lower half of rear wall	Vandal-resistant and patterned stainless steel
Mirror	Aluminium-framed silver to upper half of rear wall
Car ceiling	Fixed “white” coloured or stainless steel
Handrail	Linished stainless steel in compliance with the requirements of AS1735.12
Car door, car front	Linished stainless steel
Skirting	Linished stainless steel
Flooring	Black vinyl.
Car control panels - main and auxiliary	Steel, satin finish and complying with AS1735.12 and mounted in vertical alignment
Car and landing buttons	Commercially available “third party supplier” items that comply with AS1735.12. Generic lift company manufactured buttons are generally not acceptable
Car and landing indication	Commercially available “third party supplier” items that comply with AS1735.12. Generic lift company manufactured indicators are generally not acceptable

Goods Lifts

Goods transportation are to be provided as required for particular projects including mid- and high-rise schools. With wood and metal workshops on the upper floors, as a minimum, the following must be provided:

CONTENT UNCHANGED FROM **EFSG 2025**

- Minimum lift door size to load specified goods.
- Minimum lift car size to carry specified goods. Where the goods lift is also used for passenger transport, the lift car size shall not be less than 1600mm wide by 2100mm deep.
    - Specified goods may include educational equipment such as lathes, saws, fridges, photocopiers, 3D printers, etc. as well as delivery of curriculum material including lengths of timer and steel. The designer shall consider the equipment that is required to be transported and specify the goods lift appropriately.
    - The designer shall consider the needs of other services in the ongoing operation of the building. This may include the need to transport various items of plant, mobile plant and façade items. Where lifts are integral in the future maintenance of the building the lifts are to be designed to accommodate the maintenance requirements where practical.
- Bump rails
- Hazardous Goods Operation mode.
- Extra landing indication to show lift availability, operation mode and position on each landing.

Goods Lift Car Finishes

The finishes must comply with the following requirements.

Table 6.18.3 Goods Lift Car finishes

Item	Detail
Side walls and lower half of rear wall	Vandal-resistant and patterned stainless steel
Mirror	Aluminium-framed silver to upper half of rear wall
Car ceiling	Fixed “white” coloured or stainless steel
Handrail	Linished stainless steel in compliance with the requirements of AS1735.12
Car door, car front	Linished stainless steel
Skirting	Linished stainless steel
Bump rails	Stainless steel installed on side and rear walls. Bumps rails are to be a flat plate of approximately 150mm wide by 6mm thick securely mounted to the lift car walls.
Flooring	Galvanised steel floor plate
Car control panels - main and auxiliary	Stainless steel, satin finish and complying with AS1735.12 and mounted in vertical alignment
Car and landing buttons	Commercially available “third party supplier” items that comply with AS1735.12 and with White/Blue Illumination. Generic lift company manufactured buttons are generally not acceptable

Car and landing indication	Commercially available "third party supplier" items that comply with AS1735.12 and with. Generic lift company manufactured indicators are generally not acceptable
Special applications	Goods lifts used for chemicals, animals, etc. must use specific fit-for-purpose durable and resistant finishes to resist exposure damage.

0.03 Performance and Traffic

For schools with four or less floors it is recommended that lift services are reserved for students with limited mobility and for staff use only, all other students will typically use the stairs.

Where a school has floor levels above level 4 (including ground floor), the general student body will be using the lifts to access the higher levels. A traffic study must be conducted by a suitably experienced vertical transport engineer using analysis software such as 'Elevate'.

The traffics study shall consider the following traffic patterns:

- Morning up peak;
- Class/period changes;
- Breaks such us recess and lunch (down and up peaks);
- Afternoon down peak.

Performance requirements and definitions

Interval

The period of time between successive car arrivals (or departures) at the main lobby level with cars loaded to any value.

Interval is considered a measure of the "quality" of the elevator service when a conventional dispatching system is used.

Handling Capacity

Handling Capacity is defined as the total number of passengers (expressed as a percentage of the calculated building population) that an elevator system can transport from the main lobby level during a peak 5-minute period assuming, that the elevators cars are not loaded to more than 80% of their rated capacity.

Handling capacity is considered a measure of the "quantity" of lifting that the elevator system provides.

Lift Capacity

Lifts are to be designed to a maximum of 65% filling capacity to enable sufficient space for students with backpacks.

Stair Factors

Due to the high-peak demand cycles of an education building, heavy stair use can be expected. Therefore, stair factors in traffic calculations is allowable but are to be a rational factor based on:

- stair location and accessibility;
- stair visibility (preferably encountered before the lift lobby);
- the width of the stairs.

The performance targets nominate a suitable stair factor for each traffic pattern, provided the above points are met.

Performance Targets

The traffic profiles for a school building vary depending on the function of the building and the arrangement of the school timetable. Considering an education building with learning spaces on all levels and a standard (non-split) timetable, the following performance targets are to be implanted.

Table 6.18.4 Public School Performance Targets

Traffic Pattern	Interval(s)	Handling Capacity	Traffic Profile Incoming	Traffic Profile Outgoing	Traffic Profile Interfloor	Utilisation Factor	Stair Factor
Morning Up Peak	50 – 60	25%	100%	0%	0%	90%	50%
Break Down Peak	50 – 60	25%	0%	100%	0%	80%	70%
Break Up Peak	50 – 60	25%	100%	0%	0%	80%	50%
Afternoon Down Peak	50 – 60	25%	F0%	100%	0%	90%	70%

Table 6.18.5 High School Performance Targets

Traffic Pattern	Interval(s)	Handling Capacity	Traffic Profile Incoming	Traffic Profile Outgoing	Traffic Profile Interfloor	Utilisation Factor	Stair Factor
Morning Up Peak	50 – 60	15%	100%	0%	0%	90%	60%
Class Change	50 – 60	33%	10%	10%	80%	25%	60%
Break Down Peak	50 – 60	25%	0%	100%	0%	60%	80%
Break Up Peak	50 – 60	25%	100%	0%	0%	60%	60%
Afternoon Down Peak	50 – 60	25%	0%	100%	0%	80%	80%

Skip Stop Arrangement

To improve the efficiency and performance of the vertical transportation system, the designer may consider a ‘skip stop’ arrangement. Generally, in skip stop arrangement the lift system will only service some flows within the building, with the other floors accessed via the stairs.

As a general principle, the lifts in a skip stop arrangement service every third floor. This allows users to catch a lift to a served floor then use the stairs to reach their destination by either:

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- walking one floor up to their destination, or;
- walking two floors down to their destination.

For a skip-stop arrangement to work effectively the stairs must be suitably wide, easily accessible and located near the lifts.

Other Performance Considerations

Other performance considerations that to be discussed with the designer and DoE include:

- Pedagogy and school operations;
- Consideration for split timetabling, early starts or late finishes.

Consult with the Senior Project Director or equivalent Project Lead to confirm if these considerations apply, the performance targets are to be adjusted to suit specific application.

Performance Criteria Parameters

The following performance criteria are to apply to all passenger lifts:

Lift Speeds

All new installations of passenger lifts are to have a minimum lift speed of 1.0 m/s.

Table 6.18.6 Door Times

Door Movement	Time
Opening	2.2 Seconds
Closing	2.8 Seconds

Door Open Dwell Times

For lifts installed in line and arranged interconnected in operation, the following door dwell times are to be used:

Table 6.18.7 Door Dwell Times (no advanced warning)

Action	Dwell Time
Car Call	6.0 Seconds
Lobby Call	6.0 Seconds

Where the lifts provide an advanced warning of at least 3 seconds prior to arrival, the dwell times are to be:

Table 6.18.8 Door Dwell Times (advanced warning)

Action	Dwell Time
Car Call	3.0 Seconds
Lobby Call	3.0 Seconds

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Where more than 3 lifts are installed in line and arranged in interconnected operation, the door dwell times of the lifts furthermost from the centre of the lift lobby must be increased by 2 seconds.

Floor Levelling Accuracy

At all levels served, irrespective of the direction of travel, and for all loading conditions, the car door sill shall be:

- not more than 6mm above,
- not more than 6 mm below the landing door sill

Automatic relevelling may be used to achieve this tolerance on levelling accuracy.

Noise

The ambient noise inside the lift car shall not exceed 55 dBA

Acceleration, Jerk and Vibration

The following parameters shall stay within the specified limits:

Table 6.18.9 Lift Acceleration, Jerk and Vibration requirements

Condition	Rate
Maximum vertical acceleration	< 1.0 m/s2
Maximum jerk rate	< 1.2 m/s3
Maximum Lateral Vibration	< 10 milli-g
Maximum Vertical Vibration	< 15 milli-g

0.04 Lift Features

Non-Proprietary Systems

Only non-proprietary lift equipment, or lift equipment that has been available locally for at least 5 years in Australia, or lift equipment that has a ready supply of spare parts to local lift companies, other than the original manufacturer, must be used. Lift equipment refers to any and all parts of the entire lift installation, in particular the controllers, drivers and its various component parts.

Lift Car Lighting

Lifts are to be equipped with LED lights that illumine the lift car in accordance with AS1735.12.

The lighting system shall operate automatically in response to the passenger demand of the lift. Key switches shall not be provided except for isolation of the lights to enable testing and maintenance.

Lift Car Emergency Lighting

All lift cars are to have an emergency lighting feature that are to be energised automatically following the failure of the mains supply to the normal car lighting and are to provide constant illumination of 20 Lux at the Centre of Place (CoP) for a duration of not less than 2 hours.

The Light Fittings for the emergency lighting are to be located and rated such that, in addition to providing general illumination of the car, they are to provide sufficient luminance to distinguish the car threshold and all communication and control features within the lift car.

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Provision shall be made for a suitable means of simulating mains failure for testing the emergency lighting system for both luminance and duration.

Required Hands Free Communication Systems

The Lift Contractor are to provide a 'hands free' communication system.

The hands-free system shall be activated by a telephone / alarm push button incorporating an appropriate legend in accordance with EN81-20. Continuous activation of the telephone push button for a nominal period of 3 to 5 seconds shall initiate automatic, sequential dialling to a minimum of three numbers.

The system shall be available at all times, including during a loss of mains power supply. The system shall utilize a suitable cellular network and not rely on any base building communication network or National Broadband Network (NBN).

Telephone buttons, speakers and microphones, are to be located in the car- operating panel and shall interface with the telephone system as required by EN81-20 in relation to connection feedback and confirmation.

A suitable notice shall be engraved in the car informing passengers how the hands-free telephone is operated. The wording, size and location of the notice are to be agreed with the Engineer.

A cellular gateway device must be provided and mounted in an appropriate location to ensure that a reliable cellular network signal is maintained. The Lift Contractor must provide all wiring from the gateway device to the lift shaft, the gateway device must be provided to terminals and travelling cables with a termination point in the lift machinery space. Where there are two or more lifts installed the gateway device may be common to multiple lifts.

The communications system shall automatically identify the lift and its location and relay this to the answering service.

The operation of the communication system shall allow the Lift Contractors call centre to dial into any lift car at any time.

The communication system shall include remote stations on the car top and in the pit.

The system shall be of the latest technology and not include any reliance on technology that is slated for disconnection in the near future.

Protective Curtains

The lifts are to have provision for protective curtains in all lift cars to protect their finishes. Each building which has lifts is to have minimum of one (1) set of lift protective curtains. Therefore, if only one lift in the building it must have set of curtains supplied with the lift.

Notices

All required notices in the landing buttons panels and lift car operating panels are to be engraved. No stick-on labels will be accepted.

This applies to such notices as the Statutory warning against the use of lifts in a fire, lift number, building address, emergency telephone instructions, lift car load details etc.

Emergency Battery Drive

A facility shall be provided to automatically move the lift car to a floor when the car has stopped between floors due to a failure of the normal power supply.

The emergency operation is performed at low speed and all safety functions shall remain operational to prevent an unsafe condition occurring. When the car has reached a floor, the doors are to be opened.

The lift shall return into normal service automatically following re-instatement of the power supply.

Lift Well Lighting

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The lift well shall be provided with permanently installed electric lighting in accordance with EN81-20. The lighting will provide illumination of the well and car roof so that, at any point in the car's travel within the well, the following intensity of illumination are to be achieved:

- at least 50 lux, 1.0m above the car roof within its vertical projection;
- at least 50 lux, 1.0m above the pit floor everywhere a person can stand, work and/or move between working areas;
- at least 20 lux outside of the locations defined in a) and b), excluding shadows created by the car or components.

This illumination must be achieved with all doors closed.

Machinery spaces and pulley spaces are to be provided with permanently installed electric lighting with an intensity of at least 200 lux at floor level everywhere a person needs to work and 50 lux at floor level to move between working areas. In the case of MRL lifts, this machinery space is part of the well, and therefore, this lighting may be part of the lighting of the well.

To achieve this illumination, a sufficient number of lamps are to be fixed throughout the well and where necessary additional lamp(s) may be fixed on the car roof as a part of the well lighting system.

Lighting elements are to be protected against mechanical damage.

Well lighting switches (or equivalent) are to be located both in the pit and close to the main switch (within the lift controller cabinet for MRL lifts) so that the well light can be operated from either location. The pit lighting switch are to be positioned within a maximum horizontal distance of 0.75m from the pit access door frame inner edge and at a minimum height of 1.0m above the access floor level.

The electric lighting supply to the well, machinery spaces and pulley spaces, are to be independent of the supply to the machine.

In the case additional lamps are installed on the car roof, they are to be connected to the car light circuit and switched from the car roof. The switch(es) are to be in an easily accessible position not more than 1.0m from the entry point(s) for inspection or maintenance personnel.

Maintenance of lift car, shaft, pit and machine space lighting is to be included as part of the lift maintenance contract for each lift installation.

Glass Cars and Glass Shafts

Where the building design and budget allows, glass lift cars, shafts and doors can be used. All glass shall be specified in accordance with EN81-20.

Where glass cars and glass shafts are installed, analysis is required to determine the severity of potential solar gain in the lift shaft and car. Mechanically ventilation of the lift shaft is required to remove heat generated by Air Conditioned (AC) unit.

Keys

All Fire Service keys are to be TOK 3. All other lift control keys are to be TOK 6.

The MRL lift controller door lock(s) must be keyed the same as other DoE controller door locks.

Closed Circuit TV (CCTV) Camera in the Car

All CCTV use in schools should comply with the Department Legal Services Legal Issues Bulletin 41.

Suitable cabling shall be provided by the Lift Contractor, within the travelling cables to suit the provision of a monitoring camera installed in the lift car. The Lift Contractor are to include for fitting a camera within the lift car. The camera will be supplied by others.

The Lift Contractor will be responsible for liaising with the security contractor to ensure the correct cabling is provided. The CCTV camera feed will be connected to a master station at a nominated location within the school.

CONTENT UNCHANGED FROM EFSG 2025

Security Access Control

All new lift installations and modernisations shall be equipped with security access control in the form of proximity card readers positioned adjacent to the external cell call button on all floors. The call button must not activate without a valid proximity card/fob being presented to the reader.

When the security access control system is activated it will restrict access to specified floors by disabling the lift car buttons. Authorised persons and students will access restricted floors by presenting a valid proximity card which will enable the lift car button/s for the floors to which the passenger is granted access.

Where two (2) card readers are specified, each card reader will operate independently of the other.

The security operation is described below:

- Security access card readers will be provided in the lifts.
- Staff will access their floors by presenting a valid proximity card within the lift car.

When the security access control system is active the lift control system shall not automatically zone lifts to park at levels that are secured unless special measures are used to ensure there are no passengers in the lift car.

The access control system must be integrated into the school's alarm system and comply with the School Security Unit (SSU) Specifications and Guidelines, Section 8 Access Control Systems.

The Lift Contractors are responsible for liaising with the security contractor to ensure sufficient space is provided within car operating panels for security card readers.

System Interfacing where a BMS is available

All lifts (excluding Service Lifts) are to have certain functions monitored by a campus Building Management System (BMS). The BMS are to be located in one particular place on campus. The system interfacing will run on the communication protocol active on the campus (i.e. BACnet).

The following lift functions and operations are to be monitored by the BMS:

- Lift failure to start
- Lift on Fire Service
- Alarm button pressed
- Lift on Independent Service
- Lift on normal operation
- Lift on maintenance
- Lift on Hazardous Goods Operation
- Lift Position (optional – for buildings or more than 10 floors)

The level of the interface (high or low) is to be determined on a campus by campus basis depending on the requirements of the campus.

Hazardous Goods Operation

Hazardous Goods Operation is to be used only by authorised personnel and is restricted by security swipe cards as described in this section. The lift contractor shall liaise with the Senior Project Director or equivalent Project Lead to ensure that all required features of the system suit the building operational requirements.

Method of Operation

The hazardous goods operation mode shall be controlled as follows:

CONTENT UNCHANGED FROM EFSG 2025

5. When the hazardous goods feature is not active, the designated lift will operate normally and where applicable as part of a lift group.
6. The attendant calls the lift using the card reader in the hall operating panel. A tone shall sound when the card reader is activated. The landing indicators for the lift shall display "Warning! Hazardous goods operation. Use other lift."

Figure 01: Examples of Hazardous Goods indicators



7. The lift will deliver any current passengers to their required destination, and then travel to the floor at which the hazardous goods call was made. All other lift car calls will be cancelled and new lift car calls will not be accepted. If the lift is idle, it will immediately travel to the floor at which the hazardous goods call was made.
8. The lift will park at the called floor and open its doors.
9. The car indicator shall display "Warning! Hazardous goods operation initiated" The car announcement shall say "hazardous goods operation". This audio announcement shall repeat approximately every 10 seconds.

Figure 02: Hazardous Goods Warning indicator



10. The lift will remain 'captive' in hazardous goods operation mode for 60 seconds. If the process does not proceed to the next stage, the lift will return to normal service.
11. The attendant enters the car and swipes the hazardous goods card reader in the car operating panel. A tone shall sound when the card reader is activated.
12. Car indicator to change to display "Warning! Hazardous goods loading in progress". Voice announcements to continue in accordance with step 5.

13. The goods are loaded into the car.
14. The attendant exits the car and checks no one is in the car with the hazardous goods.
15. The attendant swipes the card reader in the hall operating panel. A tone shall sound when the card reader is activated.
16. The doors of the lift close, and the lift will remain parked at the current floor. The car indicator shall display “Warning! Hazardous goods operation in progress”. The car door open buttons will remain active.
17. The attendant travels via another lift or stairs to the destination floor.
18. The attendant swipes the card reader in the hall operating panel of the destination floor. A tone shall sound when the card reader is activated.
19. The lift travels to the destination floor.
20. The doors open.
21. The attendant removes the hazardous goods from the lift.
22. The attendant swipes the card reader in the car operating panel to deactivate the hazardous goods operation and return the lift normal service. A tone shall sound when the card reader is activated. The car indicator and landing indicators shall return to normal.

The hazardous goods operation will not initiate if

- The hall or car fire service is active
- The lift is in inspection mode
- The lift is independent service

Selection of the hall fire service mode while the lift is in hazardous goods operation will return the lift to a designated floor for unloading.

If the hall fire service mode is selected while the lift is on hazardous goods operation, there will be an announcement in the lift car, advising the attendant (passenger) to abandon the use of the lift and exit the lift before the doors close and the lift returns to the designated floor.

0.05 Special Lifts

Service Lifts for wood/metal workshops located on upper floors

Service lifts are to be provided as required for particular projects. These lifts are restricted for staff use only. The following minimum requirements must be provided:

- Minimum lift door size to load specified goods
- Minimum lift car size to carry specified goods
- Proximity card reader or a keyed switch
- Comply with AS1735.4

Service Lifts supplying Laboratories with chemicals and equipment

Where a high school has multiple science labs on multiple floors a dedicated lift for the movement of chemicals and equipment is to be provided.

This lift is restricted to staff access only and should have a proximity reader or keyed switch

Service lifts for use in transporting laboratory equipment must be sized to accommodate a large laboratory trolley. This lift is not for people, only chemicals and equipment that is transported on trolleys.

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CONTENT UNCHANGED FROM EFSG 2025

The dimensions of a large 3 shelf laboratory trolley are as follows: 1100mm x 520mm x 1020mm high.

Figure 03: Large 3 Shelf Laboratory Trolley



A service lift for this application shall have a minimum size of 1200mm x 600mm x 1500mm high.

The size of the service lift may exceed this, but it may not exceed the requirements of Class 2 Service Lifts as specified in AS1735.4

Platform Lifts for loading areas

Platform lifts are to be provided as required for particular projects where deliveries of large and bulky items are required. The following minimum requirements must be provided:

- Minimum platform size of 1100mm x 1400mm
- The area of the platform shall not exceed 1.6m2.
- Travel of the platform shall not be more than 2000mm.
- Access controlled by keyed switch
- Comply with AS1735.14.

0.06 Lift Documentation and Support

As-Installed Documentation and Service Manuals

On completion of the lift installation a complete set of as-installed documentation is to be provided to the DoE in electronic format.

The following design documents must be provided:

Lift layouts.

23. Lift car interiors.
24. Lift landing entrances.
25. Lift car and landing faceplate details.
26. Lift labels, notices and signage.
27. Project specifications check sheets for each major component detailing each lift plant and equipment item that needs to be checked, tested and verified during the installation process.

28. Return Brief defining the systems proposed and any deviations from this specification.
29. Applications to Supply authorities, and their responses.
30. Designer's statutory compliance certificates.

The following documents must be provided at practical completion:

a) Completed project specification check sheets for lift plant and equipment verified by the project consultant/designer, including the rectification of identified defects including:

- Ride quality results.
- Door open and close times.
- Door dwell times.
- Floor levelling accuracy.
- Acceleration and deceleration rates.
- Jerk rate.
- Contract speed.
- Flight times (door open to door open) for one, two and four floor runs.
- Power consumption.

b) Operation and Maintenance manuals.

c) Commissioning records.

d) Product Manufacturer specific information.

e) System schematics.

f) Complete As-built workshop drawings.

g) Electrical and wiring diagrams.

h) Lift functionality and operation description.

i) Plant registration documentation.

j) Hazard and risk assessment provided by lift contactor.

k) Work Cover registration.

l) Installer's statutory certificates.

m) Safe-to-Operate certification.

Testing and Commissioning

DoE Asset Management Unit is to be involved in the commissioning of all lift installations. At least 2 weeks prior notice is to be given to DoE Asset Management Unit of any commissioning of lifts.

The lift contractor shall carry out such tests as required by EN81-20.

The lift contractor shall allow access to lift spaces for the consultant to inspect the lift prior to final handover.

Training

A training session or sessions to be provided for DoE maintenance personnel and the School staff. Training session/s are to be at no additional cost to the DoE.

The training session/s to include the operation of the lift and its controls, keys and locks, cleaning of all finishes, operation in an emergency (such as fire or power failure), hanging, cleaning and storage of protective curtains, etc. The Lift contractor is to allow for at least 2 sessions of 2 hours each. Written documentation of the training details is to be provided.0.07 Maintenance

CONTENT UNCHANGED FROM EFSG 2025

Independent Maintainability

All new lift equipment must be able to be fully and effectively repaired, serviced and maintained, in accordance with the requirements and recommendations of each designer, supplier, manufacturer and installer of the lift equipment (including as set out in the Operation and Maintenance Manuals required under the contract) by any qualified and competent lift maintenance contractor. There are to be no need to rely on or use devices or intellectual property of a proprietary nature such as, but not limited to, tools, instruments, pass words, software, keys and access cards, even if only required on very infrequent occasions.

The Department or its maintenance contractor must not be required to pay and/or enter into contractual arrangements with the designer, supplier, manufacturer or installer of the lift equipment in order to perform repair, service or maintain the lift equipment.

Supported Maintainability

The Department will consider new lift equipment, which is not compliant with the independent maintainability requirement in Independent Maintainability above if:

a. all devices, spare parts and intellectual property required for independent maintainability will be provided to or made available to the DoE at, and as part of the requirements for, practical completion; and

b. no additional amount will be payable at any time to the contractor or any third party for the DoE or its contractors to receive or to have access to the relevant devices, spare parts or intellectual property. All Operation and Maintenance manuals are to include instructions on how to use or apply these tools, instruments, pass words, keys, cards, spare parts and intellectual property, etc.

Integration with Existing Maintenance Procedures

The following procedures are to be included in any new lift construction specification to assist the integration of any new lifts into the existing lift maintenance program.

School Infrastructure Asset Management Unit must review all documentation regarding the lift tender and specifications. Information must be made available with at least two weeks prior notice of the assessment date.

School Infrastructure Asset Management Unit is to be involved in the commissioning of all lift installations. At least 2 weeks prior notice is to be given prior to any commissioning of lifts.

Prior to commissioning of any lift (at least 1 week) School Infrastructure Asset Management Unit is to be provided with at least one copy of the Operational and Maintenance Manuals for that particular lift.

Any lift in Defects Liability Period must comply with the procedures for recording and reporting of the existing lifts that are in place for the DoE at the time of tender. It is the contractor's responsibility to ensure that the procedures being applied are current and the latest available.

Maintenance Schedule

All maintenance and inspections are to be carried out in accordance with the Maintenance Schedule. All scheduled maintenance is to be initialled and dated in the appropriate column in the Maintenance Schedule by the person carrying out the work.

Inspections

The Contractor is to, when required by the Departments Representative and at no greater than 12 monthly intervals, inspect the entire lift equipment in company with the DoE's Asset Management representative to ascertain the condition in which the equipment is being maintained. Such an inspection is to not in any way relieve the Contractor of its obligations to perform the Lift Services.

CONTENT UNCHANGED FROM **EFSG 2025**

The Contractor is to immediately prior to the completion of the Defects Liability Period inspect the entire lift equipment in company with the DoE's Representative to ascertain the condition in which the equipment is being maintained.

The responsibility for arranging such inspections is to rest with the Contractor. The Contractor must give a minimum of two (2) weeks' notice to the DoE's Asset Management representative of such any inspection.

Final completion at the end of the Defects Liability Period will not be granted without this inspection being satisfactorily completed and all defects rectified.

Spare Parts

Each building with a lift installation are to have a collection of spare parts stored on within the building at a location confirmed by the Senior Project Director or equivalent Project Lead. These spare parts are to include, but are not limited to:

- Door locks
- Buttons

6.18.7 Tactile Indicators

Preamble

Resilient tactile ground surface indicators for orientation of people with vision impairment.

Requirements:

Tactile indicator studs with spigots preferred.

The specified tactile indicator system must be appropriate for the floor finish.

- Installation: To AS/NZS1428.4.1 and in accordance with the manufacturer's printed installation instructions.
- Slip resistant classification for pedestrian surface to AS/NZS 4586, HB197 and HB198 as appropriate to the location of the tactile indicators.
- Selection of tactile indicator colour must achieve the luminance contrast required under AS/NZS1428.4.1 when compared to the floor finish.

6.18.8 Handrails

Requirement:

- Wherever practicable the outside handrail at stairways must be continuous throughout the stair flights and around landings.
- At ramps and stairways, a second handrail must be provided at a height between 665-700mm to all school types.
- Where inclusion of a second handrail creates a foothold associated with a balustrade, a full height screen must also be provided.
- Where positioned against a background wall or screen, handrails must have a luminance contrast factor (LRV) with the background of 30 LRV points or more.
- Handrails are to be of circular profile with diameters as follows:
  - Public and Preschools: nominally 35mm
  - High Schools: nominally 50mm
  - SSPs: 35 to 50mm

6.18.9 Balustrades

Requirements:

- Balustrade to be minimum **1300mm high**.
- Balustrades are to be provided where the difference in level exceeds 300mm except to the front edge of tiered seating.
- Balustrades must not contain openings greater than 100mm in width.
- Within Pre-Schools balustrades must not contain openings greater than 90mm in width.
- The design of stair balustrades and position of fixings must avoid creating footholds on the outer side of the balustrade which may enable climbing.
- In buildings of three or more storeys, any balustrade in the third storey and above must not have openings in the first 100mm above the floor, to prevent objects rolling off and falling from the floor
- All balustrades must not contain a toehold in the zone of 150-760mm above the floor and in accordance with current applicable regulation.
- Material: Grade 316 Stainless steel, Aluminium (powder coated), Mild Steel (galvanised and/or painted).

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- The loading rating of the perforated metal screen to be compliant with AS/NZS 1170.1 and AS/NZS 1170.2 as required.
- The design and fixing of the balustrade are to be approved suitable and in writing by the project Structural Engineer.

6.18.10 Balustrades within Heritage Areas

Requirements:

- Required balustrades are to meet the requirements of current applicable regulation and are exempt from compliance with the EFSG standard provisions for balustrade form and height.

6.18.11 Tensile Mesh Screens

Note: **This Section is being updated**.

A review by the Department of Education and others is being completed to assess this building component in order to provide improved built solutions.

This includes built elements within Special Support Program School Types.

Until the revised Section is published, the requirements below are to apply.

Requirements:

- Maximum aperture width of mesh of 30mm to prevent climbing within 1800mm Above Finished Floor Level. Aperture of 60mm may be used above.
- The deflected shape of the tensile mesh screen is to not result in the formation of temporary non-compliant openings.
- Material: Grade 316 Stainless steel.
- Loading rating of the tensile mesh screen to be compliant with AS/NZS 1170.1 and AS/NZS 1170.2 as required.
- The fixing methodology must be in accordance with the supplier's recommendations. Care is required to ensure that the reactions applied to the base structure can be adequately supported. The resultant load reactions for tensile mesh screens are to be approved by the Structural Engineer.
- The use of a Tensile Mesh Screen does not remove the requirement for an accessibility handrail where required by current applicable regulation.
- Connections to the base supporting structure are to be adjustable, anti-tamper, and located in areas to not create an additional hazard.
- Galvanised mesh screens are not to be used.

6.18.12 Perforated Metal Screens

Requirement:

- Where perforated metal panels are accessible to students on balustrades, screens, and similar structures (within 3000mm Above Finished Floor Level), the holes must be sized to prevent fingers from getting trapped and to ensure that larger holes cannot be used as footholds.
  - Maximum perforation size SSP, Public and High Schools: 7mm within 2100mm Above Finished Floor Level
  - Maximum perforation size Preschools: 5mm within 2100mm Above Finished Floor Level
- Material: Grade 316 Stainless steel, Aluminium (powder coated), Mild Steel (galvanised).
- The loading rating of the perforated metal screen to be compliant with AS/NZS 1170.1 and AS/NZS 1170.2 as required.

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- The fixing of the metal screen is to be designed and approved suitable by a Structural Engineer.
- Painted mild steel perforated screens are not to be included in schools.

6.18.13 Barrier Heights

Requirements:

- Climbable zone -footholds: to prevent climbing, balustrades and screens designs are not to contain a foothold within the climbable zone - between 150 mm and 760 mm above the floor (e.g. horizontal rails, perforations, panel joints or ornamentation are to not form a step).

Table 6.18.10 Balustrade and Screen Height Dimensions

Location	Level / Condition	Balustrade / Screen Height
Walkways and Corridors	Ground Level	1300mm
Walkways and Corridors	First Floor and above	1300mm
Rooftop	Rooftop Playground (passive play and outdoor learning)	2100mm high screen with 1300mm high balustrade
Rooftop	Rooftop Playground (informal ball sports)	5000mm min fully enclosed with tensile mesh to sides and to top.
Rooftop	Rooftop Sports Court	8300mm min fully enclosed with tensile mesh to sides and to top.
Stairs	Nominal Ground Level to 4m	1300mm
Stairs	Balustrades at 4m above the adjacent surface where a lower handrail is included at 665-700mm	Full height
Walkways and Corridors	Balustrades at 4m above the adjacent surface where a lower handrail extension is included at 665-700mm	Full height

6.18.14 Circulation Spaces for Heritage Buildings

Requirements:

Walkways, stairs, ramps, balustrades and screens to heritage buildings are to meet the requirements of the EFSG.

Where alternative solutions are required for the existing conditions of a heritage building or its associated spaces, notify the Senior Project Director or equivalent Project Lead to establish a suitable solution in consultation with the DoE Heritage Team.

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6.19 Vermin Control

6.19.1 General

Preamble:

The detailing of exposed structure and external finishes must be carefully designed to avoid possible vermin ingress, nesting and roosting positions. Eliminate insect, rodent and bird access to cavities in walls, roof and structure especially at junctions.

6.19.2 Bird Roosting

Preamble:

To minimise bird roosting flat sloped ledges are required to be incorporated in the construction of school facilities.

The detailing of ledges and structural members are to discourage bird roosting.

Requirements:

- Where structural members and beams are exposed, use square, rectangular or circular hollow sections in preference to Universal beam or L-shaped members to avoid ledges that may be used for roosting. Detail the structure to avoid structural members forming ledges.
- Use cant bricks to the top of masonry walls where adjoining to a thinner cladding material.
- For window ledges of masonry walls use cant bricks or follow the angle of inclination requirements noted within Table 01 for rough surface finishes.
- Exposed ledges are not to be wider than 40mm.

Table 6.19.1 Minimum Angle of Inclination for Sloped Ledges

Material or Building Element	Minimum Angle of Inclination
Perforated metal sunshade hoods	Minimum 15° angle of inclination
Smooth metal sunshade hoods	Minimum 25° angle of inclination
Concrete column tops where reducing to a smaller steel structure	Minimum 45° angle of inclination
Window ledges with rough surface finish	Minimum 50° angle of inclination
Window ledges with smooth surface finish	Minimum 25° angle of inclination

Source: Haag-Wackernagel, Daniel and Geigenfeind, Ila. (2008). “Protecting buildings against feral pigeons”. European Journal of Wildlife Research. 54. 715-721. 10.1007/s10344-008-0201-z.

6.19.3 Access for Vermin

Preamble:

Access points for vermin, including birds, rodents, insects and other animals are to be avoided through detailing of the design.

Requirements:

- Prevent entry to the roof space at eaves and roof junctions.
- Provide end caps to trusses and struts.

- Include eaves ventilator strips.
- Services penetrations are to be sealed to prevent insect ingress.
- Vermin mesh is to be included to mechanical vents.

Table 6.19.2 • Sizing of Openings to Restrict Pigeon Access

Restriction	Measurement
Restriction in width:	4 cm
Restriction in height:	5 cm
Square restriction:	6×6 cm

Source: Haag-Wackernagel, Daniel and Geigenfeind, Ila. (2008). "Protecting buildings against feral pigeons". European Journal of Wildlife Research. 54. 715-721. 10.1007/s10344-008-0201-z.

6.19.4 Overlapping Roofs

Preamble:

Overlapping of roof structures are to avoid creating sheltered spaces which may encourage bird roosting.

Requirements:

- Ensure roof overlaps are at least 400mm vertically apart.
- Ensure roof overlaps are no more than 400mm horizontally.

6.19.5 Termite Management

Preamble:

Termite management is required to prevent damage to building fabric and structure.

Requirements:

- Keep dense vegetation clear of building edges to improve ventilation and chances of termite detection.
- Termite resistant timbers must be used for timber framing of floors, walls, ceilings, roofs and similar. The following are suitable:
    - Naturally termite resistant timbers to AS 3660.1 Appendix C.
    - Preservative treated timber to the applicable hazard class to AS 1604.1.
- Non-Chemical Soil Barriers must be used. The following requirements apply:
    - Paving next or close to buildings where termite barriers have been installed must be below the termite barrier to AS 3660.1.
    - Provide effective termite barriers at all doorways in accordance with the manufacturer/suppliers written or drawn recommendations.
- Chemical barriers including chemical soil barriers and reticulation systems must not be used due to environmental and safety risks. Use alternative physical barriers instead.
- Non-Soil Matrix Barriers: Chemical barriers including composite membranes incorporating a termicide and bedding mortar incorporating a termicide must not be used.

6.19.6 Inspections and Certifications

Requirements:

- The supplier and / or installer is to organise to undertake a completion inspection with the Senior Project Director or Project lead 14 working days prior to completion, to inspect the termite control systems and submit a report on their efficacy and status.
- The supplier and / or installer is to submit source certification for timber selection to the Senior Project Director or equivalent Project Lead.
- The supplier and / or installer is to submit documentation for an Integrated Pest Management (IPM) program used to the Senior Project Director or equivalent Project Lead.

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7

Services

7.1 Transition to Electric
7.2 Electrical Services
7.3 Lighting
7.4 Communication Services
7.5 Audio Visual
7.6 Electronic Security
7.7 Ventilation
7.8 Heating and Cooling
7.9 Hydraulic Services
7.10 Fire Protection

7.1 Transition to Electric

7.1.1 General

Preamble:

The NSW Net Zero Government Operations Policy 2025 (Net Zero GO Policy) requires that all new buildings with estimated development costs above $10 million must be all-electric. This includes:

- Electrification of science labs (electrical Bunsen burners).
- Electrification of Food Technology and VET kitchens (induction cooktops).

This transition future-proofs school facilities, improves indoor air quality, and reduces both upfront and ongoing energy costs.

Interim Provision:

Applicable for Projects under $10 million not subject to Greenstar requirements.

Pending full electrification by 2035, limited bottled LPG gas may be installed in specific learning spaces (science labs, VET kitchens, and workshops) where required for curriculum delivery.

The design of all facilities must allow for future transition to 100% electrification, including provision of sufficient electrical capacity to replace gas appliances and removal of gas reticulation.

Transition to Electrification:

- All designs must:
  - Size electrical loading to allow removal of LPG appliances by 2035.
  - Ensure gas reticulation can be capped off and decommissioned.

Provide layouts and services compatible with all-electric operation. to 1 turret on science lab demonstration bench in each science lab to carry out experiments. The gas to the turret is bottled LPG that is stored external to the building. The 50% gas cooktops being from bottled LPG that is stored external to the building. To future proof the VET kitchens, the electrical loading for the kitchens is to be sized to replace the 50% gas cooktops with all electric cooktops, the gas reticulation could be capped in the future, LPG bottles removed, and gas cooktops replaced.

7.2 Electrical Services

7.2.1 General

Preamble:

Electrical service systems are to provide safe, reliable and maintainable supply to all school facilities, supporting learning, ICT and critical building services, and enabling future expansion with minimal disruption.

Requirements:

Provide at least the following electrical services in Schools:

- Main Switchboard (MSB)
- Distribution boards (EDBs), with RCD protection, controls, circuit breakers and labels
- On-site renewable energy generation (Solar PV)
- External and internal reticulation and cable containment for consumers mains, submains, final sub-circuit, and control cabling.

- Power installations
- Lighting installations
- Fixed electrical equipment

The completed system is to meet the regulatory requirements of the following:

- Current Applicable Regulation
- NSW Service and Installation Rules
- Relevant Power Supply Authority requirements.

7.2.2 Permanent Supply

Requirements:

- New Schools
  - A new permanent electrical supply will be required.
  - The electrical designer is to undertake a Maximum Demand assessment to size the permanent electrical supply.
- Existing School expansions and major refurbishments:
  - Assess the existing electrical supply and upgrade only if supply capacity is insufficient.
  - The electrical designer is to undertake a Maximum Demand assessment to determine if an upgrade is required.

7.2.3 Maximum Demand

Requirements:

- A suitably qualified electrical designer is to undertake a Maximum Demand assessment for the project.
- Maximum demand is to be determined based on an all-electric solution in all areas.
- New schools and buildings:
  - Determine the maximum electrical demand using **Appendix C of AS/NZS3000:2018 (Wiring Rules) ("AS3000")**.
- Existing schools:
  - Determine the existing Maximum Demand using recorded data (minimum 24 months of data)
    - Maximum demand recorded in electricity billing data provided by the project or Department of education, or
    - Private site meter data
- When metered data is unavailable or incomplete: Use **AS3000** to determine Maximum demand. This are to be applied where a portion of a school is to be removed to allow for a new expansion, to determine the reduced Maximum Demand of the demolished portion.
- Electrification: Schools are fossil-fuel free, all equipment is to be assumed electric, particularly in canteens and food learning spaces which have historically used gas equipment. Maximum demand calculations are to be determined based on an all-electric solution in all areas.
- Projects with staged delivery and future needs:
  - School Site Arrangements are often staged to meet projected future needs that are not immediate.

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  - The Maximum Demand includes any future stages included in Site Arrangement documents. Calculate Maximum Demand for all stages documented in the school Site Arrangement, regardless of when each stage will be delivered.
- Periodic power logging of load is to not be used to determine the maximum demand of spaces as this does not fully capture seasonal peak loads.

7.2.4 Connection

Requirements:

- The electrical designer is to prepare the Application for Connection of Load for the local electricity Distribution Network Service Provider (DNSP).
  - Application is to follow the standard application process applicable for the local DNSP. Note: The three DNSPs in NSW (Ausgrid, Endeavour Energy and Essential Energy) each currently use an online portal for submitting an application for connection to the network. An Electrical Designer can submit an application on behalf of School Infrastructure for all DNSPs.
- To determine the availability of supply the electrical designer will require information on what is proposed, including:
  - The location of the project
  - The extent of the works
  - The anticipated Maximum Demand (determined by Maximum Demand assessment for new or refurbishment works, including the deduction for any removed load)
  - The NMI of the existing connection, where an existing connection is being modified
- In response to the application, the DNSP will advise if any works are required to their network. The following requirements apply if any works are required to the DNSP network.
  - School Infrastructure will engage a Level 3 Accredited Service Provider Designer (ASP/Level 3) to provide certified design for works to DNSP network if required, up to Design for Construction documentation.
- The electrical designer is to provide the following input to the ASP Level 3 Designer:
  - The substation location (if required) or point of attachment preferred by the wider project team
  - The Maximum Demand
  - Any relocation or modification to network assets requested by the wider project team
  - Any additional information likely to influence their deliberations such as inclusion of Solar PV and/or BESS.
- For network upgrade works, the ASP Level 3 Designer, with input from the electrical designer, will be required to provide the following:
  - the Proposed Method Of Supply (PMOS)
  - certified design, in accordance with DNSP brief
  - any other documentation as required by the DNSP
  - Liaison with School Infrastructure with regard to design and or certification fees
  - Confirmation of finalised substation/point of attachment locations
  - Confirmation of relocation or modification of network assets (either as requested by the wider project team or as necessary for the ASP Level 3 design)

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7.2.5 Substations

POLE-TOP SUBSTATION

Requirements:

- Substations are to be a “pole-top” substation wherever possible to minimise spatial impact to school grounds.
- If this is not possible, a ground-mounted substation will be required. The electrical designer is to coordinate with the ASP Level 3 Designer, Architect and other services to ensure all DNSP requirements are met.

GROUND-MOUNTED SUBSTATIONS

- Ground-mounted substations are to be a “kiosk” or “padmount” type (rather than a “chamber” type) as they are a more cost-effective solution and often can be located near landscape spaces already required for schools. “Chamber” type substations may be considered in urban settings where constraints (such as spatial constraints, environmental assessment requirements or heritage impacts) impact the substation location. The electrical designer is to seek approval from the Senior Project Director or equivalent Project Lead where a chamber substation is required, and is to coordinate with the ASP Level 3 Designer, Architect, Structural Engineer and other services to ensure all DNSP requirements are met.
- DNSPs have strict requirements for the location, spatial and fire rating requirements of substations and buildings in proximity. Where buildings are impacted, the electrical designer is to coordinate these requirements with the Senior Project Director or equivalent Project Lead as soon as practicable.
- DNSPs generally require the substation to be located on a site boundary with 24-hour access.
- The preferred location is adjacent to carpark entries and away from playgrounds to minimise the impact of service vehicles and to meet DNSP requirements for service/consumer mains cabling length. This will also impact MSB placement.
- Substation easements require fences at least to the easement line.
- The proposed locations of substations are to be reviewed with the Senior Project Director or equivalent Project Lead with the project team during the planning and design period and prior to installation, to ensure that they are appropriately located and do not pose a risk to the school community.
- If a proposed substation is to be located in a heritage area or where heritage items are present, the proposed location is to be agreed with the Senior Project Director or equivalent Project Lead and in consultation with the DoE Heritage Team.

7.2.6 Site Connection Point

Preamble:

Coordination with the DNSP will be required to determine the Point of Common Coupling and the Connection Point.

Requirements:

- Beyond the NSW Service and Installation Rules and specific DNSP requirements, the Connection Point is to abide by the following requirements:
- The Connection Point are to be at the property boundary.
  - If a substation is required on site, this are to be the Connection Point with an underground consumer mains.

— If a substation is not required, sites are to seek to use an underground service if possible (either by an existing underground distribution mains or overhead distribution mains with authority UGOH). A private pillar is to be used as the Connection Point.

— If the DNSP requires an overhead service be used, then a private pole is to be installed as the Connection Point with an underground consumer mains.

7.2.7 Metering

Requirements:

- Include authority metering at the Main Switch Board to meet statutory and local DNSP and NSW Government Contract C778 requirements.

7.2.8 Switchboards

Requirements:

- All switchboards are to be three-phase.
- Provide laminated circuit schedule showing all circuits, including circuit breaker ratings, settings and device details. This are to be updated and replaced after any modification or addition to the switchboard.
- Provide laminated A3 as-built single line diagrams and wall mount within the switchboard space or cupboard.
- Switchboards and associated equipment are to be provided for any new building or refurbishments, and designed and installed in accordance with the requirements of the local DNSP and the relative AS.
  Note: AS/NZS 3000:2018 Appendix K provides information on the requirements for switchboards with respect to AS/NZS 3000 and AS/NZS 61439 requirements for switchboards.
- Switchboards are to be steel construction, finished with thermoset powder coating or two-pack liquid coating.
- Switchboard finish is to be X15 Orange.
- Select external switchboards and switchboards in naturally ventilated plant areas to suit the school's atmospheric corrosivity in accordance with AS 4312. For coastal, marine or other corrosive environments, provide corrosion-resistant switchboard enclosures, fixings and accessories.
- For switchboards in existing schools that cannot be housed in dedicated spaces or cupboards, a departure is to be sought for the location and for colour. An alternative colour may be used to minimise visual impact.
- All switchboards are to use circuit breakers for overcurrent protection. This will minimise the impact of rectifying a fault. Fuses are to not be used as these require replacement parts and the additional labour by a qualified contractor to rectify a fault.
- Switchgear and metering are to be from a uniform manufacturer across the installation.
- Cascading (backup) protection may be used to meet AS requirements. If cascading is used, the switchboard must be clearly labelled switchgear to ensure this is considered for any future modifications.

7.2.9 IP Ratings

Requirements:

- Switchboards are to be located according to "MSB Location" and "EDB Location" sections. These sections require switchboards to be located indoors in dedicated spaces or cupboards.

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- The provisions for external switchboards are for situations when an EFSG departure for MSB/EDB location is pursued.
- IP ratings:
  - Indoor switchboards within dedicated cupboards and spaces – IP42 minimum
  - Indoor switchboards in commonly accessible spaces – IP43 minimum
  - Switchboards within cupboards that open to external areas – IP 54 minimum
  - External switchboards – IP56 minimum

7.2.10 Surge Protection

Requirements:

- Provide surge protection devices at MSBs and EDBs where cabling enters a building from an external location, beyond any requirement for Lightning Protection.

7.2.11 Power Factor Correction

Preamble:

NSW Service and Installation Rules (NSW SIR) sets out minimum requirements for power factor of supplies and power factor correction units (PFC Units). Power factor cannot be accurately determined until a project is energised and in use.

- New Main Switch Board installation (new build or upgrade): the design is to assess if NSW SIR requirements power factor compliance requires a PFC unit to be installed.
- If power factor is non-compliant after energisation.

Requirements:

- PFC Units are to not be installed as a blanket requirement in new schools or in existing schools as part of an MSB replacement.
- The design is to include provision for future installation of a standalone PFC unit in order to meet NSW SIR Requirements for power factor.
- The design is to:
  - Include 1-off spare 3-phase circuit breaker frame dedicated for a future PFC unit. Size to the smaller of:
    - Match the largest outgoing circuit breaker on the switchboard or;
    - 400A
  - Label spare frame to indicate use for a PFC in future.
  - Provide clear space within the MSB space for a PFC unit matching the spare frame size, including all required equipment clearances.
  - Provide free space for future cable containment to support PFC unit cabling.
- If spare space in accordance with Spare Capacity is above and beyond the PFC allocation – PFC unit spare frame is to be counted as a required circuit breaker for determining spare capacity.
  - The PFC unit are to utilise the allocated spare space.
  - The PFC unit are to be programmed and arranged with consideration of power factor influences form PV generation equipment, to ensure no adverse interactions.

7.2.12 Main Switch Board

Preamble:

Every site requires a Main Switch Board (MSB) to accommodate the incoming electrical supply, house authority metering for billing, and distribute electrical supplies across the site. This may commonly need to be accessed by contractors to service the authority meter or any part of the electrical installation, or by emergency services personnel (who are unfamiliar with the stie) if there is a need to shut down power to the site.

Requirements:

The Main Switch Board (MSB) are to be located and enclosed in accordance with “MSB Location” and “MSB Space” sections.

- Locate MSB on the ground floor collocated with other building services.
- Locate MSB as close as practicable to the Point of Supply (ie, substation or connection to street network) to minimise Consumer Mains cabling length.
- Locate the MSB on the ground floor of one of the service cores. Alternatively the MSB can be located in the Hall block.
- Enable ease of access to the MSB for maintenance in a location that is outside of spaces which are utilised by students – including learning spaces.
- Provide a clear trench pathway free of other structures from the Point of Supply to the MSB location. Consumer Mains cabling is to reticulate underground to the MSB
- Provide access away from an area occupied by students in their daily activities (such as during breaks or when moving between classes), eg accessed from staff carpark, and/or near administration/reception area.
- Review the pathway from the main entrance/FIP location to the MSB to ensure clear access for emergency personnel during an emergency e.g. Fire.
- The electrical designer is to review the MSB location with the Architect, Senior Project Director or equivalent Project Lead as early as possible in the design process to minimise the impact to the overall layout of spaces.
- The electrical designer is to review DNSP requirements for the MSB location with the Architect and Senior Project Director or equivalent Project Lead to determine the requirements as early as possible in the design process.
- Provide an engraved notice near the main public entry door to the administration block indicating the location of the main switchboard.
- Note there may be statutory requirements to show the MSB location on block plans/at the Fire Indicator Panel (FIP).
- Where an MSB needs to be located in a heritage item, confirm the proposed location for the MSB is as-agreed with the Senior Project Director or equivalent Project Lead and in consultation with the DoE Heritage Team.

Provide the following sections to the MSB:

- Incoming control – Service Protection Device (SPD) and MSB local isolation
- Authority metering – for the purpose of billing by the electricity supplier
- Private metering and surge protection
- Safety Services section (as required by current applicable regulation)
- Distribution section

Include the following equipment in the MSB:

- Any required Safety Services are to be supplied in accordance with the current applicable regulation.
- Provide a fault make and load break switch on the load side of the Service Protection Device (SPD) for MSB local isolation (with consideration for Safety Services requirements).
- Include authority metering equipment in accordance with local DNSP requirements.
- MSB are to be of a modular design with provision for flexible expansion without modification to the busbar assembly. Allow for busbar extensions with pre-drilled holes ready to serve future modular extension of the switchboard.
- Switchboard are to be constructed with a floor mounted galvanised steel plinth with minimum 75mm height Above Finished Floor Level
- Provide shunt connected surge protection devices at the Main Switchboard and for communications equipment as recommended by AS1768. The surge protection are to have an indicator showing surges received.
- House the MSB in a dedicated main switch room.
- Allow for external door access for meter reading and out-of-hours operations.
- Space to meet minimum compartmentation and separation requirements in accordance with current applicable regulation. Note: Compartmentation and Separation cover “Fire rating” or “FRL” requirements.
- Space to meet minimum spacing, access and location requirements in accordance with current applicable regulation. The Electrical Designer are to coordinate with the relevant designers where applicable (eg, door hardware).
  Note that current regulation requires two points of egress for switchboards exceeding a certain size.
  Note there are also requirements in current regulation for door hardware (door closers, facilities to hold doors open), including if doors are located within egress pathways.
- Provide free egress, outward opening double door access. Door height to be minimum 2200mm height to allow for MSBs to be transported into the space.
- Ensure floor level is 75 mm above corridor and adjacent spaces, to minimise danger of water entering cabling pits due to hosing down floors in adjacent areas, flash-flooding, etc.
- MSB space is to be artificially illuminated. Position the Light Fittings to avoid casting shadows into the switchboard when switchboard covers are removed and not above equipment to enable safe access to lighting for maintenance.
- MSB space are to not have windows.
- Provide one double socket outlets for general maintenance use
- Provide one DGPO adjacent to MSB and data outlet.
- Provide mechanical ventilation to remove generated heat. Electrical and mechanical designers to coordinate requirements based on anticipated heat load.
- Provide cable pit under the MSB to facilitate the entry of the consumer’s mains and underground submains if this strategy is used.
- Doors are to be locked with dual access locks - PWD “E” keys to allow access for authorised persons, and school master key access.
- Above and beyond mandatory labelling requirements, provide MSBs and MSB Spaces with the following labelling and schedules to facilitate future maintenance or upgrade works.
- Provide white vinyl “traffolyte” style labels with black text to the outside of each switchboard panel door with the following items for identification:

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MAIN SWITCHBOARD

INCOMING SUPPLY FROM [AUSGRID/ENDEAVOUR/ESSENTIAL ENERGY] SUBSTATION XXX/POLE XX

INCOMING SUPPLY LCOATED ON [STREET]

X-CORES OF XXX mm XLPE WITH

(Actual locations, cable types and sizes to be referenced)

Use site map space numbers as reference, with local names as appropriate.

- Beyond mandatory labelling requirements, provide engraved identification plate and/or ”traffolyte” labels with the following information as a minimum:
  - Switchboard manufacturer
  - Installing contractor
  - Manufacture date
  - Switchboard form rating
  - Degree of protection (IP rating)
  - Rated operating current
  - Fault current rating (including current level and duration)
- Schedules and Single Line Diagram (SLD):
  - Provide manufacturer workshop SLD of MSB – laminated, A3 size
  - Provide site-wide SLD showing downstream EDBs, circuit protective devices and cable sizes – laminated, A3 size
  - Provide printed digital switchboard schedule in MSB space
  - Schedules/SLDs are to include contractor company details and date of update
  - Provide metal framed schedule/SLD holder
  - Provide laminated schedule sheets or clear plastic cover for printed sheets
  - Identify all circuits connected to switchboard. No connected circuit are to remain “unknown” or “spare”.
  - All labelling is to be typed and printed – labels are to not be handwritten
  - A new typed schedule and/or SLD are to be produced to replace existing for any switchboard additions.
- MSB space labelling:
  - Provide white vinyl “traffolyte” style label with black 40mm high lettering to the outside of the switchboard cupboard door that reads as follows:

MAIN SWITCHBOARD

Provide white vinyl “traffolyte” style label with red 25mm high lettering to the outside of the switchboard cupboard door that reads as follows:

Line 1 – NOT TO BE USED

Line 2 – FOR STORAGE

Refer to:

Including but not limited to the following:

- EFSG Part C for examples of MSB locations.
- Applicable sections within this document.

7.2.13 Electrical Distribution Board

Preamble:

Electrical Distribution Boards (EDBs) are to be strategically located to reduce cable runs and adequately supply the surrounding spaces. EDBs will commonly need to be accessed by contractors to service part of the electrical installation.

Requirements:

- Minimum one EDB is required per separate building. Buildings joined only by roofs or at corners are to be considered as separate buildings.
- Minimum one EDB is per floor (except for small mezzanines and stores).
- Locate EDB within a services core zone.
- Access EDB from common/circulation areas, not from learning or student areas.
- Stack EDBs vertically within buildings to provide simple submain reticulation pathway.
- Space EDBs no greater than 30m apart.
- Do not locate EDBs within spaces used by students – including learning spaces.
- Where external services are required (eg external lighting, external power for COLA spaces etc), locate Ground Floor EDB for direct reticulation pathways.
- Facility needs – consider higher loaded areas (Workshops, science labs, food tech kitchens) and locate EDB to minimise cable runs.
- Provide the following sections on each Electrical Distribution Board (EDB):
  - Incoming control – main switch for the incoming submain. It may be mounted on the distribution chassis if appropriately identified.
  - Control and monitoring section - local main switch, submain controls, meting, surge protection, emergency lighting test switches, external lighting control, smart lighting control systems, relays and contactors, etc
  - Power distribution section.
  - Lighting distribution section
- These sections may be arranged in a single compartment or in adjacent compartments.
  - The incoming control are to be a fault-make load-break switch.
  - Provide separate lighting and power distribution sections. Provide separate isolation control for each section using fault make load break switches.
  - Spare spaces for future circuits
  - Metering

Given the nature of use of schools with air conditioning installed, the electrical usage is relatively light for general lighting and power. As such, the limiting factor for EDB placement is usually

voltage drop, not electrical capacity requirements, and so EDB location are to be considered alongside the voltage drop of final subcircuits.

- Provide lockable dedicated cupboards for EDBs.
- Locate cupboards so that access is available only directly from general circulation areas. It is not acceptable to locate EDBs where access will disrupt learning activities or where equipment and material may impede access (eg within storage cupboards).

EDB cupboards are to meet the following requirements:

- Minimum doorway 2.2 metres high. Allow space on either side of the board to facilitate servicing
- Lockable doors with school master key access.
- Provide artificial lighting within the cupboard, with a local switch.
- Provide one DGPO and double data outlet
- Provide space allocation for cable tray to support submain reticulation to plant/EDBs, as well as final subcircuit cabling running within the ceiling void

EDB cupboards will require minimum spacing, access and separation in accordance with current applicable regulation. This includes minimum spacing for access, door requirements (eg facilities to hold open if within a corridor), and consideration to minimise the impact to egress paths (eg smoke sealed and located outside fire-isolated exits). EDB Cupboards will also need to meet minimum compartmentation and separation (ie “fire rating”) requirements in accordance with current applicable regulation.

Due to the standard location of EDB cupboards in schools being in corridors, they often require a hold-open device (in accordance with AS/NZS 3000) and a non-combustible cupboard with smoke sealed door.

Above and beyond mandatory labelling, provide EDBs and EDB Cupboards with the following labelling and schedules to facilitate future maintenance or upgrade works.

- Provide white vinyl “traffolyte” style labels to the outside of each switchboard panel door with the following items for identification:

DB-XX BLOCK X

INCOMING SUPPLY FROM DB-XXX IN BLOCK XXX

X-CORES OF XXX mm XLPE WITH XXX mm EARTH

(Actual locations, cable types and sizes to be referenced)

Use site map space numbers as reference, with local names as appropriate.

- Beyond mandatory labelling requirements, provide engraved identification plate and/or ”traffolyte” labels with the following information as a minimum:
  - Switchboard manufacturer
  - Installing contractor

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- Manufacture date
- Switchboard form rating
- Degree of protection (IP rating)
- Rated operating current
- Fault current rating (including current level and duration)

Schedules:

- Provide printed digital switchboard schedule on the inside door of all EDBs
- Schedule are to include contractor company details and date of update
- Provide metal framed schedule holder mounted within the new switchboard.
- Provide laminated schedule sheets or clear plastic cover for printed sheets
- Identify all circuits connected to switchboard. No connected circuit are to remain “unknown” or “spare”.
- All labelling is to be typed and printed – labels are to not be handwritten
- A new typed schedule is to be produced to replace existing for any switchboard additions.

EDB cupboard labelling:

- Provide white vinyl “traffolyte” style label with black 40mm high lettering to the outside of the switchboard cupboard door that reads as follows:

ELECTRICAL DISTRIBUTION BOARD

- Provide white vinyl “traffolyte” style label with red 25mm high lettering to the outside of the switchboard cupboard door that reads as follows:

Line 1 – NOT TO BE USED

Line 2 – FOR STORAGE

- Provide laminated RCBO resetting procedure mounted within switchboard or switchboard cupboard.

7.2.14 Metering and Monitoring

Preamble:

Electrical metering and monitoring allows for detail recording and analysis of power usage, and in turn for actions to be taken in response to this. This section considers the technical requirements of metering and monitoring.

Requirements:

Buildings under 2500m^2

- Provide meters in all new switchboards for the following supplies:
  - Main incoming supply (following authority meter)
  - Supply to lighting sections in each distribution board
  - Supply to power sections in each distribution board

  - Outgoing supply to mechanical services switchboards
  - Outgoing supply to central hot water plant
  - Each outgoing lift supply
  - Supply to solar PV inverters
  - Outgoing supply to EV charging section/distribution board
  - Other ancillary plant with a rating over 50A/phase

Buildings over 2500m^2

- Over and above the requirements of current applicable regulation, provide meters in all new switchboards for:
  - Each outgoing lift supply
  - Supply to power sections in each distribution board

All new switchboards are to be provided with private multi-function energy smart meters, provided with CTs of tariff accuracy classification and class 0.5M. Meters are to have either Modbus or BacNet native protocols. Meters are to monitor and store time-of-use date for the following parameters:

- Current in each phase
- Line to line voltages of each phase
- Line to neutral voltage of each phase.
- Power (real and apparent – kW and kVA)
- Energy usage (kWh)
- Power factor
- Power harmonics quality data
- Supply frequency
- Maximum Demand (current per phase and power)

Provide a machine engraved label adjacent to meter reading:

METER TO BE RESET BY AUTHORISED PERSONNEL ONLY –

BEFORE RESETTING ENTER MAXIMUM DEMAND READINGS IN SCHEDULE.

- Where new meters are installed as part of a project, provide an Energy Monitoring System (EMS) to collate time-of-use energy data of all meters to a single interface monitoring system for information storage, analysis and review.
- Above and beyond current applicable regulation, the EMS are to have the following requirements:
  - Data storage and analysis are to be on a local server/device
  - Access via the local network, with provisions to be accessed remotely
  - Facility for live data export
  - Data export capability and tools to allow data to be used as a teaching aid

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7.2.15 Cabling

Preamble:

The route of the consumer mains from the Connection Point to the MSB are to be planned with due consideration for how it impacts the site and the requirements for maintenance or service in its lifetime.

Conduit capacity may be required for upgrades to the consumer main in future, or planned as part of a school Site Arrangement.

Requirements:

- For aesthetic and safety considerations, any new, upgraded or replaced permanent electrical supply are to be reticulated underground.
- Underground supply is to be via buried conduits – direct buried cable is not to be used.
- Consumers mains conduit pathways are to be clear of buildings where possible. The electrical designer is to consult the Site Arrangement and liaise with the Architect, Senior Project Director or equivalent Project Lead to ensure the planned route does not interfere with future development. The electrical design is to coordinate the conduit pathway with architectural, landscape architectural and other services input.
- Coordinate the conduit runs and numbers with the school type (eg, expandable, non-expandable) and available Site Arrangement stages, to prevent relocation works in future.
- Wherever required cabling affects heritage buildings, design the location of the cabling in visually recessive locations within existing cavities and ducts or surface mounted for future removability or change. New cabling is not to be chased into renders or brickwork and stonework. Coordinate the cabling routes with the Senior Project Director or equivalent Project Lead and in consultation with the DoE Heritage Team.

Consumer Mains

Preamble:

The consumer mains cable will need to support the anticipated load of the site, with provision for upgrade in future.

Requirement:

- The consumer mains are to be sized in accordance with AS3000 and AS3008 requirements with consideration for the Maximum Demand of the site.

  Note: The Maximum Demand includes any future stages included in Site Arrangement.
- Consumer mains are to be copper cabling.
- The consumer mains are to have a voltage drop of no more than 1%.
- Note that AS3000 requires cables be suitably sized for factors other than Maximum Demand.

Submains

Requirement:

- Submains are to be copper conductors.
- Submain active and neutral conductors are to be 10mm^2 cross sectional area minimum. Multicore cabling are to be used for all cables 35mm^2 cross sectional area and below.
- Submains may be run:
  - Underground within dedicated electrical conduits (submains are not to be direct buried)
  - Concealed within buildings (on dedicated cable tray or ladder)

- External covered walkways are not defined as buildings and thus submains are not to reticulate through these – all external reticulation routes are to be use dedicated buried electrical conduits.
- Submains are to have a voltage drop of no more than 2.5%.

Final Subcircuits

Requirement:

- Final subcircuits are to be copper conductors.
- Lighting and Power circuit active and neutral conductors are to be 2.5mm^2 cross sectional area minimum.
- All circuits are to be sized in accordance with AS/NZS 3000 requirements.
- Final sub circuits are to have a voltage drop of no more than 1.5%.
- Note: Some situations (e.g. surrounded by thermal insulation or longer final subcircuits) may require the use of larger conductor sizes for general power, general lighting, and dedicated equipment circuits. AS3000 and AS3008 requirements are mandatory for cable sizing.

7.2.16 Cable Containment - Internal

Requirements:

- All cable containment is to be concealed within the building fabric. Exceptions to this are provided for Cable Trunking and Exposed Cable Conduit.
- **Cable trunking** exposed to view may only be installed for work within existing structures that precludes the use of concealed conduit – for example, heritage restrictions or material safety concerns, and must be communicated clearly to the wider project team.
- Wherever required cabling affects heritage buildings, design the location of the cabling in visually recessive locations within existing cavities and ducts or surface mounted for future removability or change. New cabling is not to be chased into renders or brickwork and stonework. Coordinate the cabling routes with the Senior Project Director or equivalent Project Lead and in consultation with the DoE Heritage Team.
- Cable trunking exposed to view must be:
  - Installed in straight runs which are parallel or normal to the building structure over agreed routes and approved in writing by the Senior Project Director or equivalent Project Lead.
  - Be of a finish and colour to match the surrounding building fabric, as nominated by the project team and approved in writing by the Senior Project Director or equivalent Project Lead.
- All cable trunking must be:
  - Fabricated from not less than 0.8 mm thick hot-dip galvanised steel, including all straps, couplings and accessories.
  - Not be less than 75 mm x 50 mm in cross section and are to be filled with cables to not more than 50% of its useable capacity
  - Be employed to replace multiple runs of conduit in accessible locations in addition to the instances where specifically indicated, providing that this does not incur additional cable derating factors in accordance with AS/NZS 3008, to reduce the current rating below the rating of the specified protective device
  - Equipped with screw fixed readily removable covers, of maximum length 1200 mm
  - Provided with removable cable retaining straps along the length, to permit covers being removed and replaced without interference to the cables enclosed

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  - Equipped with couplings between adjacent lengths, to facilitate electrical conductivity and mechanical union
  - Fitted with integral partitions throughout the length of ducting, where it is necessary to accommodate services of different voltages, frequencies or natures within a common trunking run, such that each service are to be mutually segregated and completely surrounded by earthed metal
  - Installed in straight runs true, horizontal or perpendicular to reduce the number of bends and sets to a minimum
  - Run square or parallel to the building lines
  - Fitted with purpose made bends, sets, end sections and intersection pieces as required and formed with gussets such that the effective wiring space is maintained
  - Supported at intervals not exceeding 1200 mm
  - Installed complete with all requisite accessories
  - Be supported such that the maximum deflection between supports does not exceed 10mm when fully loaded.
- **Skirting duct** may be used only when agreed with the project team to match the interior design of the building.
- All skirting wiring ducts are to be:
  - Manufactured from extruded aluminium section
  - A nominal size of 150 mm x 50 mm
  - Provided with 2 or 3 segregated wiring compartments for voice/data, power and miscellaneous cabling. Compartment number to be selected as appropriate for the space.
  - Suitable for surface mounting or recessed within partitioned walls
  - Fitted with clip in aluminium front cover plates provided by the same manufacturer to suit the selected duct.
  - Finished in powder coat of selected colour, as agreed with the Project Team
  - Recesses with fishplates or dowels to align duct sections at joints
  - Fitted with diecast metal or moulded plastic end plates
  - Fitted with separate short length lid outlet sections die punched to receive a power or telecommunications outlet
  - Supplied with adequate feeder conduits such that the full cross sectional area of each compartment is available for current and future wiring
  - Provided with no significant air gaps
  - Appropriately secured and tamper proof.
- **Cable ladder/ trays** must be:
  - Perforated steel with minimum 50% of the surface area open for air circulation
  - Hot-dip galvanised finish
  - Fitted with the manufacturer's standard bends, risers, curves, reducers and fishplates
  - Fixed to steel brackets and hangers to provide a rigid fixing
  - Fixed such that there is sufficient air space between the structure and the tray to which they are secured enabling natural air circulation to occur and for cable access – minimum 200mm from the top surface of the tray.

  - Supported such that the maximum deflection between adjacent supports does not exceed 10mm when fully loaded to the ultimate capacity provided with a 2:1 safety factor
  - Free from sharp edges or corners
  - Installed parallel or at right angles to the building structure and planning grids
  - Sized so that they are loaded a maximum 80% of their capacity, width, including spaces between cables for derating purposes without undue bunching
  - High sided type (minimum 50mm depth) for cable loads in excess of 20 kg per metre
  - Located where maintenance access is readily available
- Cable tray/ladder should generally only be installed internally. For existing schools where they are required externally:
  - Select finish suitable for the environment it is installed – hot-dip galvanised steel or stainless steel
  - Provided with vented sun covers where exposed to sunlight
- **Catenary wire** may be used to support power cabling internally. Catenary systems are to :
  - Be sized for the cable weight required
  - Utilise stainless steel wire
  - Have supports installed according to manufacturer spacing requirements
  - Be labelled to indicate design cable loading to prevent overloading in future
- **All internal conduits** are to be:
  - Installed using the loop in system
  - Free from conduit fittings other than junction boxes, wall boxes, bends or couplings
  - Conduits must be 20 mm minimum diameter with a circular cross section.
  - Conduits are to be concealed from view by running in ceiling spaces, concrete slabs, air space of stud or double brick, or block, walls or chased into rendered masonry walls, unless otherwise specified or agreed.
  - Restricted to contain a maximum of two circuits with derating in accordance with AS/NZS 3008
  - Provided with a 3 mm diameter, minimum, nylon cord where specified for future wiring or wiring for other trades
  - Comply with relevant sections of AS/NZS 2053
- **Chasing in masonry is not suitable in schools in heritage buildings.**
- **Exposed conduits** may only be installed for work within existing structures that precludes the use of concealed conduit – for example, heritage restrictions or material safety concerns, and must be communicated clearly to the wider project team.
- Conduits exposed to view must be:
  - Installed in straight runs which are parallel or normal to the building structure over agreed routes
  - Secured by spacer bar type saddles grouped in symmetrical positions providing 3 mm clearance of the fixing surface
  - Painted a selected colour, as nominated by the Project Team
- **Flexible conduits** must be:

  - Anaconda type flexible steel conduit where subject to mechanical damage or required for earth continuity, e.g., across construction joints
  - Provided between fixed conduit and equipment which is likely to be moved or subject to vibration
  - Fitted with brass or nylon terminators
  - Connected to concealed fixed conduits via a flush mounted junction box with a terminator secured by locknuts to the cover plate
  - Not used in concrete walls or slabs unless otherwise approved in writing by the Senior Project Director or equivalent Project Lead
  - A maximum of 500mm in length and neatly arranged to minimise length.
  - Only used at the final end of a wiring pathway/conduit run as a means of connecting to fixtures or equipment.
- **Steel conduits** must be:
  - Hot-dip galvanized, including all straps, couplings and accessories.
  - Cut square, threaded with the minimum number of threads being cut consistent with the union, painted over the threads with conductive paint, reamed to remove burrs, and adequately terminated into threaded connections or lock nuts with no threads showing after assembly.
  - Proprietary alternative systems such as to threaded connections may be offered for approval in writing from the Senior Project Director or equivalent Project Lead where they provide equal or better performance to threaded connections.
  - Fixed at 1200 mm (maximum) centres where surface run.

Rigid PVC Conduits Requirements:

- Rigid PVC conduits must be:
  - Of high impact, cold setting, light duty
  - Jointed together and to fittings with an approved solvent cement
- Not used in the following locations:
  - Where exposed to mechanical damage
  - Where subject to ambient or contact temperature in excess of 50°C
  - Where exposed to sunlight (without appropriate UV rating)
- Provided with one approved expansion joint for each straight section of surface run conduit exceeding six (6) metres in length
- Secured in position by approved saddles spaced at 1000 mm, maximum, apart
- Provided with saddles fastened to the side of a timber batten where installed across rafters or joists in accessible ceilings.

Corrugated Conduit Requirements:

- Corrugated conduits must be:
  - Manufactured from PVC
  - Compressive tested to meet the requirements equal to Category A rigid PVC conduit
  - Assembled with accessories which comply with IP65 rating in accordance with AS 60529 to exclude dust and water
  - Not used for general wiring where exposed to view unless terminating at equipment not normally moved

- A maximum of 500mm in length and neatly arranged to minimize length.

7.2.17 Cable Containment - External

Requirements:

- Conduits, pit arrangements and routes must be in accordance with AS/NZS 3000 and derating of underground cables to AS/NZS 3008
- In existing sites, underground boring are to be considered where pathways cross existing hard surfaces to avoid the breaking/damaging of the surface
  - Trenching works must include cleaning, excavation, back filling and consolidation of the trenches including compaction and reinstatement of surface, paving or sealed areas
  - Set-out route proposed on site must be coordinated with structural, civil, landscaping and all underground services identified and pre-marked, are to be submitted to the Senior Project Director or equivalent Project Lead for review and approval prior to commencement of any work.
  - Trench widths, depths and pit locations must be surveyed on site
- All sizes of underground conduits dedicated for mains, sub-mains, external lighting and services or spare
  - Trenching requirements near tree protection zones identified by arborist with the inclusion of any hand digging required
- All excavation work must ensure the site is left clean and tidy at any time and all excess material and spoil is removed from site.
  - All external metallic conduit saddles and fixings are to be hot-dip galvanised steel.
  - All conduit runs are to employ their own fixing systems

Pit Requirements:

- Cable pits and covers are to be designed and specified in collaboration with the landscape design.
- Be sized to allow cable bending radii
- Incorporate a conduit system which must be vermin and pest resistant,
- Incorporate space to facilitate cable hauling and cleaning
- Constructed from polymer concrete or cement concrete. Plastic pits are to not be used.
- Each pit to be fitted with a non-removable metallic label describing service contained and existing conduit directions, change of direction, termination and building entry point, and in straight runs at intervals of not more than 100m
- Provided with drainage for water. This may be:
  - Drainage opening in the bottom of the pit to aggregate fill – min 500mm depth
  - Drainage via empty 50mm conduit installed in pit side lower than all other conduits for drainage - min 3° fall, 500mm length, to aggregate buried fill 300 x 300 x 300mm
  - Drainage directly to the stormwater system via a valve that will prevent surcharging. Coordination with civil engineer is required.

Pit Lid / Access Cover Requirements:

- Pits lids/access covers are to be:
  - AS3996 Load Class C or higher within carparks
  - AS3996 Load Class B in all other areas

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- Pit lids/access covers are to be steel or ductile iron construction
- Pit lids/access covers are to have a slip resistance equivalent to the surrounding surface finish, provided by:
  - Infill lids/covers
  - Spray coating finish (steel covers only)

7.2.18 Underground Conduits

Requirements:

- All underground cabling is to use conduit system for containment – no direct buried cable may be used.
- PVC construction
  - Sized to allow for the installation of mains, sub-mains, sub-circuits and all associated control cabling
  - Provided for future use
  - Provided with draw cords with 1m of cord coiled at each end (not required for conduits at capacity)
- Provided with bell mouth at conduit opening within pit, fully sealed to pit side
- Cut to length with less than 50mm length into pit
- All joints glued using gap filling adhesive to manufacturer's specification.
  - Conduit set out must be coordinated with the landscaping layouts, building layouts, civil and structural underground footing works and all other proposed services.
- Separated from other services requirements in accordance with Australian Standards
  - Sealed to prevent any ingress of moisture.
  - Installed with appropriate fall to facilitate drainage into pits
  - Ensure all building entry points are not the lowest point of a conduit system to prevent gravity water ingress. Turn up conduits externally and enter building above surface level if required to prevent water ingress.

7.2.19 Spare Capacity

Preamble:

Future expansion to suit increased student numbers is common for school facilities. Including this spare capacity during the design and construction of a school greatly reduces cost and impact to add spare capacity at a later point when it is required.

Requirements:

Spare capacity is required in all cases, except where a school is determined as ”non-expandable”

Allow for the following spare capacity:

- Consumer mains:
  - Consumer mains are to be sized to suit the Maximum Demand of the school and the agreed load from the DNSP. Note: The Maximum Demand includes any future stages included in Site Arrangement documents.
- MSB:
  - Allow space for 3 phase circuit breakers to serve known future building stages.

- Allow space for additional 3 phase Moulded Case Circuit Breakers (MCCB); either 25% of required or 4-off MCCB frames, whichever is greater.
- Size them as follows:
    - 1-off to match the largest outgoing circuit breaker
    - 1-off to match the second largest outgoing circuit breaker
    - Remainder to fit 250A circuit breakers

Worked Example 1: An existing high school is being upgraded and requires a new MSB. The existing MSB is being retained as an MDB to supply existing school buildings. The new MSB is rated 1250A and requires the following outgoing circuit breakers to serve the proposed changes:

1-off 800A MCCB (old MSB as "MDB")
3-off 400A MCCB
6-off 250A MCCB (including for future PFC unit)

The MSB will require the following number of circuit breaker frames added as spares for future use:

1-off 800A MCCB frame
1-off 400A MCCB frame
2-off 250A MCCB frame

Worked Example 2: A new Public School is being built and requires a new MSB. The design requires the following circuit breakers to serve the proposed buildings:

1-off 400A MCCB
5-off 250A MCCB

The MSB will require the following number of circuit breaker frames added as spares for future use:

1-off 400A MCCB frame
3-off 250A MCCB frame

- EDB:
    - Allow for additional poles to suit Miniature Circuit Breakers (MCBs); either 25% of required poles or to suit 4-off 3-phase MCBs (ie, 12-off poles), whichever is greater. Provide a minimum of 6-off spare poles per section.

Worked Example 1: A new distribution board is proposed that will require 23 poles (23 MCB protected single phase circuits) in the lighting section and 41 poles (3-off 3 phase MCB protected circuits and 32 single phase MCB protected circuits) within the power section.

Spare capacity calculations require a minimum of 16 spare poles. The EDB is designed with a 30 pole lighting section and a 60 pole power section to allow for this spare capacity.

- Internal cable containment:
    - Size cable trays and internal cable catenary such that they are at maximum 75% capacity (in accordance with manufacturer guidelines) at the time of installation.

- External cable containment –
  - Size underground conduits such that they are loaded to a maximum of 75% capacity (in accordance current applicable regulation at the time of installation.
  - Provide the following spare conduits in all external underground cable pathways:

Table 7.2.1 Spare Conduit Requirements in All External Underground Cable Pathways

Conduit diameter	Spare allowance
Ø ≥100mm	1-off spare conduit
50mm ≤ Ø < 100mm	2-off
Ø < 50mm	3-off

  - Future buildings
    - Allow for pit and conduit systems to serve the area of the new building.
    - Size conduits for the anticipated Maximum Demand (minimum 2-off 100mm conduits).
    - Conduits are to contain draw cords and be capped off and sealed within pits.

7.2.20 Emergency Power Generator

Preamble:

Schools may be designated as Community Evacuation Facilities (CEF) in areas prone to adverse environmental events, particularly in rural or remote areas. These facilities require provision for portable Emergency Power Generators (EPGs) to allow continued use in the event of power supply failure. An emergency power generator is required if identified as CEF by the Senior Project Director or equivalent Project Lead with the project team.

Note – these requirements are separate to any requirements for Class 9 buildings for Bushfire Protection in accordance with current applicable regulation.

Requirements:

- Location
  - Locate the connection cubicle and EPG location as close as practicable to the MSB, ideally within an area of the carpark that is inaccessible to students during regular school hours.
- Truck Access
  - Design is to allow for vehicle access to the connection cubicle (including trucks for delivery of the generator and refuelling). Based on the EPG size, ensure a suitably sized truck can access the EPG with sufficient space to manoeuvre the EPG into place. The EPG may be trailer mounted or skid mounted, and positioned using a trailer, side-loading truck or crane.
  - Electrical designer, Traffic Engineers and Architect are to coordinate to ensure there is sufficient allowance for portable EPG delivery and refuelling. Provide bollards where truck access is adjacent to buildings or student play and circulation areas.
- Acoustic impact on school operation
  - Acoustic rating: nominally EPG units are to be rated 75dB(A) @1m.
  - An Acoustic Report evaluation of acoustic impact on learning spaces, library, admin and staff is to be considered in assessing the location and noise specification of the EPG. EPG noise rating may be adjusted to suit the Acoustic Report evaluation.

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- **Sizing:** Size the EPG to match the Maximum Demand calculated for the school. Determine required EPG rating using the following parameters:
  - Prime rating to be used (as this is a replacement power source)
  - Electrical output capacity (aka kWe)
  - Power factor of 1
- **Connection cubicle:** Allow for a connection cubicle that contains facility for bolted busbar connection or plug interface (such as PowerLock connectors) suitable for temporary wiring. This are to contain terminals for 3 phases, neutral and earth to use the MSB MEN connection. Size busbars/terminals to suit the capacity of the EPG.
  - Locate the connection cubicle at identified EPG location. This may wall mounted or ground mounted.
- **EPG mains**
  - Provide a permanent main cable connection between the MSB and the Connection Cubicle, sized to suit the EPG.
  - EPG mains cable voltage drop to be a maximum of 1.5% to ensure it is equivalent to the consumer mains voltage drop.
- **MSB**
  - Provide an open-transition manual transfer switch for the main/EPG supply, using a manual key interlock between the EPG supply isolator and the main isolator (downstream of the SPD).
  - Main isolators to be lockable with padlocks where MSBs support safety services.
  - Provide Phase failure and phase reversal relays for the Electricity Distributor supply and the generator supply.
  - Provide “Supply available” indication for using indicator lights for all phases of Electricity Distributor supply and the generator supply.

7.2.21 Lightning Protection

Preamble:

Lightning protection is a critical measure to support asset protection and ensure operational continuity during severe weather events.

Requirements:

- All new schools, new buildings and any expansion/refurbishment work that increase external dimensions of an existing building. The electrical designer are to complete an AS1768 Lightning Risk Assessment using the specified calculation sheet.
- All buildings are to be constructed with measures to reduce risk to acceptable levels in accordance with the AS1768 Lightning Risk Assessment.
- Lightning protection systems should employ lightning risk mitigation methods that comply with AS1768. Compliance using other methods equivalent international standards may be used in lieu of AS1768 compliance if an equal or greater level of protection can be demonstrated by the manufacturer.
- Protection measures Requirement: To minimise cost implications for existing buildings, implement surge protection measures for incoming services to reduce risk in the first instance, implementing lightning protection systems as a last resort.

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7.2.22 Solar Panels

Preamble

Solar Panels, or the Solar Photovoltaic Generation System (Solar PV), is a distributed energy resource and incorporates all components required to generate power from solar radiation collected by PV modules, convert this to useable AC power by inverters, and monitor any required aspects of this system. System Design and System Component selection are to be in accordance with the relevant sections. Installer requirements for System Commissioning and Documentation are given in the relevant section.

Applicability

- For new solar PV power grid-connect rooftop system on new schools, and new buildings on an existing school site.
- For new solar PV installations on existing schools such as replacement of an existing PV system, or introduction of a new PV system on an existing building.
- Existing structures without sufficient structural strength: Existing structures are to only have PV systems installed if the roof has sufficient structural strength to bear the PV panels' loading impact.
- Seek coordination from the Senior Project Director or equivalent Project Lead to consult with DoE Heritage with relation to roof top PV installations to heritage buildings. Where heritage restrictions apply, subject to further consultation, solar panels are to be located on:
  - non-significant buildings or
  - non-significant areas within the site.
  - Areas where they will not be highly visible or impact on Public views of the Heritage Item or Heritage Conservation Area from the street

Requirements:

- **Accreditation of Designers and Installers**: A fully SAA certified installation requires installers to also be SAA Accredited and can only be certified with consideration of the design and the installation of the system
  - Systems are to be designed to ensure a Solar Accreditation Australia (SAA) Certified installation and are to complying with the following standards:
    - AS/NZS 3000
    - AS/NZS 4777 Series
    - AS/NZS 5033
    - Other current applicable regulation
- **Design Coordination:** The design is to be coordinated with other aspects of the design; Specific coordination items include:
  - Planning restrictions – the upper edge of the PV modules must remain within any height restrictions determined by the project planner
  - Structural loading – the applied loading of the PV modules is to be allowed for when designing the roof sheeting, fixings, and the associated supporting structure. The effects of both vertical loading and wind loading are to be considered.

Location

PV arrays are to be roof mounted on sheet metal roofs only.

Do not install PV module arrays in the following locations:

- A trafficable roof area accessible to students

- Buildings with tile or slate roofs

Arrangement

PV modules are to be arranged so that they are grouped together where possible and are symmetrically or geometrically arranged. Refer to maintenance access requirements below.

PV modules are to be mounted with a north-facing aspect wherever possible to maximise solar yield.

The arrangement of the PV array is to be designed to available space:

- PV array is to be arranged such that shading of PV modules by nearby buildings, trees, obstacles or the PV modules themselves, between the hours of 9:00am and 3:00pm during all months is avoided or minimised.
- All modules are to be installed with a minimum incline of 10° to horizontal to ensure self-cleaning by rainfall.
- PV arrays are to be designed so that debris does not catch underneath panels, especially if there are trees in the vicinity, and to prevent bird roosting. This may be achieved by:
  - Positioning the mounting system so that it runs vertically in line with the corrugations of the roof and ensuring a minimum of 75mm clearance between roof cladding and module frame.
  - Installation of tray or mesh guard around the perimeter of the array where debris build-up is likely. This must be installed in a manner that does not hinder module performance or system maintenance, and such that debris will not build up on the tray or mesh guard.

Where panels are installed flat on roof surface (eg, where the roof angle allows 10° tilt or where planning restrictions apply), bird netting is to be provided.

- To minimise mismatch losses, PV arrays must be arranged such that:
  - All strings connected in parallel to the same MPPT input comprise the same number of panels and have the same module brand and model.
  - All modules in the string have the same tilt and the same orientation.

Maintenance Access

Arrays must be arranged as follows so that adequate access is provided for maintenance:

- 1000mm clearance from the edge of roof to PV array
- 500mm clearance around the perimeter of the PV arrays to other roof equipment
- Provide at least 700mm gap at every fourth row to create maintenance access way
- Ensure that access to an individual PV module does not require the removal of more than one other PV module.

Inverter Arrangement and Location

The area surrounding the inverter and all associated protective devices such as PV array DC isolator, inverter AC isolators, and wiring are to be considered as the inverter station.

The inverter station is to be located and specified such that:

- The ventilation, clearance and other requirements specified by the inverter manufacturer are met. This includes DC and AC protective switchgear unless explicitly approved by manufacturers in writing.

Inverters and all associated protective devices are to be located within the main switchboard (MSB) switch room, electrical distribution board (EDB) cupboards, or risers closest to the PV array.

Locate cupboards so that access is available only directly from general circulation areas. It is not acceptable to walk through learning spaces etc. to gain access to inverter stations, or to locate inverter stations in store spaces.

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Where the EDB cupboard is unsuitable to house the inverter and associated equipment due to its size, ventilation or other issues, installation of the inverter station/s must be in an enclosed plant space.

The inverter location is to not be exposed to direct sunlight or rain.

Equipment at the inverter station must be arranged as follows:

- Arrange DC cables and isolator switches to the left side of each inverter.
- Arrange AC cables and isolator switches to the right side of each inverter.
- Arrange switchgear and control equipment in accordance with current applicable regulation for switchboards.
- Where the PV system contains multiple PV arrays and/or inverters, provide additional descriptions indicating location of system components and electrical distribution boards to which the inverter systems are connected.

Provide DGPO and double data outlet adjacent to inverter system.

Array and Inverter Matching

Inverters are to be sized and selected adhering to requirements of the relevant Australian Standards. In addition:

- Safety margin of 5% must be applied to inverter maximum input voltage
- The inverter and PV array must be sized such that the PV array nominal capacity rating is greater than 95% of the inverter's nominal AC power rating.

Renewable Energy Scheme Benefits

- PV system must be designed and installed such that they are eligible for creation of STCs and/or LGCs.
- NSW Department of Education retains ownership of the PV system and any benefits arising from generation of Small-scale Technology Certificates (STCs), Large-scale Generation Certificates (LGCs) and any future renewable energy schemes unless otherwise negotiated.

Note – the Renewable Energy Scheme is in place until 2030. For projects being constructed after 2030, there will not be an opportunity to apply for Renewable Energy Certificates.

PV Modules

All PV modules connected to a single inverter are to be the same model and manufacturer.

All modules are to be verified as part of the Solar Panel Validation (SPV) Initiative, managed by the Clean Energy Regulator.

PV modules are to be crystalline type.

PV modules are to exceed 20% efficiency.

PV Module Mounting

- PV modules mounting systems are to be non-penetrating to minimise the risk of compromising roof integrity.
- PV module mounting systems are to be appropriately selected for the expected wind load.

Installations (such as roofs with pitch below 10°) may require tilted mounting frames to meet the system arrangement requirement of a minimum 10° tilt to horizontal – ensure the non-penetrating mounting system can accommodate the required tilt angle.

Inverters

String inverters are to be used for all installations – microinverters are to not be used.

String inverters are to be supplied from the following brands.

- SMA
- Fronius

Inverter are to have the following minimum efficiency when operating at optimal MPP voltage:

- ≥ 90% at 10% load
- ≥ 95% at 40-100% load

Inverters are to be metered in accordance with EFSG Metering requirements

The school network is to be used for communication via a Cat 6A wired connection.

All inverters and communication devices are to be Sunspec Modbus TCP compatible.

All inverters and communication devices are to support Modbus TCP client/server communication with both read and write functionality on TCP port 502

All inverters are to provide system operation status to an online monitoring platform.

SMA Cluster controllers are to not to be included in any system proposal.

Cabling

- DC and AC cables are to be selected to meet requirements of relevant Australian Standards and in applicable EFSG sections.
- The distance between the inverter and the most remote PV module are to be used to calculate DC voltage drop and ensure this is within stated guidelines.
- Where there are multiple inverters, the distance between the inverter furthest from the point of common coupling are to be used to calculate AC voltage rise.
- Cabling is to not be exposed to direct sunlight and are to be contained within earthed steel cable covers, with hot-dipped galvanised finish. Steel cable ties are to be used for fixing external cabling.

Surge Protection

- Surge protection may be required for any conductors entering the building envelope.

System Size – New Systems

Requirements:

- Beyond the minimum requirements for buildings in accordance with current applicable regulation, the system is to be sized to 15% of a school's calculated maximum demand power, to the maximum extent that space allows.
- Systems are to be minimum 15kW.

System Size – New Buildings at Existing School

Requirements:

- Systems are to be minimum 15kW.
- Note that "new buildings" only refers to Class 5/Class 9B buildings. By way of example, projects that involve new roofing structures for COLAs or carparks have no requirement to introduce a new PV system. Note that where PV is required for a wider project, new COLAs etc may still be used to mount PV systems.

System Size –Existing Systems

Requirements:

- Existing PV systems are to not be modified to prevent issues with inverter and string mismatching.

- Existing systems may be retained to provide the minimum PV allowance for a school.

Existing systems that are being replaced are to have a minimum capacity to match the system being replaced. Existing systems may be replaced with a larger system provided it:

- Fits within the same spatial footprint as the existing system
- The PV allowance on site does not exceed the maximum allowance of 15% of site-wide Maximum Demand
- The new system weight does it exceed the structural capacity of the existing roof.

There is no requirement to add PV systems where no buildings are being constructed or existing PV systems being modified, however school may choose to install new PV systems provided:

- The PV allowance on site does not exceed the maximum allowance of 15% of site-wide Maximum Demand
- The new system weight does not exceed the structural capacity of the existing roof.

Worked Example 1: An existing high school has an existing PV system rated to 40kW. The school is being expanded and there is a proposal for a new 3 storey hub building. The site's calculated maximum demand is now 500kVA, considering the existing recorded load and the maximum demand calculated for the new building.

The site's PV allocation is 15% of the maximum demand – 75kVA. Therefore, a new system rated to 35kVA will need to be installed on the new building. For example, if the power factor is 0.8, then this will approximately be a 28kW system.

Worked Example 2: A new high-rise urban Public School is being constructed. The calculated maximum demand is 250kW, requiring a PV system sized to 15% of this – 37.5kW

The roof area is quite limited however, with some area allocated as a rooftop play space. The maximum system size that can be installed is 20kW. This is installed and the school is compliance with EFSG requirements.

Worked Example 3: An existing rural high school has an existing PV system rated to 70kW. A new hall is being constructed for the school, with a resulting site maximum demand of 350kW.

The existing PV exceeds the 15% requirement of the EFSG and so under this there is no PV requirement for new PV. Under current applicable regulation, however, PV are to be installed on all available roof space. The hall will require a new PV system to cover all available space, in accordance with current applicable regulation.

System Sizing

The following schedule offers typical advice for compliance with the 15% of site-wide Maximum Demand requirement for PV systems.

Table 7.2.2 Typical PV Allowance

School type	Typical Site Maximum Demand (Amps 3ph) Note 1	Site Maximum demand (kVA) Note 1	Typical required PV size (new schools) Typical maximum PV size (existing schools)

			(kVA)
PS 250	438	304	46
PS 500	654	453	68
PS 750	870	603	90
PS 1000	1084	751	113
HS 500	813	563	84
HS 1000	1216	843	126
HS 1500	1858	1288	193
HS 2000	2562	1775	266

Note 1 – Determined in accordance with guidance in EFSG requirements for permanent supply.

Note 2 – Site Maximum Demand values have been determined using a rate of 80VA/m^2 and areas estimated in EFSG Part B: Functional design brief.

Note 3 – Maximum demand for each site are to be verified for all projects. The values in this table are typical only and should only be used for high-level planning.

Commissioning, Installation and Documentation Requirements

Documentation

The following documentation are to be submitted to the Senior Project Director or equivalent Project Lead following the completion of a PV system installation.

System and Site Details

- As-built plan view of PV array showing wiring configuration, equipment and switch locations.
- As-built electrical diagrams with equipment ratings, overcurrent protection, isolators, and switches (including electrical ratings).
- Location plan and labelling records for all PV components and disconnection points.
- All drawing(s) must identify the building and space on/in which PV system components are located, in accordance with the AMS space coding
- Equipment datasheets/manuals for panels, inverters, mounting, isolators, cabling, monitoring devices.
- Engineering certificate for mounting system and installer/designer compliance declarations.
- Photographic record – Installation and commissioning photos showing:
- Full array(s), mounting (with pitch measurement), external cabling. Incl. photos prior to panel installation.
- Inverter station, switchboards, signage, and meter changeover.

Operation and Maintenance Information – Clear instructions including:

- Shutdown and isolation procedures (emergency and maintenance).
- Actions for earth-fault alarms (also displayed at alarm location).
- Maintenance procedures/timetable, including silicone sealant inspection if used.

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- PV module recycling recommendations.
- The completed Solar Asset Data Capture Sheet

Performance and monitoring setup –

- Monthly generation estimates with seasonal/site-specific considerations.
- Data connection diagrams with unit IDs.
- Screenshots of Inverter registration and monitoring platform setup.
- Confirmation of alert notifications for faults, connection loss, inverter downtime, and underperformance.

Approvals and Compliance –

- DNSP connection approval and offer.
- Inverter registration and supporting documentation
- Any central protection/export limitation settings and wiring diagrams.

Handover copies –

- Paper copy to school office, PDF emailed to PVsolar@det.nsw.edu.au Confirmation is to be received to advise that the Solar Asset Data Capture Sheet has been updated.

Commissioning

The following commissioning actions and checks are to be conducted by the installer prior to handover.

ELECTRICAL SAFETY VERIFICATION

- Check AC/DC isolators, circuit breakers, and string overcurrent protection for correct rating and compliance.
- Verify correct labelling to AS/NZS 5033 and AS4777 on all components and documentation.

NETWORK INTEGRATION TESTS

- Verify inverter connection and functionality.

PROTECTION SYSTEMS CHECKS

- Test central protection and export limitation devices (programmed to DNSP requirements).
- Confirm lightning protection integration and surge protection installation (if required).

MECHANICAL and ENVIRONMENTAL INSPECTION

- Inspect mounting integrity, fastenings, cable management, UV protection, and impact on roof integrity.
- Ensure equipment installation meets environmental ratings

PERFORMANCE VALIDATION

- Confirm alert notifications trigger for major faults and underperformance.
- Ensure system performs in line with monthly generation estimates.

HANDOVER VERIFICATION

- Provide completed commissioning sheet, installation checklist, warranty schedules, and Solar Asset Data Capture Sheet.
- Confirm all contacts, service agreements, portal administrative rights and maintenance schedules have been handed over to the school.

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- Monitoring portal access set up with DoE and school contacts as administrators.
- All commissioning documentation and checks are to be submitted to School Infrastructure, Asset Management Unit and the School.

Referencing:

- PV system design and install checklist
- PV commissioning guide

7.2.23 Battery Energy Storage

Requirements:

Battery energy storage systems (BESS) are to not be installed by default at schools.

There is no current policy for the installation of BESS, however future policy may drive requirements in this section.

In new schools and school upgrade projects that include new MSB and MSB space installation, spatial allowance is to be provided for a future battery system, and the electrical systems are to include flexibility for future addition of a BESS.

This space is to be:

- As close as possible to the MSB space
- Inaccessible to students – located outside play spaces and general circulation spaces
- At least 1000mm separation from finished circulation footpaths
- Free from openings (eg windows, ventilation etc) below 2700mm
- Provide a pit with conduits run to the MSB space for future cabling
- Size the designated space and pit/conduit allowance in accordance with Table below.

Table 7.2.3 Minimum Conduit Sizing for BESS

MSB rating	External spatial allowance	Pit size	Conduits to MSB space
Rating <400A	3000mm x 2000mm	300mm x 300mm	1-off 50mm white communications conduit 1-off 63mm orange electrical conduit
>400A **< 800A**	5000mm x 2000mm	300mm x 300mm	1-off 50mm white communications conduit 2-off 100mm orange electrical conduit
>800A	7000mm x 2000mm	450mm x 450mm	1-off 50mm white communications conduit 2-off 100mm orange electrical conduit

Conduits

Provide conduits in accordance with table 2 between the designated pit and the MSB space.

Circuit Breaker

Provide label to a spare circuit breaker space to indicate the provision for “Future Battery”. Use one spare 3-phase MCCB frame.

7.2.24 Electric Vehicle Charging

Preamble:

No requirement for Electric Vehicle (EV) charging equipment beyond current applicable regulation or project specific Transport Access Plan requirements.

Current applicable regulation requires EV charging infrastructure to carparks in certain circumstances only.

Requirements:

Where installed beyond EFSG requirements, EV Chargers are to be located:

- As close as possible to the distribution board supplying the EV charger to reduce cable runs and associated infrastructure
- Such that the charger installation or in-ground reticulation does not interfere with any footpaths or existing services

Where installed beyond EFSG requirements, EV Chargers are to be:

- Minimum 7kW Single phase chargers
- Dual Port-chargers 2x 7kW (where multiple chargers are installed)
- Pillar or wall mounted to suit location and carpark configuration
- Pay As You Go payments enabled, with connectivity to current billing platform (see below)
- OCPP version 1.6j and 2.0 compliant and ISO15118 compliant
- Colour LCD touchscreen. Display to have colour contrast between text and background, and accessible size of text.
- Support for wired ethernet and 4G cellular connections as a minimum
- Interface for site Load Management System
- Recording of charger energy use and cost data
- Minimum IK09
- Under cover: minimum IP54
- Outdoor exposed: minimum IP55
- Permanent cable to suite IEC 62196-2, type 2 connector
- Minimum 5 years for materials and workmanship. Rate for min. 10,000 use cycles
- Where installed for public use, EV charging installations are to comply with the requirements of this section and the DCCEEW Minimum Operating Standards for Government-supported Public Electric Vehicle Charging Infrastructure.
- Linemarking to be in accordance with the latest issue of *TS 00106 Electric Vehicle Charging Stations - Signposting and Pavement Marking* issue by Transport for NSW.

The following requirements apply to infrastructure mandated by current applicable regulation or project specific Transport Access Plans.

Distribution Boards

- There is no requirement for dedicated EV charging Distribution Boards beyond the current applicable regulation allowance.

Communications Cabling

- Cabling is to be suitable for the load management system installed and suitably rated for the installation (eg externally rated, suitable for installation in pits).

Cable Containment

For new project and refurbishments that include carparking areas, cable containment to all future EV charging locations are to be installed, regardless of whether chargers are installed as part of a project. Cable containment is to be:

- Overhead cable tray for carparks within buildings. Cabling is to not be exposed to direct sunlight.
- Underground conduit for open carparks – separate, dedicated conduits for power and communications.

Where containment is installed for future use, provide labelling to indicate the future use for EV charging. Conduits are to be capped and sealed above ground, with draw line installed.

Conduit systems are to be designed to suit the quantity of chargers installed, with the following minimum sizes:

- Power conduit – 32mm
- Communications conduit – 25mm

Load Management

Load management is required where new private power meters are installed on the MSB and any EDB supplying EV charging equipment.

Load management is to be provided within any switchboard supplying (or allocated to supply in future) EV charging equipment. This are to be brand-agnostic to work with any charger equipment, and compatible with Open Charge Point Protocol (OCPP).

Metering and Billing

Metering and billing are to use the current NSW Government nominated provider of charger and electric vehicle management solutions.

As of the time of publication of EFSG 2026, the NSW Government nominated provider is Chargefox.

E-Micromobility

Charging facilities for e-micromobility devices are to not be provided to any schools.

E-micromobility devices include e-bikes and e-scooters. Due to inherent risks of fire caused battery failure, which are heightened during charging, facilities are not to be provided in order to minimise or completely avoid these devices being charged within schools.

7.2.25 Socket Outlets

Preamble:

This section details the distributed system of low voltage power which is to be provided throughout a school for connection of portable equipment via general purpose socket outlets (GPOs), and fixed equipment.

Requirements:

- Socket outlets are to be positioned to suit the application and intended use.
- Socket outlets are to be positioned:
  - On the walls – 300mm Above Finished Floor Level (from the bottom of the wall plate)
  - Above benches – 150mm above surface (from the bottom of the wall plate)
  - Below benches – 100mm below underside surface (from the top of the wall plate)
- Accessibility: At least 20% of general use sockets (minimum one per GLA) are to be positioned to enable access for disabled persons:
  - At least 500mm from internal corners and between 600mm and 1100mm Above Finished Floor Level (in accordance with the requirements of AS/NZS 1428).
- Workstation sockets: Are to be located above or below bench level to suit furniture selection. Coordination with Architect/Interior Designer and / or the joinery for the space is required.
- General cleaning/maintenance sockets: Refer to Cleaner's Outlets section
- Specific equipment:
  - Dedicated sockets are to be positioned to suit the equipment. This may include positions within joinery.
  - Specific equipment may include but is not limited to: Kitchen equipment such as fridges, microwaves and dishwashers, Office equipment such as printers, Equipment for specialist learning areas.

Outlets for cleaning are to be provided to all spaces.

- Provide one DGPO to each space over $30m^2$
- Provide one DGPO for every 15m of corridor
- Locate at 300mm Above Finished Floor Level
- Locate within 500mm of entry door (of the handle side) to spaces and clear of any fixed joiner/furniture.

General socket outlet circuits are to utilise 20A RCBOs for circuit protection.

The maximum number of individual 10A socket outlets per 20A circuit are to be arranged according the following table:

Table 7.2.4 Maximum Socket Outlets Per Circuit

Space	Individual 10A socket outlets per 20A circuit
Kitchen prep areas (both in learning areas and for staff use)	6
Areas without permanent air-conditioning	6
Science laboratories	6 socket outlets, with a maximum 2-off laboratory benches per 20A circuit.
Areas with permanent air-conditioning	12
Where socket outlets are part of a workstation soft wiring system (fed from a starter socket)	24

Note: In accordance with AS3000, multiple outlets are to be counted with the respective number of individual outlets eg, a double general purpose outlet (DGPO) is counted as two socket outlets.

The following socket outlet and equipment arrangements are to be provided with dedicated circuit (utilising an appropriately rated RCBO as required by AS3000):

- Socket outlets rated 15A or higher
- Starter sockets for workstation soft wiring
- 3 phase socket outlets
- Permanently connected equipment

Each socket outlet is to be fitted with a label indicating the supply switchboard and circuit number.

Labelling is to be permanent and utilise a design to prevent tampering with labels. They are to be:

- Contained within the outlet plate behind a window (such as on the Clipsal Pro Series sockets and switches)
- Engraved layered plastic labels (such as Traffolyte or Gravoply) fixed securely to the plate

Note that for preschools, 10mA RCD protection is required in accordance with AS/NZS 3000.

7.2.26 Floor Boxes

Preamble:

Floor boxes provide power to locations isolated from walls where cabling must reticulate through the floor.

Requirements:

- Floor boxes may be used in staff spaces. Do not use floor boxes in areas accessible to students.
- Use only recessed flush floor boxes. Pop-up floor boxes and surface mount floor boxes are not to be used. Floor boxes are to be steel construction with in-fill sections to incorporate surrounding floor finish. All lids, handle mechanisms and cable exit flaps are to be of steel construction.
- Outlets are to be in accordance with Socket Outlets section. For AV or Communications outlet provisions (eg for display interface).

Coordination is required with the structural designer to ensure slabs can accommodate floor boxes. Existing slabs may require structural engineer input to confirm this can be accommodated.

7.2.27 Softwiring Systems

Preamble:

Softwiring solutions provide efficient and convenient power and communications to office spaces and allow easy rearrangement of workstations.

Requirements:

- Softwiring solutions may be used in staff spaces. Do not use softwiring solutions in areas accessible to students.
- Softwiring devices may be above bench or below bench devices. The electrical designer are to coordinate with the interior design and furniture selection and must ensure compatibility with selections.
- Softwiring may include USB and/or wireless charging capability.

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- The soft wiring installation must comply with AS/NZS 3000, AS/NZS 61535.1, AS/NZS 3131, AS/NZS 3100 and AS/NZS 3112 as relevant to the component parts and be compatible with workstation furnishings and fixtures.
- All starter sockets are to be rated to a minimum of 20A and connected to a dedicated circuit. All starter sockets must be mounted in position to a permanent building component so that they are not disturbed in the event of removal of the equipment served by the soft wiring system.
- All interconnecting leads from between the starter socket and cascaded socket outlets must be rated to a minimum of 20A, comprise of flexible cables with stranded copper conductors of a minimum 2.5mm2 cross sectional area and fitted with plug and socket couplers.

  Interconnecting leads must be concealed from normal view and enclosed within workstation/joinery wiring compartments and fixed in position with purpose made clips. Intermediate couplers must not be used.

7.2.28 Table Boxes

Preamble:

Table boxes provide a convenient interface for services at table level where equipment is not installed adjacent to wall mounted outlets.

Requirements:

- Table boxes may be used in staff spaces. Do not use table boxes in areas accessible to students.
- Use only recessed flush table boxes. Table boxes are to be sized to allow appliance adaptors to be concealed within the table box when in use.
- Outlets are to be in accordance with Socket Outlets section. For AV or Communications outlet provisions (eg for display interface).

7.2.29 Master Controls

Preamble:

Educational spaces require master control both for operational (master switch) and emergency use (emergency power off).

Requirements:

Provide controls to spaces detailed in Table below.

Table 7.2.5 Master Controls Required by Space

Space Type	Spaces	Control Type
Learning Spaces	Computer Learning Space	Master Switch
Canteen and Food	Canteen	Emergency Power Off
	Food and Hospitality Learning Spaces	Emergency Power Off
Science	Science Laboratories, Science Preparation, Botany / Zoology Space	Emergency Power Off
Visual Arts	Visual Arts Workshop / Visual Arts GLS, Dark Room	Master Switch

	Kiln	Emergency Power Off
TAS	Wood / Metal Workshop / TAS Learning Spaces / Welding Bay	Emergency Power Off Keyed lockable isolator Emergency Power Off
PE Fitness, Performing Arts and Multimedia	PE Fitness Laboratories, Performing Arts Workshop, Multimedia Workshop	Master Switch
Agriculture	Agriculture Shed Workshop	Emergency Power Off

MASTER SWITCH

A “Master Switch” is required in spaces in accordance with Table. This item allows authorised staff to control power supply to all outlets by a suitably located key-switch. Each space must be able to be isolated without affecting any other space.

One wall-mounted outlet closest to the space entry are to be uncontrolled by the switch for use by cleaners. This outlet is to be labelled as “Cleaners outlet”.

Use direct switching where the number of circuits allows, otherwise size locate a contactor within the distribution board enclosure from which the circuits originate to enable control from key switch.

EMERGENCY POWER OFF

Emergency power off controls is to be supplied in spaces in accordance with Table.

The Emergency Power Off button are to isolate all equipment outlets within a space.

Dust extraction equipment is to not be isolated by the Emergency Power Off button.

One wall-mounted outlet closest to the space entry are to be uncontrolled by the switch for use by cleaners. This outlet is to be labelled as “Cleaners outlet”.

The Emergency Power Off button are to be:

- Mushroom head type push button
- Minimum head diameter of 35mm
- Contact normally closed in the ON position
- Push button to lock into the OFF position when pushed button requires a keyed release back to the on position
- Key removable in both the on and off positions
- Robust and tamper proof suitable for flush mounting unless otherwise specified
- Red in colour
- Provided with a label reading:

“EMERGENCY POWER OFF”

- Provided with a clear label stating operating instructions

- Locate close to the teacher's desk (where a clear designated location exists)
- Separated from all other space controls by 500mm
- Mounted at a height between 900mm and 1100mm Above Finished Floor Level

SPECIFIC EQUIPMENT

Certain teaching spaces will require dedicated socket outlets/supplies.

Electrical designers and installers should always coordinate with the final equipment selection where possible to ensure the appropriate outlets to suit equipment are provided.

KILN OUTLETS

Provide kiln outlets with dedicated circuits.

Provide two outlets for each kiln location of the following types to allow for flexibility in kiln selection. Both are to be a minimum IP56 rating.

- Single phase 20A flat-pin socket (compliant to AS/NZS 3112), switched locally
- Three phase 20A 5-pin socket (compliant to AS/NZS 3123), switched locally

7.2.30 Power to Food and Hospitality Spaces

All food and Hospitality Learning Spaces are to be equipped with infrastructure for full electrification. Regardless of any gas installation, designers are to consider fully electric appliances when calculating maximum demand, sizing submains and final subcircuit cabling, and switchboard loading and protective devices.

Preamble:

Permanently connected cooking equipment with an open cooking surface require a dedicated isolation switch in accordance with AS/NZS 3000.

Requirements:

Isolator switches are to:

- Control all permanently connected cooking equipment (beyond the AS3000 requirements for appliances with open cooking surfaces)
- Have integrated indicator lights to signify power is present to the appliances

7.2.31 Power to Materials Technology Spaces

Preamble:

Provide dedicated socket outlets to suit proposed equipment. These may require single phase flat-pin sockets with ratings above 10A, or single or three phase round-pin sockets.

Provide an overhead power system using a 'busway' system.

These systems are used in some of the specialised Materials Technology spaces to provide increased flexibility when relocating socket outlets, and also as a connection point for task or supplementary lighting.

Requirements:

Provide minimum 8-off DGPOs in addition to direct connection points.

For equipment that requires direct connection, provide lockable isolators within 2m of the equipment.

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Equipment power outlets are to be coordinated with data outlets installed to connect equipment such as CNC machinery, and data outlets installed for future use.

These spaces also require emergency power isolation switches for al outlets.

The busway must meet the following:

- 32A minimum rating for busway system
- Three phase system, with neutral and earth
- Location coordinated with other ceiling services
- Socket outlets are to be mounted within proprietary type “take-off” modules with integrated RCBO
- It must be possible to relocate the take-off modules in steps no more than 1 metre long, without needing any electrical expertise
- Take-off modules must be key lockable to restrict movement to approved staff (eg, TAS staff and AMU staff)
- Provide single phase take-off modules to fill all take-off spaces, with 2-off three phase modules supplied with each system to allow for temporary connection of three phase equipment.
- Maximum number of socket outlets per circuit to be as nominated in Socket Outlets
- Provide power outlets to shelving units where power tools will be stored for re-charging.

LASER CUTTING/3D PRINTING SPACES

Provide 8-off GPOs at bench height, coordinated with bench and equipment locations, and install adjacent to equipment data outlet locations.

WELDING BAYS

Provide welding bay outlets with dedicated circuits.

All outlets are to be a minimum IP56 rating and are to include local isolation switches.

Provide two outlets for each welding bay of the following types:

- Single phase 20A flat-pin socket (compliant to AS/NZS 3112), switched locally
- Three phase 20A 5-pin socket (compliant to AS/NZS 3123), switched locally
- Ensure an earthing control panel and associated elements are provided to each welding bay where a welder will be used.

7.2.32 Building Services Equipment - Electrical Requirements

Hydraulic Services

Requirements:

HOT WATER UNITS

- Provide outlets/permanent connections suitable for equipment nominated in the hydraulic design and to locations shown in the hydraulic design.
- Equipment to be minimum IP56 rating if located externally or in wet areas.
- Provide all equipment with lockable isolation switches at the location of equipment.
- Exception: Isolation switches need not be lockable where they are located above 2200mm Above Finished Floor Level.

BOILING/CHILLED WATER UNITS

- Provide dedicated socket outlets for boiling/chilled water units in staff kitchenette areas.

PUMP SETS

- Pump sets may be required for cold water, rainwater, or sewage subject to site conditions and hydraulic design.
- Provide outlets/permanent connections suitable for equipment nominated in the hydraulic design and to locations shown in the hydraulic design.
- Provide all equipment with lockable isolation switches at the location of equipment.
- Equipment to be minimum IP56 rating if located externally or in wet areas.

Mechanical Services

Preamble:

This includes all elements of the Ventilation and Heating and Cooling systems (including radiant electric heaters).

The point of interface between services depends on whether the mechanical equipment is supplied from dedicated Mechanical Services Switchboards or from the local Electrical Distribution Switchboards.

Requirements:

FOR DEDICATED MECHANICAL SERVICES SWITCHBOARDS (MSSBS):

The electrical designer/installer is to size the MSSB submain based on the required load of the MSSB, and install submain (and required containment) to the location of the MSSB. The mechanical contractor is to terminate this to the MSSB and complete all works downstream of the MSSB.

FOR MECHANICAL EQUIPMENT CONNECTED TO EDBS:

The electrical designer/installer is to size the equipment submain based on the required load of the equipment, and install submain to a suitable rated lockable isolator at the equipment location (IP56 minimum for external equipment). The mechanical contractor is to terminate equipment cabling to the installed isolator.

Exception: Isolation switches need not be lockable where they are located above 2200mm Above Finished Floor Level.

Fire Services

Requirements:

No specific requirements beyond current applicable regulation.

Communications Services

Requirements:

Provide socket outlets in BCRs and MCRs in accordance with requirements as well as standard space layouts within the EFSG.

Generally, these will be 2-off 15A single phase flat-pin captive socket outlets per communications rack.

Provide individual surge protection to final sub-circuits containing socket outlets which provide power to critical communications equipment.

Generally, this will apply to final subcircuits containing socket outlets as applicable:

- Supplying structured cabling system CDs and BDs
- Supplying the telephone system
- Supplying the WAN router

Select surge protection appropriate for the circuit loading and the equipment to be protected. Provide confirmation from the manufacturer or supplier of the surge protection.

Distinguish socket outlets that are connected to surge protected circuits using coloured switch toggles.

Provide LED indicators for socket outlets that are protected by a dedicated surge diverter.

Audio Visual Services

Requirements:

- Provide dedicated circuits for Audio Visual equipment. Multiple socket outlets may be connected in accordance with the Socket Outlet Circuit arrangements section.
- Where AV equipment racks are provided, provide surge protection to final subcircuits.

Electronic Security Services

Requirements:

- Provided dedicated socket outlets for electronic security panels.
- Provide a dedicated circuit to each group of panels.
- Provide surge protection to final subcircuits supplying security equipment.

Generally, these panels will be located within communications spaces – these require one circuit per space.

Worked example: A GLS hub contains a BCR which houses security equipment. It has three security panels – two for access control, and one for intruder detection. One dedicated circuit with final subcircuit surge protection is required to supply these panels.

Motorised Window, Louvres and Blinds

Requirements:

- Where motorised windows, louvres or blinds are installed, a dedicated remote control manufacturer is to be engaged.
- Power is to be provided to all locations of motorised window and louvre drivers. Coordinate with remote control manufacturer for final power requirements.

Fans

Requirements:

- Fans to provide airflow to assist with thermal comfort are to be installed in the spaces listen in Table below
- Coordinate fan locations with artificial lighting layout and type, and any skylight locations to avoid flicker affect.

Table 7.2.6 Ceiling Fan Locations

Space Type	Requirement	Notes
Learning Spaces (including Libraries)	Yes	

Hall / Gymnasium	Yes	Must be located at high level to mitigate impact risk. Provide Large diameter, High-Volume Low-Speed (HVLS) fans for internal sport courts in gymnasiums – note 1.
Administration and Staff	Yes	
Canteen and Food	No	
Science	Yes	
Visual Arts	Yes	
TAS	No	
PE Fitness	Yes	
Performing Arts	Yes	
Lecture	No	
Agriculture	No	
Wet Areas	No	
Circulation	No	
Storage	No	
Services	No	

Note 1 – refer to detail below for HVLS fans.

CONVENTIONAL CEILING FANS

- In spaces with ceiling heights 2700mm Above Finished Floor Level or higher, ceiling fans are to be installed. Fan blades are to have a minimum height of 2400mm Above Finished Floor Level.
- Provide one ceiling fan for each 35m^2 of floor space (minimum one fan).
- Ceiling fans are to be minimum 1420mm in diameter.

WALL FANS

- In spaces with ceiling heights below 2700mm Above Finished Floor Level that require ceiling fans, provide wall fans instead in the same quantities required for ceiling fans.
- In spaces smaller than 25m^2 provide one wall fan.
- Wall fans are to be minimum 400mm in diameter and supplied with an enclosure rated IP2x or greater to prevent injury to hands and fingers.

HIGH-VOLUME LOW-SPEED (HVLS) FANS

- Provide HVLS fans to gymnasiums where there are internal sports courts, to provide adequate airflow with the higher mounting heights required for sports courts.
- Provide quantities to align with manufacturer guidelines for area. Fans are to be mounted in accordance with manufacturer requirements.
- HVLS fans are to be mounted a minimum of 5000mm Above Finished Floor Level, with a preferred height of 7000mm Above Finished Floor Level wherever possible.

NOTE: Manufacturer requirements dictate minimum spacing in various dimensions – vertically above and below, as well as horizontally, and the requirements stated here do not preclude compliance with manufacturer requirements.

FAN CONTROL EQUIPMENT

- Fans are to be controlled by dedicated wall controls, independent of any mechanical or lighting systems. Provide minimum 1 controller per space, controlling a maximum of 4 fans each.
- Fan controllers are to have at least 3 speed settings.

Heat Lamps

Requirements:

- Heat lamps are required in accessible shower and accessible changing facilities. These are required for occupant comfort above and beyond general lighting.
- Heat lamps are to be minimum 500W output.
- Ensure lamps are replaceable and that suitable lamps can be sourced from at least 3 separate suppliers to ensure availability for replacement.
- Lamps must be controlled by a local toggle switch a local timer. The timer must automatically power off the lamp after 15 minutes, and must allow manual off control at any time.
- Provide a dedicated circuit from the “lighting” section of the local DB servicing the accessible change or accessible shower.

Assistance Alarm and Call Systems

Requirements:

- An alarm call system is to be installed in the following spaces to notify staff that students need assistance.
- The system is to use an ELV DC power supply installed in accordance with current applicable regulation.
- The alarm systems are to be independent to the electronic security (intruder detection and access control) system, unless specific written approval is provided by the Senior Project Director or equivalent Project Lead in consultation with the School Security Unit (SSU).

Table 7.2.7 Assistance Alarm and Call System requirements in Spaces

School Type	Spaces
Public School	Sick Bay, Accessible shower/Toilet/change space
High Schools	Boys’ and Girls’ Clinics, Accessible shower/Toilet/change space

ALARM SYSTEM IN SICK BAY/CLINIC

- Provide the following indicators for the alarm system:
- Red indicator light
- A “chirp” buzzer mounted at 2000 Above Finished Floor Level
- A flush plate to label indicators with the words “SICK BAY” or “CLINIC” engraved as required.
- Provide indicators in the following locations:
- Clerical office
- Provide call button complying with the following requirements:
- A high impact IP56 rated latching call button with manual release
- Wall mounted at 1000 Above Finished Floor Level
- Flush plate engraved with the words “CALL”

ALARM SYSTEM IN ACCESS SHOWER/TOILET/CHANGE SPACE (ADDITIONAL REQUIREMENTS)

An Alarm System are to be provided to align with AS1428.2 requirements.

Provide the following indicators for the alarm call system:

- Red indicator light
- A “chirp” buzzer mounted
- A flush plate to label indicators

Provide indicators in the following locations:

- Above the door to the accessible bath room; flush plate label to read “HELP REQUIRED INSIDE”
- Within the Clerical office; flush plate label to read “HELP REQUIRED IN [BLOCK xx LEVEL xx] ACCESSIBLE BATHROOM”, as suitable to identify location

Provide call button complying with the following requirements:

- A high impact IP56 rated latching call button with manual release, red in colour
- Wall mounted at locations detailed in AS1428.2
  - 1-off button at 300mm Above Finished Floor Level adjacent to the pan
  - 1-off button at 750mm located adjacent to the light switch at 800mm Above Finished Floor Level
- Flush plate engraved with the words “CALL”

7.2.33 Vape Detection and Alarm Systems

Preamble:

Vape and smoke detection systems are used for behaviour management of students, and are separate to smoke detection systems for fire safety.

Requirements:

- Vape detectors are to be installed in all bath room areas used by high school students.
- Vape detectors are to utilise a wired power source such as 230V AC or PoE.
- Vape detectors are to be connected to the IP network of the school for connection and communication.

- Vape detectors are to be protected using metallic enclosures to prevent damage from vandalism.

Devices in use are to be approved by the Senior Project Director or equivalent Project Lead (as the body managing school IP networks). Devices may be an existing approved device or may be presented for approval.

To protect student privacy, vape detectors are to not have the following features:

- Cameras
- Microphones
- 3rd party data collection

Vape detectors are to not use an audible alarm – they are to trigger an alert within the detection network software and notify the executive team via email.

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7.3 Lighting

7.3.1 General

Preamble:

Lighting in schools serves three key functions:

- Access Lighting: Provides safe and comfortable illumination for movement throughout the school during and outside of normal hours.
- General Purpose Lighting: Task and background illumination that supports the effective use of learning and activity spaces in line with their intended functions.
- Emergency and Exit Lighting: Ensures clear exit route visibility and maintains essential illumination in the event of a power outage.

Lighting systems are to be designed according with the requirements of this DTR and the following relevant standards. Where there are conflicting requirements, this DTR are to take precedence.

Relevant Standards:

- **AS/NZS 1680** Series – *Interior and workplace lighting*, including:
- **AS/NZS 1680.0** – *Safe movement*
- **AS/NZS 1680.1** – General principles and recommendations
- **AS/NZS 1680.2** series – *Specific applications*
- **AS/NZS 1158** Series – *Lighting for roads and public spaces* (all applicable parts)
- **AS/NZS 4282** – Control of the obtrusive effects of outdoor lighting
- **AS 2560** Series – *Sports lighting* (all applicable parts)
- All other current applicable regulation.

Requirements:

Lighting designs are to be verified using one of the industry-standard lighting design software listed below:

- AGi32
- DIALux or DIALux Evo
- Relux

The modelling output are to clearly demonstrate compliance with relevant standards, including but not limited to the following parameters:

- **Maintained illuminance** (average, maximum, and minimum) on horizontal surfaces (e.g. floors, desks, and work planes), as required by **AS/NZS 1680.4** or **AS/NZS 1158**, depending on the application.
- **Maintained illuminance** on vertical surfaces (e.g. walls, shelving, racks), with values broken down in accordance with the applicable standards.
- Unified Glare Rating (UGR), in accordance with AS/NZS 1680.
- **Uniformity**, as defined in the relevant standard for indoor or outdoor lighting.

The following values serve as a guide for use in lighting design and calculations. These are to be validated with the relevant parties responsible for interior finishes.

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Table 7.3.1 Surface Reflectance

Surface Type	Reflectance (%)
White painted plasterboard/render	85%
White painted brick	75%
Light face brick (cream)	35%
Dark face brick (dark brown)	20%
Light timber (e.g. radiata pine)	35%
Dark stained timber	20%
Light carpet (beige)	30%
Medium carpet (green)	10%
Dark carpet (dark blue)	5%

Table 7.3.2 – **External Schedule of Light Fittings** Lighting Design

Area Type	Description	Use	AS/NZS 1158 Category	AS/NZS 1158 Category Notes
Vehicle Parking Area	Driveways and carparks	Car parking, occasional pedestrian movement	PC3	Pedestrian – Carpark, Category: 3
Accessible parking spaces	Accessible car parking spaces and access areas	Designated parking spaces specifically intended for people with disabilities	PCD	Pedestrian – Carpark, Category: Disability
Walkways, COLAs (Note 2.3)	For external movement and circulation	Uncovered and covered external areas for access to school areas	PA3	Pedestrian – Area, Category: 3
External sports courts/fields (Note 4,5)	Lighting for sporting activities at night.	Dedicated sports fields	NA – AS 2560.2 category	NA – refer to AS 2560.2 requirements specific to activity

Note 1: Not applicable during daytime. Values only applicable when used at night

Note 2: Where a COLA is attached/directly adjacent to a hall it is to comply with category PA3.

Note 3: The installation of lighting in standalone COLAs is to be decided on a project-by-project basis to meet the project specific needs. Any lighting installation are to meet category PA3 as a minimum, but may be higher to suit specific project needs.

Note 4: The installation of lighting to sports fields are to be decided on a project-by-project basis to meet the project specific needs. Any lighting installation are to meet the required level for amateur/low level competition.

Note 5: A COLA with marked sports courts and fixed equipment (eg netball hoops) are to comply with this category if lighting is installed.

Where spaces are not clearly defined in this table, the requirements for specific areas are to meet the requirements defined for the type of space in the AS/NZS 1680.2 series of standards.

Table 7.3.3 – **Internal Schedule of Light Fittings** Lighting Design

Space Type	Spaces	Maintained illuminance (lux)	Unified Glare Rating (UGR) Maximum	Uniformity (Note 6)
Learning Spaces	General Learning Spaces, Multi-Purpose Spaces, Library, Special Programs Spaces, Senior Study, Computer Learning Space, Seminar Spaces, Sensory Space	240	19	0.5 0.7
	Learning Commons, STEM Space	240	19	0.5
Hall / Gymnasium	Gymnasium, Movement Studio Note 1	300	19	0.5
	Communal Hall	240	19	0.5
	Stage Note 2	240	19	0.5
	Control Space, Sound Cupboard, Multimedia Studio (recording space)	240	19	0.5 0.7
Administration and Staff	Entry Vestibule, Reception Areas, Administration, Offices, Interview Spaces, Meeting Spaces, Library Office, Staff Lounges, Uniform Shop	240	19	0.5 0.7
Canteen and Food	Canteen	240	19	0.5 0.7
	Food and Hospitality Learning Spaces	240	19	0.5 0.7

	Staff Kitchenettes	240	19	0.5
Science	Science Laboratories, Science Preparation	320	19	0.5 0.7
	Botany / Zoology Space	320	19	0.5 0.7
Visual Arts	Visual Arts Workshop / Visual Arts GLS	320	19	0.5 0.7
	Kiln	240	22	
	Dark Room Note 2	240	22	0.5 0.7
TAS	Wood / Metal Workshop / TAS Learning Spaces	320	19	0.5 0.7
	Welding Bay	320	19	0.5 0.7
PE Fitness	PE Fitness Laboratories and PE Fitness GLS	240	19	0.5 0.7
Performing Arts	Performing Arts Workshop, Multimedia Workshop	240	19	0.5 0.7
Lecture	Lecture Theatre	240	19	0.5
Agriculture	Agriculture Indoor Areas	240	22	0.5
Wet Areas	Toilets, Laundries, Change Spaces and Showers	160	22	0.5
	Accessible Toilets, Change Spaces and Showers	200 Note 4	22	0.5
	Clinic, Sick Bay, Utility Space, First Aid	240	19	0.5
Circulation	Internal corridors, stairwells, circulation	160	22	0.3
	Lift Note 5	160	22	0.3

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Storage	Learning Space Storage, Administration Storage and Library Storage	160	-	0.5
	Canteen Store, Pantries	160	-	0.5
	Bulk Store, Garden Store, Chemical Store Room	160	-	0.5
	Hall and Gymnasium Storage	160	-	0.5
	Cleaner's Stores	160	-	0.5
	TAS and Visual Arts Project Store Rooms, Science Apparatus Storage	160	-	0.5
Services	BCR, Main Communications Space	240	22	0.5
	Distribution Board Cupboard	160	-	0.5
	Dust Extraction Space	160	22	0.5

Reference Standards: AS/NZS 1680.0, AS1680.2.1:2008, AS2560.2.2

Note 1: This level is a minimum - refer to AS/NZS 2560 Series for specific requirements, using those targets where they exceed this value.

Note 2: Applicable to general lighting in Stage area only.

Note 3: These requirements are for general lighting within Dark Rooms. Dark Room safelights are to be supplied in addition to general lighting.

Note 4: Accessible Bath Rooms and Showers require 200lx in accordance with AS1428.2 requirements.

Note 5: Light lighting is generally by lift contractor. Electrical design to coordinate with Lift design.

Note 6: Where two uniformity values are shown, the general lighting system should deliver uniformity over the space of 0.5 and over the task area of 0.7.

7.3.2 Illuminance

Requirements:

- For internal lighting applications, illuminance levels are defined in accordance with current applicable regulation.
- A default maintenance factor (MF) of 0.8 are to be used, unless otherwise calculated in accordance with current applicable regulation.
- For external lighting applications, illuminance levels are defined in accordance with current applicable regulation. A default maintenance factor (MF) of 0.7 are to be used.
- External lighting is to be designed to minimise excess output. To achieve this, designed average illuminance should not exceed two times the required minimum average illuminance.

- External lighting is to be designed to face away from site boundaries (including undeveloped natural spaces) wherever possible to minimise spill light at all levels.

7.3.3 Glare

Requirements:

- UGR are to be assessed in accordance with current applicable regulation.

Further to these requirements, lighting within the building is to meet minimum comfort requirements, and glare limitations in alignment with the minimum expectation on Credit 11: Light Quality from Green Star Buildings Version 1: Revision C.

- External Light Fittings are to use zero tilt to minimise glare and excessive light above ground level.
- For external areas, lighting design is to comply with glare requirements of current applicable regulation.

7.3.4 Lighting Power Density

Requirements:

To align with sustainability targets, all new buildings, and refurbishment projects if their work includes electric lighting upgrades (except for heritage buildings or minor building works that meet relevant exempt development provisions), are to meet the below requirements:

- Actual installed aggregate illumination power density are to be less than the maximum illumination power densities defined in current applicable regulation by at least 10%.

7.3.5 Uniformity

Requirements:

- For internal and external lighting applications, uniformity is defined in accordance with current applicable regulation.

7.3.6 Light Pollution Management

Requirements:

- All external lighting systems and Light Fittings, including illuminated signage, are to comply with current applicable regulation.

Note: Although AS/NZS 4282 compliance is often mandated under certain planning pathways, EFSG requires compliance with the latest revision for all new or modified external lighting.

Refer to:

Including but not limited to the following:

- Green Star Buildings Credit 35 – Impacts to Nature – Minimum Expectation for detailed requirements
- Other applicable sections within this document.

7.3.7 Light Fittings

Preamble:

Light Fittings are to be selected and installed to suit the specific needs of each project. Site-specific requirements are to be confirmed in consultation with users.

Requirements:

- Seek coordination from the Senior Project Director or equivalent Project Lead to consult with DoE Heritage for light fitting selection, location and mounting requirements to heritage buildings.
- Light Fitting design is to account for environmental conditions, potential physical impacts, and long-term maintainability.
- The selection of Light Fittings is to be tailored to the specific needs of each space, ensuring safety, performance, and ease of maintenance.
- The following are key design considerations and performance requirements for Light Fittings:
  - **Impact Resistance (IK)**: Light Fittings are to be robust enough to withstand physical impacts from activities or vandalism. Ratings are to be verified by test to IEC 62262 requirements.
  - **Ingress Protection (IP)**: Light Fittings are to be rated to resist the ingress of moisture or solid objects likely to be present in their installation location. Ratings are to be verified by test to AS 60529 requirements.
  - **Tamper Proofing**: Light Fittings are to be resistant to tampering and damage. Design features include hidden, recessed or countersunk fixings requiring special tools.
  - **Recessed Light Fitting Classification**: Non-IC Light Fittings (in accordance with AS/NZS 60598.2.2) are to not be used. All other classifications are allowed and are to be installed in accordance with their rating.
- External Light Fittings are to consist of the following types and meet the respective Light Fitting construction requirements based on type.

Note – types not listed are to not be used, e.g. bollards, in-ground up-lights.

Table 7.3.4 External Light Fittings

Light Fitting Type	Spaces	Ingress Protection (IP rating)	Impact Resistance (IK rating)	Tamper proof
Pole lights	External and exposed pathways and areas, eg paths, carparks, sports fields	IP65	IK08	N
Wall mounted Light Fittings	External uncovered walkways and areas - adjacent to buildings	IP65	IK08 Note 1	Y
External surface mounted on or recessed in soffit/ceiling	External covered walkways and areas	IP44	IK08 Note 1	Y

Note 1 – IK10 required in COLAs and other covered areas with ball game courts.

Table 7.3.5 Internal Light Fittings

Space Type	Spaces	Ingress Protection (IP rating)	Impact Resistance (IK rating)	Tamper proof
Learning Spaces	General Learning Spaces, Multi-Purpose Spaces, Library, Special Programs Spaces, Senior Study, Computer Learning Space, Seminar Spaces, Sensory Space	IP40	IK04	N
	Learning Commons, STEM Space	IP40	IK04	N
Hall / Gymnasium	Gymnasium, Movement Studio	IP40	IK10	N
	Communal Hall	IP40	IK08	N
	Stage	IP40	IK08	N
	Control Space, Sound Cupboard, Multimedia Studio (recording space)	IP40	IK04	N
Administration and Staff	Entry Vestibule, Reception Areas, Administration, Offices, Interview Spaces, Meeting Spaces, Library Office, Staff Lounges, Uniform Shop	IP40	IK02	N
Canteen and Food	Canteen	IP44 Note 2	IK04	N
	Food and Hospitality Learning Spaces	IP44 Note 2	IK04	N
	Staff Kitchenettes	IP44 Note 2	IK04	N
Science	Science Laboratories, Science Preparation	IP44 Note 2	IK04	N
	Botany / Zoology Space	IP44	IK04	N

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		Note 2		
Visual Arts	Visual Arts Workshop / Visual Arts GLS	IP44 Note 2	IK04	N
	Kiln	IP44	IK04	N
	Dark Room	IP44	IK04	N
TAS	Wood / Metal Workshop / TAS Learning Spaces	IP54	IK08	Y
	Welding Bay	IP54	IK08	Y
PE Fitness	PE Fitness Laboratories and PE Fitness GLS	IP40	IK10	N
Performing Arts	Performing Arts Workshop, Multimedia Workshop	IP40	IK04	N
Lecture	Lecture Theatre	IP40	IK04	N
Agriculture	Agriculture Indoor Areas		IK08	N
Wet Areas	Toilets, Laundries, Change Spaces and Showers Note 3	IP44 Note 2	IK08	Y Note 4
	Clinic, Sick Bay, Utility Space, First Aid	IP44 Note 2	IK04	N
Circulation	Internal corridors, stairwells, circulation	IP40	IK08	Y
	Lift	IP40	IK04	Y
Storage	Learning Space Storage, Administration Storage and Library Storage	IP40	IK04	N
	Canteen Store, Pantries	IP40	IK04	N

	Bulk Store, Garden Store, Chemical Store Room	IP44 Note 2	IK04	N
	Hall and Gymnasium Storage	IP40	IK04	N
	Cleaner's Stores	IP44 Note 2	IK04	N
	TAS and Visual Arts Project Store Rooms, Science Apparatus Storage	IP44 Note 2	IK04	N
Services	BCR, Main Communications Space	IP40	IK08	N
	Distribution Board Cupboard	IP40	IK04	N
	Dust Extraction Space	IP54	IK08	N

Note 1 – IP and IK ratings are minimums – higher ratings are suitable in schools.

Note 2 – Internal Light Fittings require IP for any parts within the space only. Within ceiling space, recessed fittings require a rating of IP40.

Note 3 – Accessible shower and change facilities require heat lamps

Note 4 - Amenities restricted to staff use only do not require tamper proof Light Fittings.

7.3.8 Light Fitting by Space Type

Requirements:

- The following Light Fitting type are to be used for the spaces listed.
- Seek coordination from the Senior Project Director or equivalent Project Lead to consult with DoE Heritage regarding selection of light fitting types.

Table 7.3.6 Light Fitting Type by Space

Space Type	Spaces	Light Fitting Type
Learning Spaces	General Learning Spaces, Multi-Purpose Spaces, Library, Special Programs Spaces, Senior Study, Computer Learning Space, Seminar Spaces, Sensory Space	L02, L03
	Learning Commons, STEM Space	L02, L03
Hall / Gymnasium	Gymnasium, Communal Hall	L07

	Movement Studio	L03 Note 1
	Stage	L01
	Control Space, Sound Cupboard, Multimedia Studio (recording space)	L02
Administration and Staff	Entry Vestibule, Reception Areas, Administration, Offices, Interview Spaces, Meeting Spaces, Library Office, Staff Lounges, Uniform Shop	L02
Canteen and Food	Canteen	L02
	Food and Hospitality Learning Spaces	L02
	Staff Kitchenettes	L02
Science	Science Laboratories, Science Preparation	L02
	Botany / Zoology Space	L02, L03
Visual Arts	Visual Arts Workshop / Visual Arts GLS	L02
	Kiln	L01
	Dark Room	L01
TAS	Wood / Metal Workshop / TAS Learning Spaces	L01
	Welding Bay	L01
PE Fitness	PE Fitness Laboratories and PE Fitness GLS	L02 Note 1
Performing Arts	Performing Arts Workshop	L02 Note 1
	Multimedia Workshop	L02
Lecture	Lecture Theatre	L03, L04
Agriculture	Agriculture Indoor Areas	L01

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Wet Areas	Toilets, Laundries, Change Spaces and Showers	L04
	Clinic, Sick Bay, Utility Space, First Aid	L02 Note 2
	Accessible Toilet and accessible change facilities	L04 Note 3
Circulation	Internal corridors, stairwells, circulation	L04
	Fire isolated stair	L01
	Lift	N/A – to lift manufacturer specification.
Storage	Learning Space Storage, Administration Storage and Library Storage	L01
	Canteen Store, Pantries	L01
	Bulk Store, Garden Store, Chemical Store Room	L01
	Hall and Gymnasium Storage	L01
	Cleaner's Stores	L01
	TAS and Visual Arts Project Store Rooms, Science Apparatus Storage	L01
Services	BCR, Main Communications Space	L01
	Distribution Board Cupboard	L01
	Dust Extraction Space	L01
External	Carparks	L06
	Open paths/walkways	L06
	Sports fields	L06
	Covered external walkways	L05

Note 1 – fittings in these spaces are to be recessed or surface mounted only to minimise Light Fitting movement (eg swinging) due to space vibrations caused by activities (such as dance or exercise activities in unison).

Note 2 – prioritise low-glare options in these spaces to ensure occupant comfort, as students may be lying on the sick bay/clinic bed

Note 3 – accessible shower and accessible change facilities require heat lamps in addition to general lighting.

L01 – Batten Light Fitting

Requirements:

- Batten Light Fittings are standard in length (600, 1200 or 1500mm) with an integrated LED strip lamp element. They are designed to be surface mounted or suspended and are to be surface mounted on all ceilings 3500mm Above Finished Floor Level and lower. They use opaque wraparound diffusers. They may have integral emergency Light Fittings and/or motion sensors.

L02 – Troffer / Panel Light

Requirements:

Troffer/panel Light Fittings are designed to fit grid ceilings with standardised sizing as listed below:

  - 600mm x 600mm
  - 300mm x 1200mm

- These may be mounted in a grid ceiling system or recessed in plasterboard. Coordinate selection of lighting type to suit specified ceiling tile system where applicable.
- L02 should not be suspended or surface mounted for new buildings or ceiling replacement.
- Where new troffer/panel lighting is installed in spaces with existing ceilings, surface mounted types may be used to minimise cutting or impact to the existing ceiling.

L03 – Linear Extrusion

Requirements:

- Linear extrusion is constructed from a continuous metallic body (usually aluminium) with an LED strip type lamp element. They may be specified to custom lengths and manufactured for specific applications.
- For ceilings 3000mm Above Finished Floor Level and lower, recessed or surface mounted are to be used with direct lighting element only. No part of the Light Fitting are to be lower than 2700mm Above Finished Floor Level.
- For ceilings higher than 3000mm Above Finished Floor Level, suspended type are to be used with direct and indirect lighting elements.
- Linear Extrusion are to be delivered to site in complete, tested form – they are not to require cutting or modification on site.
- Where corner/angle pieces are used in linear extrusion lighting, these are to be manufactured corner pieces with any joins being in straight sections only.

L04 – Recessed Downlights

Requirements:

- Recessed downlights are circular Light Fittings integrating a single LED chip lamp and either lens or reflector light control elements. Downlights with a frosted diffuser as the only light control element are not to be used.

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L05 – Surface Mounted Downlights

Requirements:

- Surface mounted downlights utilise the same Light Fitting characteristics as recessed downlights, with the addition of an enclosure to contain the Light Fitting and LED driver. These types are to be fully self-contained and are not to use any external control gear.
- Surface Mounted Downlights are to be mounted so no part of the Light Fitting is lower than 2700mm Above Finished Floor Level.

L06 – Pole and Wall Mounted Light Fitting

Requirements:

- This type is to be used for external lighting and are to use a fully sealed design with all LED and control gear contained within the unit.
- All Light Fittings are to be installed with the light emitting surface parallel to the ground – that is, Light Fittings are to be installed with zero tilt angle.
- LEDs are to use light control methods such as reflectors, lenses or shield elements to limit light spill outside the intended area for illumination.
- Where an area requires both pole-mounted and wall-mounted Light Fittings, matching Light Fittings with both mounting options are to be used.

L07 – High Bay Light Fitting

Requirements:

- This type of Light Fitting is to be used in gymnasiums. They are to be surface mounted or suspended as close to the ceiling as possible to minimise movement from ball strikes etc and to allow flexibility with placement around HVLS fans.

7.3.9 Light Fitting Lifetime

Preamble:

Light Fittings are to meet the minimum life expectancy requirements set out in this section to minimise the impact of faults and reduced efficacy over the lifetime of a Light Fitting.

Requirements:

- Light Fitting components are to have lifetimes measured using the IES LM-80 Test Method.
- Overall Light Fitting lifetime are to be determined using the IES TM-21 method of extrapolating the LM-80 test data.
- Light Fittings are to only be used if LM-80 and TM-21 reports are available from the lighting supplier. Lighting suppliers are to also supply evidence that reports consider the impact of their Light Fitting design on the lifetime of tested LED components – for example, an In-Situ Temperature Measurement Test (ISTMT) report.

Note: the TM-21 test method only allows extrapolation a maximum of 6x the LM-80 test duration. As the most common LM-80 test duration is 10,000 hours, ratings are typically limited to 60,000 hours.

Table 7.3.7 Lifetime of Light Fittings

Area	Lumen Maintenance Rating	Minimum lifetime hours (extrapolated)
Security Lighting (24h Operation)	L90B10	60,000

Internal Spaces – Task Lighting (including Learning Spaces and Offices)	L90B10	54,000
Internal Spaces – General Lighting	L80B10	48,000
External Circulation Areas	L80B10	48,000
Plant and Store Spaces	L80B10	32,000

Note 1 – "Task Lighting" and "General Lighting" definitions in accordance with AS/NZS 1680 series.

7.3.10 Light Quality Metrics

Preamble:

Light Fittings are to have metrics measured using the IES LM-79 Test Method. Testing is to be of full Light Fittings – LM-79 reports of Light Fitting elements are not acceptable.

Requirements:

- Colour temperature is not to exceed 4000K in internal areas.
- Colour temperature in continuously occupied spaces is to be 3500K or higher.
- Colour temperature is to be consistent in each space.
- Colour temperature is to be 2700K in external areas.
- Amber colour LEDs may be used for ecologically sensitive areas if approved suitable in writing by the Senior Project Director or equivalent Project Lead.
- All Light Fittings are to have a minimum CIE Colour Rendering Index (CRI) R_a value of 85, verified by IES LM-79 testing.
- Light Fittings with Colour Quality assessed using more modern methods (such as the IES TM-30 Test Method) with equivalent performance to the CIE R_a requirement may be used.
- All LEDs are to have a Standard Deviation Colour Matching (SDCM) of 3 or less.
- The actual installed aggregate illumination power density is to be less than the lighting power density requirement of current applicable regulation by at least 10%.
- All Light Fittings are to be flicker free in accordance with IEEE 1789 recommendations.

7.3.11 Emergency and Exit Lighting

Preamble:

Beyond the requirements of current applicable regulation, the following Light Fitting type requirements apply to Emergency and Exit lighting.

Requirements:

- All emergency and exit lighting systems are to be single-point systems, utilising self-contained Light Fittings supplied with batteries and control gear and complying with current applicable regulation.
- All exit signs are to be internally illuminated types in accordance current applicable regulation.
- Integrated emergency Light Fittings can provide a cost saving over a standalone emergency Light Fitting and general lighting Light Fitting.

- Integrated emergency Light Fittings are to be incorporated into the design where a standard product that matches the general lighting design is available on the market.

Worked Example 1 – an existing gymnasium requires emergency lighting under the current applicable regulation and uses batten-style fittings. It may use integrated emergency batten Light Fittings to meet both general lighting and emergency lighting requirements.

Worked Example 2 – a GLS uses linear extrusion fittings for general lighting. The chosen supplier has partnered with an emergency lighting supplier and can integrate a self-contained emergency Light Fitting within the linear extrusion fitting. This may be used to reduce the visual impact of a separate emergency Light Fitting.

- All systems are to utilise manually operated testing facilities in accordance with current applicable regulation. This system is to be installed within the local EDB that supplies a group of emergency and exit Light Fittings.
- Where a refurbishment project includes modification/extension of an existing emergency and exist lighting system that does not comply with the requirements of this section, the design may depart from the requirements of this section where approved suitable in writing by the Senior Project Director or equivalent Project Lead.

7.3.12 Lighting Control

Preamble:

Digital lighting control systems are to be installed in schools to enable comprehensive control of lighting conditions and to enable simpler standardised installation and programming of lighting.

All spaces are to be controlled in accordance with the Table within this section. Where a space is not listed or a definition is not clear, the following overview are to be applied.

Requirements:

- In all new schools, a digital lighting control system is to be installed for all lighting.
- In existing schools, a digital lighting control system are to be installed for all lighting impacted by refurbishment of a space when the refurbishment includes replacement of:
  - Artificial lighting, and
  - Lighting control devices (switches and motion sensors), and
  - All cabling associated with lighting, and
  - The local EDB supplying this equipment

Note; A centralised digital lighting control system requires compatible equipment in Light Fittings, control devices such as switch panels, and central equipment such as controllers, gateways and relays commonly installed within EDBs.

In existing schools not covered by the conditions above, provision of a digital lighting control system is to be reviewed and costed for consideration by the Senior Project Director or Project Lead early in the design process.

- Systems are to be centralised and allow programming of all spaces from one interface.
- Systems are to use the DALI protocol developed by the Digital Illumination Interface Alliance (DiiA). All components are to comply with the requirements of AS/NZS IEC 62386 and have DALI-2 Certification from DiiA.

- The following building automation systems may be used as a master system for lighting control, provided any communication with Light Fittings is via certified DALI-2 gateways to allow greater flexibility in Light Fitting and control device selection:
  - KNX open standard protocol (e.g. ABB i-bus)
  - Philips Dynalite
  - Zencontrol
  - Rapix
  - Clipsal C-Bus

Contrary to the other options listed, KNX is an open control protocol that is utilised by multiple vendors and thus is preferred for new installations.

- Schools are to use one protocol for all areas to allow one supplier/programmer to address any part of the school for repairs or maintenance.
- All components of lighting control systems are to be DALI-2 Certified, including Light Fitting and DALI-2 gateways compatible with the selected vendor.
- Lighting controller/gateways are to communicate where required with dedicated point-to-point networks. They are to not use the ITD network for communication across floors and buildings.
- Where possible, lighting control devices (switches, sensors, etc) should also be DALI-2 compatible with open compatibility to work with any other vendor.

Lighting control products on the current market are largely locked down and have only one specific communication protocol they accept. These then work with gateways which use the open DALI protocol to communicate with Light Fittings.

- Dedicated switch panels are to be provided for lighting control. A physical interface with tactile feedback is to be provided – touch-sensitive control is not suitable in schools.
- Switch panels are to be located adjacent to the Main Entry door of the space they control.

ZONING FOR AV

- All teaching spaces equipped with AV display are to have lighting switched such that the zone of Light Fittings directly above AV display (usually the front row of Light Fittings) can be independently switched off to allow for easier viewing and reduced glare on the display.
- Occupancy sensors are to comply with the requirements of “Motion Sensors” as detailed current applicable regulation.
- Further to the requirements of current applicable regulation, motion sensors are to use dual detection device, utilising PIR technology alongside either ultrasonic or microwave sensors in a combined detector.
- Occupancy sensors are to be overridden by an “off” switch at the local switch panel, and are to only allow activation of lighting whilst space lighting is in the “on” state.

INTERNAL LIGHTING

- Daylight sensing is to be used to reduce power consumption when adequate daylight is present in space, aka “Daylight Harvesting”.

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- Daylight sensors are to be installed in spaces noted and are to operate in accordance with current applicable regulation.
- Sensors are to be programmed with closed-loop control to dim artificial lighting to maintain a level of:
  - 300lx at the working plane (700mm height) for continuously occupied spaces
  - 160lx at floor level for circulation and amenities (circulation and amenities)
- Sensors are to be located on the furthest wall from windows to ensure accurate activation for areas further from windows.
- Permanent labelling is to be provided at local switch panels to indicate a space has Daylight Harvesting, that reads as follows:

"DAYLIGHT HARVESTING IS IMPLEMENTED IN THIS SPACE. ARTICIFIAL LIGHTING WILL AUTOMATICALLY DIM TO SAVE POWER WHEN ADEQUATE DAYLIGHT IS DETECTED"

EXTERNAL LIGHTING

- Daylight sensing is to be implemented to switch external lighting.
- Externally mounted daylight sensors are to be provided to detect when natural light drops below 100lx at dusk, and when natural light exceeds 50lx at dawn. Control are to be implemented in accordance with Lighting Controls section.

TIME CLOCK

- A time clock is to be used to switch off lighting at the end of school hours to conserve power. Time clock is to track dates and update automatically for daylight saving time.
- An override switch is to be provided in the main reception to bypass the timer for one say for after-hours events.
- All Light Fittings configured as part of the smart lighting control system are to receive an "Off" signal at 5:00pm.
- Light Fittings that do not have localised controls are to switch on with motion detectors for after-hours use, returning to normal operation at 8:00am each day.
- Light Fittings that do have localised controls are to require activation to "on" for any use after this time.

CONTROL OVERVIEW

Regularly occupied spaces (that is any space that is likely to be continuously occupied or occupied for more than 2 hours, as defined by the Green Star Buildings) are to have:

- Local on/off control (including separate zone for lighting above AV displays)
- Locally controlled dimming
- Power off when unoccupied – 15-minute timer
- Daylight harvesting control
- Timeclock power off (end of school hours) – manual switch "on" for after-hours operation

Intermittently occupied spaces (such as storerooms) are to have:

- Local on/off control (including separate zone for lighting above AV displays)
- Power off when unoccupied – 15-minute timer

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Internal circulation and amenities spaces are to have:

- Time clock on/off operation for school hours (with override)
- Motion sensor control for after-hours
- Daylight harvesting control

SECURITY EXTERNAL LIGHTING

A portion of external lighting is to remain switched on overnight to provide illumination to enhance security.

- External security lighting is to switch on when:
  - Lux level drop below 100lx or;
  - The time is 7:00pm, whichever occurs first.
- External security lighting is to switch off when:
  - Lux level exceeds 50lx or;
  - The time is 7:00am, whichever occurs first.

GENERAL EXTERNAL LIGHTING

External covered walkways are to utilise the same control method as internal corridors.

The following control method are to apply for all other external lighting:

- External lighting is to switch on when:
  - Lux level drop below 100lx or;
  - The time is 7:00pm, whichever occurs first.
- External lighting is to switch off at 10:30pm using the timeclock.
- External lighting is to switch on at 5:30am using the timeclock
- External lighting is to switch off when:
  - Lux level exceeds 50lx or;

The time is 7:00am, whichever occurs first.

Table 7.3.8 Control Requirements by Space Type

Space Type	Space	Local on / off	Occupant Sensor	Manual Dimming	Daylight Sensors	Time clock operation
Learning Spaces	General Learning Spaces, Multi-Purpose Spaces, Library, Special Programs Spaces, Senior Study, Computer Learning Space, Seminar Spaces, Sensory Space	Y	Y	Y	Y	N
	Learning Commons, STEM Space	Y	Y	Y	Y	N
Hall / Gymnasium	Gymnasium, Movement Studio	Y	Y	N	Y	N

	Communal Hall	Y	Y	N	Y	N
	Stage	Y	Y	N	N	N
	Control Space, Sound Cupboard, Multimedia Studio (recording space)	Y	Y	N	N	N
Administration and Staff	Administration, Offices, Interview Spaces, Meeting Spaces, Library Office, Staff Lounges, Uniform Shop	Y	Y	N	Y	N
	Entry Vestibule, Reception Areas	N	Y	N	Y	Y
Canteen and Food	Canteen	Y	Y	N	N	N
	Food and Hospitality Learning Spaces	Y	Y	Y	Y	N
	Staff Kitchenettes	Y	Y	Y	Y	N
Science	Science Laboratories, Science Preparation	Y	Y	Y	Y	N
	Botany / Zoology Space	Y	Y	Y	Y	N
Visual Arts	Visual Arts Workshop / Visual Arts GLS	Y	Y	Y	Y	N
	Kiln	Y	Y	N	N	N
	Dark Room	Y	Y	N	N	N
TAS	Wood / Metal Workshop / TAS Learning Spaces	Y	Y	Y	Y	N
	Welding Bay	Y	Y	N	N	N
PE Fitness	PE Fitness Laboratories and PE Fitness GLS	Y	Y	Y	Y	N
Performing Arts	Performing Arts Workshop, Multimedia Workshop	Y	Y	Y	Y	N
Lecture	Lecture Theatre	Y	Y	Y	Y	N

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Agriculture	Agriculture Indoor Areas	Y	Y	N	N	N
Wet Areas	Toilets, Laundries, Change Spaces and Showers	N	Y	N	Y	N
	Clinic, Sick Bay, Utility Space, First Aid	Y	Y	N	N	N
Circulation	Internal and external corridors, stairwells, circulation	N	Y	N	Y	Y
	Lift	N	Y	N	N	N
Storage	Learning Space Storage, Administration Storage and Library Storage	Y	Y	N	N	N
	Canteen Store, Pantries	Y	Y	N	N	N
	Bulk Store, Garden Store, Chemical Store Room	Y	Y	N	N	N
	Hall and Gymnasium Storage	Y	Y	N	N	N
	Cleaner's Stores	Y	Y	N	N	N
	TAS and Visual Arts Project Store Rooms, Science Apparatus Storage	Y	Y	N	N	N
Services	BCR, Main Communications Space	Y	Y	N	N	N
	Distribution Board Cupboard	Y	Y	N	N	N
	Dust Extraction Space	Y	Y	N	N	N

7.4 Communication Services

Note: **This Section is being updated.**

Until the updated Section is published, the requirements below and on the following pages of content unchanged from EFSG 2025 are to apply.

7.4.1 General

Preamble:

This section explains requirements for communications services within schools.

CONTENT UNCHANGED FROM EFSG 2025

0001c Design Checklist – Communications

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.

Until an updated version is published, the requirements set out below are to continue to apply.

0.02 Communications Overview

NSW Department of Education (DoE) is moving towards Unified Communications Services (UCS). The UCS will incorporate some or all the following services:

- Structured Cabling System
- Networking - Wired and Wireless
- Telephony
- Interactive Learning space

The above services will be either described in full or referenced to other DoE documents including those of the Information Technology Directorate (ITD) and should take into consideration the Whole of Life principles.

0.03 Structured Cabling System

General

The DoE Structured Cabling System (SCS) is compliant or exceeds the Australian Standard for Telecommunications Customer Premises Cabling (AS3080).

The SCS contains a Main Communications Space (MCR), previously referred to as the Campus Distributor (CD), remote Building Communications Space (BCR), previously referred to as a Building Distributor (BD) connecting to Telecommunications outlets (TO). The interconnection cabling is Campus Backbone Cabling (CBC) between distributors and Horizontal cabling from the MCR or BCR to the TO.

The Public location and quantities of distributors and outlets are defined within the EFSG and SCS along with the associated plans. As a guide the distance will be a radius of 70 metres between the outlet and the Communications cabinet to ensure a pathway no longer than 90 metres. If additional SCS are specified as part of the building works additional outlets will be defined as required of the service(s).

The NSW Department of Education's (DoE's) **Structured Cabling System Specification** defines the design plus the minimum quantity and quality of the components within the SCS. All communications cabling works performed for NSW DoE are to comply with this specification.

Civil and architectural requirements and business practices to cater for the installation of the SCS are described in the following sections.

0.04 Pathways (General)

Campus/Building Pathways

Refer to the NSW DOE Structured Cabling System Specification for the provision of Campus/Building pathways.

- Conduits for external underground horizontal cabling are to be minimum 100mm diameter, white conduit marked by the manufacturer as being for communications use.
- To limit drawing forces, minimise the amount of bends in the run.
- Install cable pits adjacent to the buildings for cable drawing purposes or use a sweep to enter the building where it is impractical to install pits.
- Cables shall not be joined in cable pits.

- A star topology shall be used. Fibre shall be run in underground conduit with an inspection pit system.
- Provide pathways from this duct to the respective BD/BCR or CD/MCR to allow installed and future horizontal cabling to be installed.
- Connecting pathways should preferably be accessible ducts so installed and future cabling can be laid in. Provide 100% spare space.
- If conduits must be used, they are to be white communications conduit of minimum length and run with a minimum number of sweeps so cables can be drawn in without exceeding the maximum pulling force. Provide 100% spare conduits.
- Provide an adequate number of connections to the skirting/wall duct to ensure there is 100% spare space within the communications channel.

Duct for internal use

As part of new or refurbished buildings install duct for the voice/data cabling and socket outlets with the following specification:

- Select ducting from a range that has factory made accessories including dowels, fishplates (to achieve bends and tees) and cable retaining pieces.
- Provide cable retainers at maximum 900mm centres to hold the installed cables within the duct when a cover is removed.
- Duct design must ensure that any screws used for fabrication or cabling retention do not penetrate into the duct to avoid damage to the communications cabling.
- Two parallel continuous threaded screw flutes are required for fixing the cable retaining pieces.
- Allow for future cables to be run using lay-in technique.
- Provide each length of cover strip with points at both ends to allow removal of covers with a tool without damage to the paint finish. Alternatively, the cover is to be affixed by screws designed for the purpose and colour coded.

Finishes

The external surfaces for exposed duct are to be finished in baked powder coat enamel of selected colour.

Colours will be selected from the colour schedules specific to a project and more than a single colour may be required in a school.

Campus Backbone cabling

The cable pathway installed for cabling can also be used for the cabling providing manufacturers' cable installation specifications (e.g. minimum bend radius) can be achieved. Ducts must be sized for the horizontal cabling, spare capacity and for the backbone.

Between buildings, conduits installed in the ground are the preferred pathways. Ducts installed in indoor-rated covered ways are an acceptable alternative.

Conduits used for the CBC are to be a minimum 100mm diameter white conduit marked by the manufacturer as being for communications use. To limit drawing forces, minimise the amount of bends in the run. Install cable pits adjacent to the buildings for cable drawing purposes or use a sweep to enter the building where it is impractical to install pits. Cables are not to be joined in cable pits. Provide minimum 2 x 50mm diameter white conduits from pit to the site Campus Distributor within a building and minimum 1x50mm diameter white conduit from pit to each Building Distributor within a building.

CBC cables installed underground in conduit must be classified by the manufacturer as suitable for external underground use.

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0.05 Responsibilities

For new and refurbishing schools, request the Senior Project Director or equivalent Project Lead to seek direction as the requirements in this clause from the Department's Information Technology Directorate (ITD) to co-ordinate the procurement of network and telephony services. To facilitate ITD's responsibilities, the following action sheets have been developed:

- Action and check sheet 1: Application for Telephone Service – describes the process (including responsibilities and responsibility delegations) for procuring incoming telephone lines and their connection (Please see Related Resources).
- Action and check sheet 2, part A: Tendering Design and Documentation - describes the process (including responsibilities and responsibility delegations) for designing and procuring broadband and Local Area Network (LAN) equipment during the documentation phase (Please see Related Resources).
- Action and check sheet 2, part B: Construction – describes the process (including responsibilities and responsibility delegations) for procuring and installing broadband and LAN equipment during the construction phase (Please see Related Resources).

Information Technology Directorate

- Production of the NSW DOE Structured Cabling System Specification.
- Providing preliminary advice on estimates of active equipment to be supplied, based on line drawing showing Campus Distributor (CD)/Master Control Space (MCR), Distributor/Building Control Space and numbers of TOs serviced by each distributor provided by the Senior Project Director or equivalent Project Lead at time of tender documentation. For new school sites this will include a WAN device, eT4L server and UPS
- Advice will be refined based on detailed design and current standards. The project will purchase 12 weeks before commissioning based on quotation obtained by DoE ICT stakeholder.
- DoE ITD will provide a configured WAN device for installation within the CD/MCR directly to the contractor, on site.
- Payment for active equipment will be managed by the Foundations.T4L the Senior Project Director or equivalent Project Lead and may be included as a PC item in the contract sum. Please Note: Asset Management Directorate will manage project funds necessary to fund the purchase of active equipment.

Designer/Documentation

- Provide ITD with a basic block diagram of the SCS showing CD/MCR, BD/BCR and numbers of TOs serviced by each distributor to permit the determination of active equipment requirements and a budget price.
- Include the latest version copy of DoE ITD Structured Cabling System Specification in the project specification.
- Ensure all checklists related to EFSG requirements (including, but not limited to the action sheet/sheets named above) are completed and forwarded as required.
- Ensure all requirements of DoE ITD Structured Cabling System Specification are incorporated into documentation.
- Ensure quantities are correct to EFSG requirements.
- The cabling solution for each site must be specifically designed to suit that site and appropriate allowance for future permanent or temporary buildings:
- For demountables, provide cabling and frame for expansion.
- For future permanent buildings, not scheduled in 5 years, provide cable pathways NOT cable.

NOTE: In projects where there are existing buildings that are not included in the building works, the extent of the structured cabling system must be determined in the preliminary design stages. In schools receiving new buildings they may require remedial works/equipment in the existing MCR to provision the new works. (Please see Section 05 for more information)

- Ensure correct location and space requirements for distributors and adequate pathways for installation of cabling. The CD/MCR and BD/BCR should ideally be centrally located and should align vertically or provide adequate pathways between floors. As a guide TO's should fall within a 70 metre horizontal radius of its BCR. Refer to SCS.
- Include, in the tender documents, a list of the active equipment to be supplied by parties other than the Contractor.
- Program active equipment ordering - the order needs to be placed a minimum of 12 weeks prior to installation, see Contractor Installer below

Contractor/Installer

- Design, supply, install, test and commission the structured cabling to be included in the contract documents. The installation of active equipment supplied by the parties other than the Contractor is included in this requirement.
- Provide the required patch and fly leads, quantities and lengths determined from the formula contained in the Design Guide.
- Produce vendor endorsed working diagrams of the SCS to be submitted to the Senior Project Director or equivalent Project Lead a minimum 12 weeks prior to required delivery date to confirm the Active Equipment needed. Communications line for these submissions is to be:
  - Contractor to Foundations.T4L PM then;
  - The ITD School Network Solution Design Authority for approval.
  - The Foundations T4L PM then submits the final SCS diagrams to
  - AMU (Asset Management Unit)

Contact

Foundations.T4L, ITD

Email: Foundations.T4L@det.nsw.edu.au

School Network Solution Design Authority

Email: SNSDA@det.nsw.edu.au

NOTE: In Design and Construction type contracts the Design Guide is included in the contract documents. The contractor takes on relevant design development responsibilities. The Design and Construction documents must address the current Schools Design Guide and the DoE ITD Structured Cabling System Specification.

0.06 Existing school upgrades

Overview

This section aims to assist planners in determining the project brief for structured cabling, telephony, bell and PA systems as part of expand and refurbishment projects in existing schools. This section is not to be applied in any way to the requirements for new school construction as described in other sections.

Expand and refurbishment projects require a project brief to be created that is directly applicable to the merging of the new works into the existing ICT infrastructure, structured cabling, telephony, bell and PA systems. Each site is unique, the work will be determined by the Senior Project Director or

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equivalent Project Lead in consultation with ITDs Foundation.T4L PMs, ICT Support Team Leaders and the Principal. Factors affecting the project brief include:

- impacts to existing voice and data, PA and bell system cabling to ensure ESFG standards and infrastructure compatibility across the site.
- suitability of existing ICT networking equipment and its compatibility with new equipment.
- suitability/expandability of any existing telephony, bell or PA systems through assessment based on age and future lifespan of the existing equipment.
- suitability of existing structured cabling and its compatibility with new standards.
- extent of the expansion and/or refurbishment.
- project budget.
- existing operational communication systems which the schools need to retain (e.g. distributed signage or video systems).
- planned future school expansion.

The Project Brief Template is available at the link below.

Provisioning of ICT in existing school: Project Brief Template.

Confirm with the Senior Project Director or equivalent Project Lead if the Project Brief Template is available and applicable for use.

General Requirements

New, upgraded or refurbished buildings must be delivered to current DoE requirements including communications services to the current Design Guide for a new school, including:

- Data network
- Wi-Fi
- Telephony
- PA systems
- Bell systems
- Building Management and Monitoring systems including PV Solar systems
- Digital signage
- Security services routed over structured cabling such as CCTV.

Table 01: Communication systems upgrade strategies

Requirement	Example
Current communication systems deemed suitable for expansion	Expand into new or refurbished buildings
Current communication systems deemed suitable but affected by building works	Relocate and upgrade if necessary. Expand into the new or refurbished buildings
Current communication systems deemed unsuitable for expansion	Uplift/ Replace across the entire site

Provide extension of the communications system in a new or refurbished building to allow it to function.	Expand/replace structured cabling, telephony, Bell, PA cabling to the building. Expansion capabilities or replacement of these systems is to be assessed.
Extend existing operational communications systems required by the school to the new or refurbished buildings to maintain present coverage and provide common supportable infrastructure across the site.	Upgrade existing ICT infrastructure to accommodate new equipment that is being installed. Upgrade of existing WAP's and switches across the site for compatibility. Expand school's digital signage system to include new or refurbished building.
Relocate existing communications systems where their operation is affected by the additional accommodation project.	Relocate site ICT services to either new or refurbished MCR/BCR/Floor Distributors that are affected by the works. This may include Bell, PA and telephony systems.
Provide electrical and data schematic drawings detailing the location of backbone pathways, existing outlets, data cabinets and other associated systems and any proposed changes prior to design signoff.	Schematics for Expand and Refurbish projects must identify changes such as additions, removal and replacements of existing infrastructure along with new building inclusions. DoE ICT must be engaged in consultation

Note: The latest NSW DOE Structured Cabling System Specification are to be adhered to in all the above scenarios. In practice this may mean that the communications works may extend outside the area of the building works. Any required alterations to existing systems will form part of the work for the specified work. This excludes repair or re-commissioning of existing defective systems which remains the responsibility of the school.

Structured Cabling works

Refurbished buildings are to be provided with structured cabling as for new school construction. Installers should follow the structured cabling system described in this Design Guide. All cabling work requires documentation including test results and "as built" diagrams, in accordance with the Structured Cabling Systems Specifications.

Key elements include:

- Schools network is to remain functioning during the constructions works. This may require temporary installations, or staged works to ensure the school remains operational with minimal interruptions.
- Voice tie cabling may be required to connect via the existing block cabling to any existing analogue/digital (non-VOIP capable) PABX.
- Any MCR or BCR's impacted by the project must meet EFSG requirements for new school construction.
- Where there is additional equipment being installed in existing MCRs and BCRs, e.g. fibre backbone, horizontal cabling, phone controllers, CCTV head equipment, PA-Bell Controllers, etc, there may be a requirement to increase the space size, providing there is sufficient space to extend. The number and size of cabinets will also need to increase to accommodate the new services/equipment. Where possible SCS space layouts are to be adhered to.

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- Make provision in the design for the structured cabling system to be extended to planned future buildings. This is critical for underground pit and conduit systems.
- New campus backbone cabling is to be installed to current standards (pit and conduit system) and not utilise existing non-standard pathways. E.G conduits on covered walkways.
- New horizontal cabling is to utilise cable tray system in accordance with current standards.
- Where existing data cabling is retained in a refurbished building (requires ITD approval), the cabling must comply with current SCSS standards.
- Frequently the existing cabling will not have capacity for the extension and will require replacement.
- Schematics must be provided for refurbished spaces indicating existing, new and changed data and power within the spaces.

NOTE: Heritage buildings require specific solutions be developed in consultation with a Heritage Architect and are to be included in the developed brief.

Telephony equipment

The PABX should utilise VoIP for internal handsets where possible. During the construction of the brief, the existing phone system is to be assessed. A determination will be made on expansion, upgrading or replacement depending on requirements and available PABX options for the site.

Reticulated Public Address (internal and external) and Period Bells

During the construction of the brief any existing services will be assessed. Should either system exist and be in use, its functionality must be retained or enhanced by the refurbishment accommodation work. This may involve upgrade or replacement of existing systems to accommodate project works, or relocation of the microphone and amplifier or period bell timer to a new administration block. As well as retaining existing system/s, outlets are required to new or refurbished buildings in accordance with DoE requirements for new buildings.

0.07 Certification and prequalification

Manufacturer's Certification

The manufacturer is required to certify that the cabling system meets specification, including the specified performance levels.

In addition, the manufacturer is to provide a written warranty certification for a minimum period of twenty (20) years.

NSW ICT Services Scheme – SCM0020

The installation of the system must be by a contractor currently pre-qualified under the NSW iCT Services Scheme- SCM0020 accreditation for site cabling under category- F02 Network Operations including delivery "as a service".

0.08 Patch and fly lead allocation

Provide sufficient patch and fly leads for connection of TOs, as detailed:

- Supply UTP patch leads for each active Telecommunications Outlet contained in the CD/MCR and/or BD/BCR.
- Provide UTP fly leads for 100% of the total number of TOs installed. With the following numbers being:
  - 33% at 2 metres long
  - 33 % at 3 metres long

  - 34% at lengths pertinent to furniture placement

- Provide fibre optic patch leads for the commissioning and operation of all active equipment being installed as part of the contract. The connector types on the leads may vary depending on the equipment supplied by DoE. Hence contractors are to be mindful of this and ensure the correct type of leads are supplied. Civil and architectural requirements and business practices to cater for the installation of the SCS are described in the following sections.

0.09 Telecommunications outlets

Telecommunications Outlets (TOs) are the connection points between the SCS and the user's equipment, i.e. computers, telephones, AV monitors or PA loudspeakers. Each TO consists of single RJ45 modular outlet, with spring loaded shutters to reduce the risk of physical damage and ingress of contaminants.

Modular outlets are mounted in pairs on the same escutcheon plate (a double telecommunications outlet), with the outlets side by side in a single gang horizontal plate, not one above the other. Thus, a space designated as showing "2x2" communications outlets will have two 2-gang plates in it, a total of four RJ45 outlets.

Label each outlet with engraved plastic labels, glued and pinned. The other end of each 4-pair cable shall be the MCR/BCR to correspond.

The numbers of Telecommunications Outlets (TOs) for every space in the school are shown in the EFSG as a Double Telecommunications Outlet (DTO).

All TOs are to be installed as a dual TO on a single plate, i.e. as a DTO.

0.10 Labelling and records

Provide a logical identification system for all components of the SCS. The identifying letters or numbers are to relate to those used on the building blocks. The system is to individually identify all distributors, both ends of all cables, the TO and the patching outlets. It is to also provide an overall site layout to allow easy recognition of the location of items.

Flexible nylon, machine printed labels are the minimum acceptable standard.

0.11 Manuals and training

DoE requires a 4-hour on-site training session for up to four persons on the use of the SCS. Training is to be accompanied by appropriate documentation and a video that demonstrates operation of the system and its components, including patching, cable management for voice, video and data of the SCS installed on site. Include explanation of detailed drawings left on site. The video / CD ROM may be generated from the on-site training for future use by DoE school staff.

The Senior Project Director or equivalent Project Lead will, in consultation with the School Principal, nominate the timing of this session together with the number of attendees.

Manuals are to be handed to the school during the training session. Include in copies of all cabling test reports and the (minimum) 20-year warranty certificate the manual.

As built documentation, manufacturer's warranty and test results are required.

0.12 Main Communications Space

A main communications space will be required in new, and some upgrade projects approved projects. For details of the cabinets refer to NSW DOE Structured Cabling System Specification and EFSG Hubs and Layouts: PS402, HS402 and SSP402.

Allow for cabinets 1, 2 and 3 as below and additional space and power for cabinet 4:

- 45RU cabinet nominal 800mm wide by 900mm deep as the ITD ICT Services cabinet.
- 45RU cabinet nominal 800mm wide by 900mm deep as the campus and building distributors.

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- 45RU cabinet nominal 800mm wide by 900mm deep with a sever shelf for file servers

Cabinet 1 are to be located nearest to the wall. It will house the carrier passive and active equipment, wireless controllers and any ITD supplied servers and supporting equipment

Cabinet 2 are to be located adjacent to Cabinet 1. This cabinet will house the Campus Backbone Cabling and the horizontal cabling for the library. It will also house the LAN equipment.

Cabinet 3 is required for server installation.

Cabinet 4 may be required and is dependent on the cabling density to the MCR.

A managed pathway for copper and fibre patch leads between the cabinets is required.

0.13 Networking - wired and wireless

Please refer to the latest NSW DOE Structured Cabling System Specification before undertaking any networking works.

Wired networking – Backbone cabling

- Optical fibre cable is the only medium to be used to carry campus and building backbone networks services.
- The optical fibre cabling used in campus and building backbone cabling is to be a minimum of 12 core, single mode fibre.
- Any increase to fibre backbones is to be in multiples of 12 cores.

Wired Networking - Horizontal cabling

- Twisted pair cabling is be used to carry network and telephone services and will be Category 6A.
- The cable construction is to be rated as “Low Smoke Zero Halogen” for all internal grade Cat6A cabling.
- Connector security and protection is mandatory in all school locations and protection is to be provided by shuttered outlets and tamper proof faceplates or protective covers.

Wireless Networking

New buildings and refurbishments are required to provide a common wireless solution compatible across the school, providing a consistent user experience and support mechanism. This involves the replacement of existing legacy wireless equipment, such as wireless access points and site switches. This replacement shall be coordinated by the Senior Project Director or equivalent Project Lead, in consultation with the ICT stakeholder and the School Principal.

0.14 Telephony

Voice over Internet Protocol (VoIP) and National Broadband Network (NBN) connections

The department only approves the use of local Private Automatic Branch Exchange (PABX) systems at school sites.

The local PABX system are to be compatible with SIP trunks and Public Switched Telephone Network (PTSN) over NBN telephony services.

Where possible, NBN connections are being implemented into schools and may be used to deliver carrier services.

Connection orders

The Senior Project Director or equivalent Project Lead shall manage contact with the department’s Information Technology Telecommunications Manager to confirm the carrier service type and requirement, and to assist with the NBN process.

Contact

Enquiries about the NBN rollout to existing DoE school sites can be made through:

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DoE NBN Project Team - Managing the NBN rollout to all DoE sites

Corporate Telephony Team

Address: 105 Phillip St, Parramatta, NSW 2150

Telephone: 02 7814 3777

Email: nbnproject@det.nsw.edu.au

All carrier service creation and change requests are to be directed to the Fountations.T4L PM. SIP orders and NBN new development and/or relocation applications will be placed by the Corporate Telephony Team.

Supply and install

Service suppliers shall supply and install:

- the complete PABX.
- the lead-in cables.
- the Main Distribution Frame (MDF) and;
- handsets.

Service suppliers shall coordinate connection to the SIP Trunk or PSTN over NSB service with the Senior Project Director or equivalent Project Lead and network service provider. The system shall be operational before handover. Coordination of activities and scoping is the responsibility of the School Infrastructure NSW Project Director (SI PD).

The telephone system shall:

- operate over the site structured cabling system utilising VoIP;
- be able to be patched to operate on any outlet and;
- include an analogue card or like service that allows for single power failover extensions to be installed into the main administration area of the school.

Any existing analogue or digital handsets requiring direct copper cabling from the PABX to the handset location are to have cabling ties installed as required by the department's current NSW DOE Structured Cabling System Specification.

PABX telephony

Supply and install

Service suppliers shall supply and install:

- the complete PABX or key system,
- lead-in cable,
- MDF and
- handsets.

Service suppliers shall coordinate connection to the PTSN with the Senior Project Director or equivalent Project Lead and network service provider.

The telephone system shall operate over the SCS and must be able to be patched to operate on any outlet. The system must be operational prior to handover.

MDF and PABX location

The MDF and PABX are to be installed adjacent to the Campus Distributor (CD)/Master Control Space (MCR) and then wired to the PABX voice section of the CD/MCR. The operator's console is to be placed in the administration/clerical office.

Incoming carrier services

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For all schools, incoming carrier services consist of:

- A telephone service, providing voice and fax.
- Connection into the department's Wide Area Network (WAN) service, a fibre optic Multi-Protocol Label Switching (MPLS) service (a small number of schools use a satellite link), used to deliver SIP carrier services.

For new and refurbished schools, SIP Trunk is the preferred carrier service.

In exceptional circumstances, PSTN over NBN may be an acceptable option. Please check with the Foundations.T4L PM, who will confirm with the department's Information Technology Telecommunications Manager before proceeding.

For all incoming carrier services:

- The contractor shall submit the Action and check sheet 1: Application for Telephone Service to the Foundations.T4L PM (This form will be incorporated into project documentation), informing them of:
  - The services required and;
  - The date that connection of the service/services is required.

NOTE: The department requires a minimum of 15 weeks advance notice of the date the service/services are required to be connected.

- The contractor shall liaise with the carrier/s to ensure that lead-in cables suitable for the required services are installed.
- The contractor shall be required to make provision for the service/services to be connected (Typically facilities for conduit entry to the communications space and trenching from the site boundary).

Line-Work installation

Some network service providers may be required to install line-work (i.e. lead-in cables, external conduit, pits and cabling). In these cases, PDs and/PMs shall:

- request a cost estimate for the required work from the appropriate regional office and;
- ensure that any fees or charges incurred by the supplier for this work are paid.

Exchange Lines

All voice exchange lines are to be connected to the school's telephone system. Connect directory, and one (1) other exchange line are to be connected in rotary where possible.

PABX performance/capability requirements

The PABX/Key system is to be equipped with the following capabilities:

- Centralised call answering during normal school hours.
- Ability to enable each extension to be programmed with internal communication capability and access or barring to external exchange lines.
- Ability to enable exchange line access for each suitable in schools extension, programmed for either direct access or via operator access.
- Privacy for all internal and external calls.
- Programmable for night mode operation.
- One nominated extension with priority break-in facility to an exchange line.
- Ability to program numbers for abbreviated dialling.

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- To be capable of future extension by at least 50% above the numbers of lines and working extensions tabulated above.
- Voice mail facility.
- Option for cordless extensions.
- Power fail option.
- Provide one handset for each working extension.
- One loose analogue power fail handset for emergency use. (Provide cabling and patching for installation of the power fail handset in the school clerical office).

Systems, which apply voltage pulses to the signal lines during operation or standby, are not to be used without the written agreement of the SCS manufacturer.

Program the system to operate in the following manner:

- All exchange lines to have STD access and IDD barring
- STD access to Principal and Clerical office operator extensions only
- Program direct out-dial access to Principal and Deputy Principal extensions and restrict all other extensions to exchange line access via the operator.
- Each extension to have access to emergency and school business numbers by abbreviated dialling to programmed locations.
- Night mode to restrict access to emergency and school business numbers only.
- System barring as follows:
  - a) Total Barring: All extensions totally barred to 0011, 0055, 0100, 0176, 0173, 0103, 0101, 0102, 1291, 0108, 0107.
  - b) STD to have access to all areas other than those listed in (a) above.

Department of Education to advise which outlets are to be programmed for use.

Handsets

Service providers shall:

- Provide and install handsets (Handset installation locations are to be determined by the Senior Project Director or equivalent Project Lead).
- Carry out all patching within the CD and BDs to enable the system to operate on handover.

Cable termination

The cable from the TPF to the active telephone patch panel in the CD may be terminated as 1 pair per outlet (i.e. 1 pair to be terminated onto Pr 1). However, some PABX systems may require additional pairs per termination.

Note that all Voice grade cables installed as part of the backbone is to be terminated both ends into modular (RJ45) outlets with 4 pairs terminated in every modular outlet.

Training of staff

There are to be a minimum of 4 hours training of nominated staff in the care and operation of the PABX/Key system. Training is to be accompanied by adequate documentation. The Senior Project Director or equivalent Project Lead shall nominate the timing of this session, together with the number of attendees in consultation with the School Principal.

Lift Phone

Service providers shall organise the supply and installation of a 4G/5G compatible dual sim GMS gateway (Please see SG1011.4.4 for more information).

Backup mobile phone solution

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SIP Trunk and PSTN over NBN services are reliant on power being supplied and will not remain fully operational during a power failure or loss of carrier service. A robust backup mobile phone plan is to be considered if the SIP Trunk or PSTN over NBN services are out of service.

Table 02: Required Telephone lines – Public Schools

No. of Students	Incoming lines	Working extensions (incl. handsets)
Public Schools		
1 HB		
2 - 4 HBs	1	3
5 - 7 HBs (Core 7)	2	4
8 - 14 HBs (Core 14)	2	8
15 - 21 HBs (Core 21)	3	10
22+ HBs	3	10

Table 03: Required Telephone lines – Central Schools

No. of Students	Incoming lines	Working extensions (incl. handsets)
Central Schools		
30 - 112	30 - 112	30 - 112
113 - 159	113 - 159	113 - 159
160 - 240	160 - 240	160 - 240
241 - 450	241 - 450	241 - 450
451+	451+	451+

Table 04: Required Telephone lines – High Schools

No. of Students	Incoming lines	Working extensions (incl. handsets)
High Schools		
Streams 1 - 3	Streams 1 - 3	Streams 1 - 3

Stream 4	Stream 4	Stream 4
Stream 5	Stream 5	Stream 5
Stream 6	Stream 6	Stream 6
Stream 7	Stream 7	Stream 7

0.15 School audio-visual (AV) device

This document provides the minimum standard required for key equipment, power and communications required for each NSW DoE learning space. Exact measurements, quantities, equipment locations, and other space aspects such as equipment installation methods will vary from project to project.

The school audio-visual (AV) standards for school main learning displays (MLDs) include a single display panel of varying size as specified by the requirements of the learning space in which the Audio-Visual equipment is being installed (please see Appendix A: Display Sizing for further information). The school audio-visual standards for school main learning displays considers the mobility requirements that are essential for modern, configurable learning spaces.

The document will also provide the minimum standard installation requirements for learning displays in school communal halls and gymnasiums of all sizes.

All components are available and are to be purchased from approved DoE suppliers (Please note, some components including the T4L interactive multi-media PC and video/audio conferencing unit will need to be purchased separately) by the Senior Project Director or equivalent Project Lead. These components shall then be integrated into a standard Main Learning Display (MLD) by the AV Contractor, in consultation with the Senior Project Director or equivalent Project Lead.

School audio-visual device specification

The latest version of the NSW DoE school audio-visual standards for school learning displays is available at: NSW DoE school AV for learning displays standard

The latest version of the NSW DoE audio-visual standards for school communal halls and gymnasiums is available at: NSW DoE AV standards for school communal halls and gymnasiums.

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7.5 Audio Visual

Note: **This Section is being created.**

Until this section is created, please refer to other Parts of the EFSG, and seek direction from the Senior Project Director or equivalent Project Lead for requirements.

7.6 Electronic Security

Note: **This Section is being created.**

Until this section is created, please refer to other Parts of the EFSG, and seek direction from the Senior Project Director or equivalent Project Lead for requirements.

7.7 Ventilation

7.7.1 General

Preamble:

Ventilation in NSW public schools supports health, learning and efficient energy use. Three types of ventilation are used: Natural Ventilation, Mechanical Ventilation and Mixed Mode (a combination of both).

NOTE: Ventilation is separate from heating and cooling; naturally ventilated spaces may still require heating and/or cooling.

Requirements:

- Where habitable rooms are only naturally ventilated, natural ventilation must provide a 50% improvement of outdoor air required by AS 1668.4.
- Mechanical system designs must integrate the heating and cooling, ventilation, acoustic and sustainability strategies.
- Where space heating and / or cooling are also required, provide a fully integrated solution that addresses ventilation, heating, and cooling.
- Be coordinated with the project acoustic design and comply with the project acoustic report.
- Provide non return dampers for new mechanical exhaust systems with the exception of exhausts for: non-conditioned spaces, kitchen hoods, fume cupboards, wood dust, welding and griding, and other specialty systems where a non-return damper cannot be installed
- Have safe, accessible servicing provisions for mechanical equipment
- All new and existing ductwork modified as part of the project work must be cleaned prior to occupation in accordance with AS/NZS 3666.2, and standard industry practice.
- Designs are to be coordinated with the Senior Project Director or equivalent Project Lead and Asset Management and commissioned to confirm they perform in everyday school use. All new and modified mechanical systems must be fully commissioned prior to handover.
- Ventilation systems for heritage buildings must be designed with care and a clear understanding of a building's heritage requirements and be coordinated with the Senior Project Director or equivalent Project Lead in consultation with the DoE Heritage team.
- For heritage buildings, plant must not be located on the frontage area, significant building elevations, or in window openings.

- Natural room ventilation systems in existing Heritage Buildings are to be retained, maintained and accounted for in ventilation calculations. They may include but not be limited to existing wall vents, cavity vents, roof and ceiling vents, operable windows, crossflow windows into hallways and operable door highlights.
- Ensure separation distances between exhaust or pollution sources and outdoor air intakes compliant with ASHRAE Standard 62.1:2013 (Table 5.5.1) or AS 1668:2012 (whichever is greater). Refer to Table below for distances for typical exhaust types.

Table 7.7.1 Typical Exhaust Separation Distances from Outdoor Air Intakes

Exhaust Type	Minimum Separation Distance (m)	Limiting Standard
Commercial kitchen exhaust	10	ASHRAE Standard 62.1:2013
Residential kitchen exhaust less than 600 L/s	3	ASHRAE Standard 62.1:2013
Amenities Toilet exhaust below 600 L/s	3	ASHRAE Standard 62.1:2013
Amenities, Toilet, shower exhaust below 800 L/s	4	AS 1668.2
Amenities, Toilet, shower exhaust above 1000 L/s	6	AS 1668.2
Laundry exhaust below 600 L/s	3	ASHRAE Standard 62.1:2013
Printer space exhaust below 600 L/s	3	ASHRAE Standard 62.1:2013
Fume cupboard exhaust	10	ASHRAE Standard 62.1:2013
Chemical store exhaust	10	ASHRAE Standard 62.1:2013
Kiln downdraft exhaust	10	ASHRAE Standard 62.1:2013
Kiln general exhaust below 600 L/s	3	ASHRAE Standard 62.1:2013
Metal and welding general exhaust below 600 L/s	3	ASHRAE Standard 62.1:2013
Welding or metal work hood exhaust	10	ASHRAE Standard 62.1:2013
Dark Room exhaust	5	ASHRAE Standard 62.1:2013

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Laser cutter and 3D printing space general exhaust less than 600 L/s	3	ASHRAE Standard 62.1:2013

7.7.2 Ventilation by Space Type

Requirements:

- The following table provides space ventilation requirements for newbuild and refurbishment projects.
- NV spaces may also require heating and air conditioning. For space heating and cooling requirements.
- Provide adequate relief air provisions for all spaces with mechanical outside air. Where dedicated openings are provided to the outside, these must be complete with self-closing dampers.
- Pathways for make-up air or relief within a building must be via door undercuts, or transfer air ducts with ceiling grilles. Door undercuts can only be employed for non-acoustically rated doors, and must not exceed 20mm height, and 2.5m/s air velocity. Low level door grilles are not suitable in schools due to risk of damage or vandalism.

Table 7.7.2 Ventilation and Plant by Space

Note: **NV**=Natural Ventilation **MV**=Mechanical Ventilation **MM**=Mixed Mode Ventilation

Space Type	Ventilation	Plant
Permanent Learning Spaces, Libraries	MM	Inline OA Fan Ceiling Fans
Small withdrawal / group learning spaces	MM	Wall Fan MV shared with adjacent main learning space Must have external façade exposure for MM operation
Circulation Areas	NV	N/A MV only where NV is not practical
Halls, and Gymnasiums	NV	High level clear storey motorised glazing / glazed louvres, or Natural powered roof ventilators with motorised dampers AND Ceiling fans MV only if required for acoustic purposes

		Preferred High level motorised glazing / glazed louvres
Offices, Staff and Administration Areas	NV or MV if the space has no exterior walls or insufficient natural ventilation openings	Ceiling fans Air conditioning to be provided
Sick Bays / Clinics	NV or MV if the space has no exterior walls or insufficient natural ventilation openings	Wall fans Air conditioning to be provided
Canteens	MV commercial or residential kitchen hood exhaust NV outside air if there is a residential kitchen hood. MV outside air if there is a commercial kitchen hood.	Commercial or residential kitchen hood Commercial kitchen exhaust vertical discharge roof fan or bifurcated inline fan Inline outside air fan Ceiling fans not suitable in schools
Hospitality and Food Tech	MV commercial kitchen hood exhaust MV outside air	Commercial kitchen hood Commercial kitchen exhaust vertical discharge roof fan or bifurcated inline fan Inline outside air fan Ceiling fans not suitable in schools
Comms Spaces Solar Inverter cupboards, and AV cupboards	Thermostatically controlled MV exhaust or mechanical air conditioning	Inline or roof mounted exhaust fan or air conditioning
Amenities, Cleaners Stores	NV - if opening directly to the outside, MV exhaust - if opening to an undercover area, or an interior space	NV – permanent ventilation louvres, optional roof ventilators MV - Inline or roof mounted exhaust fans
Accessible Toilets / Showers	MV exhaust	Inline or roof mounted fan NV not suitable in schools
Laundries	MV exhaust	Inline or roof mounted fan Minimum 15 air changes per hour, interlocked with dryer operation via current switch on power supply, where available include ducted connection to dryer with removable lint trap
Store Spaces	NV, with permanent natural ventilation openings, openings must not compromise security	Louvres above doors, door grilles are suitable in schools only where the risk of damage is low Ventilation openings must not compromise security

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Wood Workshops	MM, Dust control system Permanent NV make up air openings with motorised dampers, Permanent NV make up air openings, c/w self-closing dampers	Inline outside air fan Dust extraction unit Dust filtration unit Ceiling fans not suitable in schools
Printer spaces	MV exhaust	Inline or roof mounted fan
Laboratories	MM, Fume cupboard exhaust, where fume cupboards are installed, Permanent NV make up air openings, c/w motorised dampers	Inline outside air fan Fume Cupboard PVC anti -corrosion centrifugal exhaust fan
Chemical Stores	MV exhaust	Inline or roof mounted exhaust fan
Ceramic Kiln Spaces	Dedicated downdraft corrosive fume exhaust, General space ventilation: NV or if not practical, MV exhaust	Downdraft exhaust - PVC anti -corrosion centrifugal exhaust fan General exhaust – inline or roof mounted fan
Metal Work and Welding	MM, Local bench mechanical exhaust points General MV exhaust Permanent NV make up air openings with motorised dampers	Inline outside air fan General exhaust – inline or roof mounted fan Welding / metal work hood high pressure exhaust fan supplied by hood supplier Ceiling fans not suitable in schools
Dark Rooms	MV exhaust, Filtered MV outside air	Inline or roof mounted exhaust fan Inline outside air fan
Laser Cutter	MV dedicated exhaust connected to laser cutter discharging to outside MV General exhaust if in a dedicated space 5 L/s / m^2	Dedicated exhaust – inline exhaust fan and ducting in accordance with manufacturer requirements General exhaust - Inline or roof mounted exhaust fan Laser cutters must be specified with their own inbuilt filtration for fume control and debris collection, and with dedicated exhaust outlets

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3D Printing	MV General exhaust if in a dedicated space 5 L/s / m^2	Inline or roof mounted exhaust fan 3D printers must be specified with their own inbuilt filtration for fume control and debris collection
Subfloor Ventilation	NV to current applicable regulation or if compliant NV openings cannot be achieved, provide a MV cross ventilation alternative solution sized at 6 air changes per hour	NV openings in accordance with NCC or for MV solution Inline or roof mounted fans

NV - Natural Ventilation

Preamble:

Natural ventilation is achieved through window, operable louvre, fixed louvre, and door natural ventilation openings to the outside. This section sets out the EFSG natural ventilation requirements.

Requirements:

- Naturally ventilated spaces may also require heating and air conditioning. For space heating and cooling requirements.
- For regularly occupied areas provide natural ventilation openings in accordance with AS 1668.4. Section 3.4. Provide effective openings for areas regularly occupied by students (all learning areas, libraries, and halls / gyms) equal to or greater than 6.25% of the floor area, and for all other areas provide at least 5%.
- Natural ventilation opening area is to be calculated as the effective ventilation area and not opening frame size. The calculated effective area must include the reduction in free area due to screens.
- For awning windows or similar, refer to the effective ventilation area calculation provided in Awning Window Area Calculation, and Figure 1 of this DTR.
- Natural ventilation openings must be:
  - Usable under all likely weather conditions
  - Not compromise security
  - Not create a potential fall risk
- The impact of natural ventilation openings on internal and external noise levels must comply with the project acoustic report, which may require mechanical ventilation instead of natural ventilation.
- Ensure that all permanent openings (eg louvres) have vermin mesh.
- For refurbishment projects of existing buildings where the proposed works do not include / allow for upgrades to the façade or operable windows the natural ventilation opening areas can be reduced to current applicable regulation as calculated based on opening frame size.

AWNING WINDOW

Note: The methodology for calculating the effective ventilation area for awning or similar windows (common on school projects) is provided. This is different from requirements of current applicable regulation which permits the window frame area to be used as the ventilation area.

- Effective ventilation area = Minimum of (Ar+2Atr) or As
- Rectangle Area: Ar = d x l

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- Triangle Area: $Atr = 0.25 \times d \times (4w^2-d^2)^{0.5}$
- Sash Area: $As = w \times l$

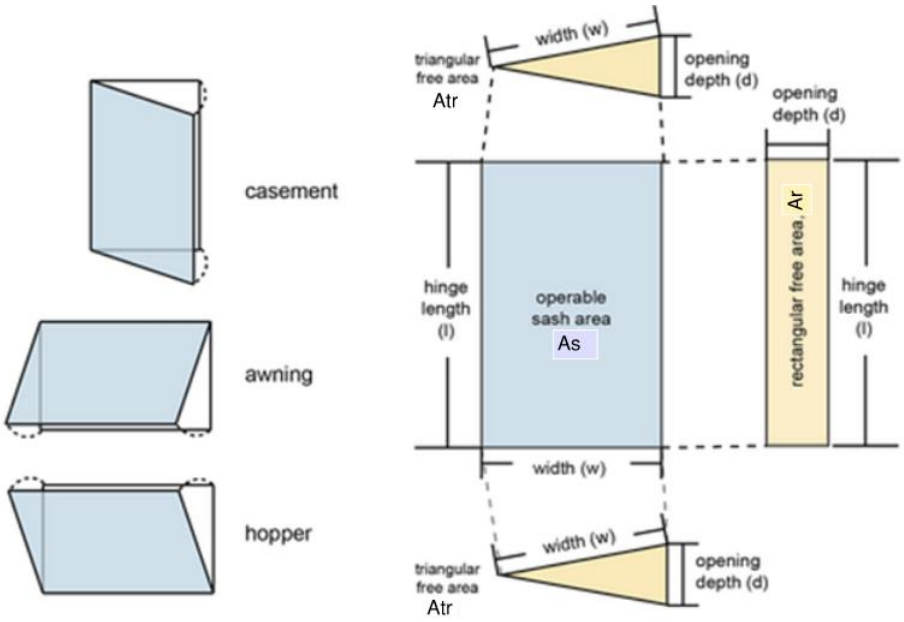


Figure 7.7.1 Awning Window Area

Window Ventilation Source: Transsolar KilmaEngineering

ENHANCED NATURAL VENTILATION STRATEGIES

This section is provided for information purposes to assist designers to optimise the effectiveness of natural ventilation openings. It is not a requirement.

- Designers should refer to CIBSE AM10 for guidance on natural ventilation design.
- Single-sided ventilation that relies solely on openings on one side of the space has a limiting depth for effective ventilation of typically 5.5m or 2 times the space height.
- Separating the openings sufficiently vertically can increase the effective depth to 2.5 times the space height.

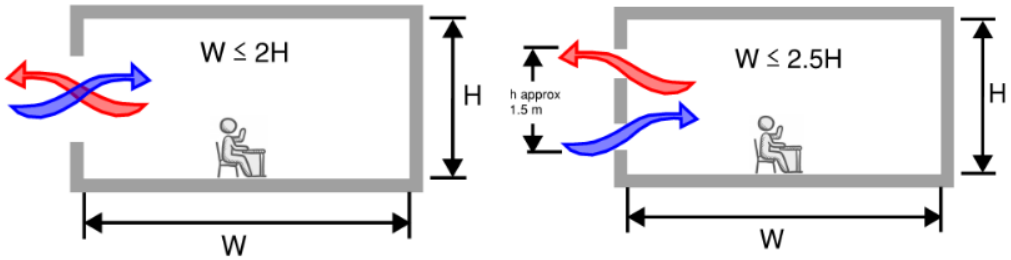


Figure 7.7.2 Single Sided Opening(s)

- Cross-ventilation occurs when there are ventilation openings on both sides of a space.
- Across the space there is a reduction in air quality as the air picks up local pollutants and heat, limiting the effective depth for ventilation to typically 15m or 5 times the space height.

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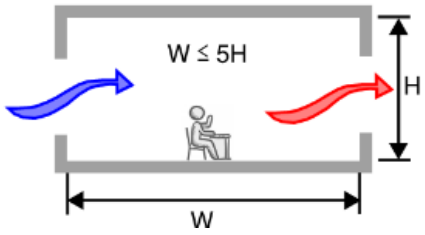


Figure 7.7.3 Cross Ventilation Openings

MV - Mechanical Ventilation

Preamble:

Mechanical ventilation involves the use of mechanical ventilation fans to ventilate a space either by providing outside air or exhaust air.

Student Space Requirements:

- for regularly occupied mechanically ventilated student spaces provide enough outdoor air to maintain carbon dioxide (CO_2) levels at or less than 800ppm
- for large intermittent occupancy spaces, ex halls, a transition time is acceptable, CO_2 levels are suitable in schools to rise up to 2000ppm during initial occupancy for 10 minutes, then must comply with CO_2 levels less than 800ppm.
- The mechanical designer must calculate the required outside air flow rate to maintain CO_2 below 800ppm based on ASHRAE 62.1 Appendix D, or another recognised standard.
- The calculated rate must not be greater than the AS1668.2 Appendix A rate plus 20%, otherwise, an energy recovery ventilator (ERV) must be provided in accordance with current applicable regulation.
- The AS1668.2 Appendix A minimum outside air ventilation rate for students up to 16 years of age is 12 L/s/person; the calculated rate to maintain CO_2 levels below 800 ppm must not exceed 14 L/s/person.

Administration Area Requirements:

- For refurbishment projects of existing buildings where the proposed works do not include / allow for upgrades to the mechanical ventilation systems, the mechanical outside air ventilation rates can be reduced to compliance with the current applicable regulation.
- Provide 50% extra outside air over the AS1668.2 effective outside air rates using high efficiency filtration.
- Provide high efficiency filters (F5 or greater).to lower the effective outside air rate.
- Employ AS1668.2 Appendix D4.5 to calculate a lower effective outside air rate.
- Apply the ESD 50% increase to the lower effective outside air rate; the final value must remain below AS1668.2 Appendix A plus 20% (10 L/s/person+20% = 12 L/s for office and administration areas).
- For refurbishment projects of existing buildings where the proposed works do not include / allow for upgrades to the mechanical ventilation systems, the mechanical outside air ventilation rate can be reduced to compliance with the current applicable regulation.

MM - Mixed Mode Ventilation

Preamble:

Mixed mode ventilation involves the use of natural ventilation to satisfy ventilation and internal thermal comfort conditions when outside conditions are suitable, and mechanical ventilation with air conditioning when conditions are not suitable.

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Mixed mode spaces are provided with both natural ventilation openings, and mechanical ventilation with air conditioning.

School occupants have the responsibility to action the use of natural ventilation or mechanical ventilation with air conditioning depending on the outside conditions; they must manually open / close windows, and push air conditioning on / off button.

Requirements:

- In natural ventilation mode - open windows, and manually turn off mechanical ventilation and air conditioning
- In air conditioning mode - close windows and turn on mechanical ventilation and air conditioning
- Outside conditions are suitable for natural ventilation when:
  - dry bulb temperatures are 18°C - 24°C
  - relative humidity is below 70%
- Specialised mixed mode controls for learning spaces and libraries are required.

7.7.3 Ventilation Fans

Requirements:

VENTILATION FANS

- All fans must be provided with speed controllers, or variable speed drives (VSD's) for balancing and controls.
- High efficiency EC motor fans must be provided where a selection is available for the required duty.
- Each installed ventilation fan system must achieve a 10% improvement over the efficiency listed in current applicable regulation.

ROOF VENTILATORS

- Wind powered (un-powered) roof ventilators are installed in schools to provide enhanced natural ventilation to spaces.

Table 7.7.3 Roof Ventilator Usage

Space	Requirement / Consideration
Halls and Gymnasiums	Required if high level clear storey operable windows / glazed louvres are not provided
Amenities Blocks and Cleaners Stores	Optional for NV areas

- Select ventilators to provide 6-7 air changes per hour, with a 6 °C temperature difference, and a 6 km/h wind factor.
- Locate near high points of roofs for maximum efficiency.
- Provide uniform spacing and sizing, optimum spacing is 6m between ventilators
- coordinate locations with the architect
- Provide complete with manufacturer mounting / transition base suitable for the roof
- Tested by an independent testing agent in compliance with AS2428.1 and AS2428.2 for resistance to leakage in wind driven ran and operation under wind load
- Must not be installed in locations where ventilators are under negative pressure.
- materials for roof ventilators and bases:

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  - Standard - galvanized steel
  - Where located within 5 km of the ocean or bays – marine grade aluminium
- Where installed in halls, gymnasiums or other conditioned spaces:
  - provide electric damper in base of roof ventilator
  - provide hinged removable core grilles connected to the bottom of the ventilator intake, mounted near the high points of the ceiling
  - damper access is to be via the removable core grilles
  - where the grilles are installed 3m or greater above the finished floor, scissor lift access is required for maintenance, ensure adequate clearance below for scissor lift
  - provide a wall mounted toggle switch labelled “Roof Ventilators”, “Summer-Open”, “Winter – Closed”

7.7.4 Ceiling Fans

Preamble:

Ceiling fans and wall fans for small spaces must be provided to aid in thermal comfort in occupied spaces.

7.7.5 Energy Recovery Ventilators

Preamble:

Energy Recovery Ventilators (ERV’s) incorporate outside air and relief air fans, an air-to-air heat exchanger, and filters. They pre-condition in-coming outside air by transferring heat to/from the outgoing exhaust air stream. In general, ERV’s are not a preferred option in schools. They increase plant spatial requirements, and capital cost.

Requirements:

- To maintain air conditioning / heating plant air on temperatures to within manufacturer limits as a result of high outside air rates, or extreme ambient temperature conditions.
- Current applicable regulation.

ERV’s must be provided with:

- Energy recovery air to air heat exchanger (sensible and latent)
- Minimum energy recovery efficiency of 75%
- Removable outside air and return air filters
- Access provisions in line with manufacturer requirements
- Interlocked with the operation of their respective air conditioning unit
- EC fan motors with speed controllers

7.7.6 Specialist Space Ventilation

Wood Workshop Dust Control

Preamble:

Woodwork dust must be controlled to maintain a safe environment.

Requirements:

Provide for all wood workshops a wood dust extraction system ducted to the woodwork machinery, and a wood dust filtration units hung at ceiling level.

The space heating and cooling system is independent of the duct control systems but must incorporate special provisions to prevent dust entrainment into the heating and cooling system. Refer to the Heating and Cooling DTR for details.

Wood Dust Extraction Systems

Preamble:

These systems transport fine air-borne wood particles from localised collection points at the woodwork machinery via specialised ducting to a dust extraction unit, where the wood particles are separated from the air and collected for disposal.

Requirements:

- Wood Dust Extraction Units:
  - Purpose built for wood dust extraction
  - Sized to an 85% usage diversity factor, must confirm for each project
  - Constructed from corrosion protected welded and bolted steel plates
  - Mounted on free standing frame
  - Automatic filter self-cleaning mechanism, shaker type is preferred
  - Explosion venting to NFPA 68 requirements
- Variable speed fan speed controlled by system pressure
- Unit must be equipped with bin type dust collector with robust sealing assembly.
- Provide spare dust collector
- Provide start/stop switch with running indicator light within workshop, and run on timer set to shut the system down after 45 minutes
- Wood Dust Extraction Unit Enclosure:
- Locate outside workshop to not impact footprint
  - Purpose built enclosure, approximate internal clear dimensions for planning purposes: 1800 mm (depth) x 3600 mm (wide) x 3500 mm (height), dimensions to be confirmed based on proposed plant.
- Enclosure double access doors to be minimum 1800 wide clear opening, and equal to the height of the machine, final dimensions to be confirmed at planning stage. Doors must be fully louvred.
- External enclosure with level floor and same level access to allow collectors to be wheeled in and out.
- Minimise distance between the enclosure and the workshop, recommend no greater than 10m.
- When locating the enclosure, consider acoustic implications both outside and inside the building
  - Acoustically treated to acoustic engineer's specifications
  - Vented to atmosphere via high and low level louvres in compliance with the unit manufacturer requirements
  - Weather protected
  - Secure and complete with entry door lock
- Wood Dust Extraction Ducting:
  - Designed in accordance with the ACGIH Industrial Ventilation Manual
  - All ducting must have a correctly fitted trailing earth electrical connection.
  - Provide explosion isolation flap valve in ducting between shop and dust extraction unit.

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  - Fixed extraction ductwork must be circular high pressure fully welded or modular with quick connect clamps pre-fabricated metal ductwork and fittings. PVC, ABS, PE and similar plastic pipes are not suitable in schools,
  - Flexible hoses must be made from an abrasion resistant, permanently anti-static, flame retardant urethane, and reinforced with steel wire-helix.
  - Size ducting at between 18-20 m/s
- Duct bends must have a minimum centreline radius of twice the duct diameter (>/=2D) to maintain efficient airflow and minimise pressure loss
  - Branch connections must not be shallower than 45 degrees
  - Transition angles must not be greater than 30 degrees
- Provide clean out panels or removable sections at all elbows, junctions, risers, and at least every 4 meters.
  - To reduce air pressure drop, co-ordinate the grouping of machines to provide a balanced layout to assist duct design and to eliminate unnecessary long ductwork.
  - Run ductwork clear of ceiling by a minimum of 50 mm
- Wood Dust Extraction Inlets:
  - Designed in accordance with the ACGIH Industrial Ventilation Manual
  - All inlets must be complete with sliding isolation gate
  - Size inlet ducting at 20 m/s
- Dust extraction must be provided for: wood bandsaws, edge sander/linishers, wood lathes, thicknessers, sanding machines, routers and table saws (arbor, drop saws, panel, SawStop), and as required by machine supplier.
- Hand Sanders must have dedicated dust collection bags, and are not to be connected to the dust extraction system.
- Hand sanders must be provided with flexible hose extraction connected to the duct extraction system, complete with a fixed sliding isolation gate
  - No dust extraction is required on buffers, drill presses or mortisers.
  - A single dust extraction point may be shared between a Disc Sander and Bandsaw; If shared, both units cannot be used at the same time. This approach must be confirmed at the planning stage.
- 2-off floor sweepouts with gates must be provided for each wood workshop
- Wood Dust Extraction Exhaust Rates:
  - For preliminary sizing purposes, typical exhaust rates are in the order of 350 L/s per machine
- Typical extraction rates are provided for reference, these dependent on the specific machine. The designer must confirm flows with the machine supplier.
- Wood bandsaws – 180 L/s
  - Edge sander / finisher – 208 L/s
- Wood lathe – 350 L/s
  - Thicknesser – 450 L/s
  - Sanding machines – 208 L/s
  - Routers and table saws – 210 L/s
- Provide permanent natural make up air provisions, complete with motorised dampers interlocked with the dust extraction system.

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- Coordinate slab to slab heights to accommodate dust extraction / filtration plant and ducting
- Wood dust extraction systems to serve only woodworking plant, do not connect other plant such as 3d printers to the system.

Wood Dust Filtration Units

Preamble:

Wood dust filtration units are required within wood workshop areas to remove general dust from the air. These units filter and recirculate air back to the space.

Requirements:

- Cassette type recirculating dust filtration unit
- Suspended from the ceiling within the space, in accordance with manufacturer installation instructions
  - Provided with wired wall mounted controls
- Sized to recirculate air at 10 air changes per hour
- Filtration efficiency 2 microns or better

Printer Spaces

Preamble:

Indoor air quality in paper printer and photo copier spaces is be maintained through the selection of modern photocopiers and printers (designed for low emissions) and mechanical ventilation.

Requirements:

- Remove the source of pollutants through equipment selection compliant with minimum emission standards.
  - RAL UZ 171:2012 Basic criteria for award of the Environmental Label – Office Equipment with Printing functions (Printers, Copiers, Multifunction devices)
  - ECMA-328 Determination of chemical emission rates from electronic equipment
  - GGPS.003 Green guard Indoor Air Quality (IAQ) Standard for Office Equipment (Hardcopy Devices)
- Where units are located within a dedicated space and not an open office area or corridor, provide mechanical exhaust ventilation directly to outside at 5 L/s / m^2.
- Single units located in open office space or corridors do not require mechanical exhaust ventilation.
- Locate the make-up air and exhaust grilles to achieve good cross flow ventilation, and to draw machine emissions away from users.
- The exhaust ventilation system must run continuously during normal operating hours, and be interlocked with space occupancy complete with a 1-hour run on timer outside of normal operating hours.
- For existing installations where low emission photo copiers and printers compliant with the above noted emission standards are not provided, increase the exhaust ventilation rate is to 15 air changes per hour.

Fume Cupboards

Preamble:

Single and double sided fume cupboards are provided to protect operators from chemicals and contaminants in high school laboratories.

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Requirements:

System design must comply with AS 2243.8.

- UPVC chamber anti corrosion construction
- Laboratory grade high pressure laminate work base with anti-spill lip
- Vertical sliding sash
- Aerodynamic back baffles
- Integral LED lighting 400 LUX or greater
- Ducted exhaust, recirculating type not acceptable
- Variable exhaust flow to maintain constant air velocity across sash
- Located clear of space openings and corners as required by AS2243.8

EXHAUST DUCTING

- Round uPVC anti corrosion ducting only
- Round uPVC ducting is non-compliant with the AS4254.2 flame and smoke spread criteria, will require a fire engineering solution.
- Provide separate exhaust duct for each fume cupboard.
- Minimise horizontal duct runs
- Size ducting to the greater of 1 Pa/m maximum pressure drop, or 5 m/s maximum air velocity
- Discharge vertically on roof in compliance with AS2243.8 and AS1668.2, and ASHRAE 62.1.

EXHAUST FANS

- uPVC anti corrosion construction
- motor outside of airstream,
- centrifugal fans are preferred
- fan must be mounted outside near the discharge point, system ducting to be negatively pressurised
- fans are to be supplied by fume cupboard supplier
- must be complete with a permanently plumbed and trapped drain connected to the lowest point of the fan casing for disposal of condensate, rainwater, and system cleaning chemicals.
- Variable speed operation to maintain constant velocity across the sash, and interlocked with fume cupboard operation / sash position.
- Sized to achieve maximum operating capacity plus 20%

OTHER

- Provide permanent natural make up air provisions, complete with motorised dampers interlocked with the exhaust fans.
- Ceiling fans, supply / exhaust grilles, or air conditioning units must be at least 3m away from the fume cupboard face, and not impact the airflow pattern at the fume cupboard sash.

Chemical Stores

Requirements:

- Must be continuously mechanically exhausted at a rate of 15 air changes per hour.
  - Provide cross flow ventilation, locate exhaust grilles at back of the space, and make up air openings near the space entry.

  - Provide ceiling level and low level exhaust grilles (underside at 150 above finished floor)
- The exhaust fan must be mounted outside and be vertical discharge type.

Ceramic Kiln Spaces

Preamble:

Ceramic kilns generate significant heat and discharge corrosive fumes. Careful consideration is needed for the kiln space and its associated ventilation design.

Requirements:

- Provide a downdraft ventilation system for removal of corrosive fumes for all kilns independent of if the space is naturally or mechanically ventilated.
- All new kilns must have down draft ventilation
- Downdraft ventilation system to be provided by kiln supplier complete with ventilation fan
  - Duct the downdraft ventilation discharge to the roof, c/w vertical discharge in compliance with AS1668.2, and ASHRAE 62.1.
  - Provide round uPVC anti corrosion ducting
  - Round uPVC ducting is non-compliant with the AS4254.2 flame and smoke spread criteria, will require a fire engineering solution
  - Interlock the downdraft ventilation fan with kiln firing operation
- Kiln spaces are to be naturally ventilated. To naturally ventilate the kiln space the following must be provided.
  - Provide full height (floor to underside of soffit) louvred or mesh wall on minimum two opposite sides of the kiln space directly to the outside.
  - Louvre or mesh minimum free area 10% of the floor area.
  - Ceiling must be smooth without obstructions to trap hot air
  - Minimum floor to underside of ceiling / soffit 2700mm
  - The louvred or mesh walls must not relieve air to passageways or normally occupied spaces, and not be near natural or mechanical ventilation intake openings.
- If the above natural ventilation provisions cannot be provided, general mechanical exhaust ventilation must be provided:
  - Provide general space exhaust for heat rejection, and permanent make up air openings
  - Discharge to the roof level, in compliance with AS1668.2 un-objectionable exhaust discharge, and ASHRAE 62.1.
  - Exhaust rate sized to maintain space temperature below 27 °C
  - Provide high level exhaust grilles located minimum 2m away in plan from kiln. Do not locate immediately above the kiln.
  - Provide standard galvanised sheet metal ducting and fan
- Exhaust fan control to include interlock with kiln operation via current switch, manual on switch, 30 minute run on timer, and local running indicator light.

Metal Work and Welding

Preamble:

Hot metal work, welding, and grinding produce fumes which must be controlled to maintain a safe indoor environment.

Requirements:

- Provide a metal workshop general exhaust sized at 5 L/s / m2, and controlled by a wall mounted switch, with running indicator light and 1-4 hour run on timer.
  - Provide local articulating exhaust hoods / arms for: welding, brazing, cutting, heat treatment, soldering, and grinding designed in accordance with the ACGIH Industrial Ventilation Manual.
  - Local articulating exhaust hoods/ arms must be fully movable / flexible proprietary built individual hoods / arms. It must be possible to pull the extraction point to any desired location on the bench and have it remain in place.
- Multiple hoods / arms may be grouped together (up to 6-off) to a common extraction system to optimise plant size and cost.
  - Welding hoods must have a dedicated exhaust system and must not be grouped with hoods for other activities.
  - Provide specialist exhaust fans, selected and supplied by the hood supplier, and complete with demand-based speed control.
  - Exhaust ducting must be high-pressure stainless-steel ducting, with vertical discharge away from occupiable areas, and in compliance with AS1668.2, and ASHRAE 62.1.
  - Each extraction system must be activated / deactivated via a manual pushbutton with adjustable 1-2hr run on timer, and indicator light in a prominent location within the workshop.
  - An indicator light, indicating that a hood is active must be provided above each bench.
- Provide permanent natural make up air provisions, complete with motorised dampers interlocked with the exhaust fans.

Dark Rooms

Preamble:

Dark Rooms require mechanical ventilation, heating and cooling.

Requirements:

- Provide mechanical exhaust at 15 air changes per hour, consisting of 150 L/s bench top exhaust, and the remainder via ceiling level exhaust grilles.
- Provide bench top side draw exhaust slotted hood underside at 150mm above the work surface, draw fumes away from users, and size for an air velocity of 10 m/s at the face.
- G4 Filtered mechanical - make up air must be provided.
- The exhaust system is to discharge vertically in compliance with AS1668.2, and ASHRAE 62.1.
- All internal duct and plenum surfaces visible through grilles, or hoods must be finished black.
- All mechanical penetrations into the space must be sealed and arranged to not permit light to enter.
- Exhaust fan control by on /off switch with 1-3 hour adjustable run on timer, located in the space. When activated, the fan runs at the full design airflow, otherwise it operates at half speed continuously.

7.7.7 Bushfire Operation

Preamble:

Current applicable regulation sets out bushfire tenability requirements for school buildings. The mechanical portion of the tenability consists of mechanical cooling and ventilation. This section sets out typical ventilation requirements. Typical measures needed for compliance are provided; it remains the responsibility of the designer to provide a fully compliant design.

Requirement:

All impacted buildings must:

- Comply with current applicable regulation.
- Provide AS3959 compliant bushfire mesh for permanent building ventilation openings
- Provide a smoke sensors and motorized dampers for all mechanical air intakes
- Provide non return dampers in all mechanical exhaust systems
- Provide manual master bushfire mode switch for each school building, or a master site switch
- Once smoke is sensed in one outside air intake, or the master switch is activated the building is to enter bushfire mode: all bushfire motorized dampers are to close, all outside air ventilation fans are to stop, and all exhaust ventilation fans are to stop (except where required for current applicable regulation smoke control provisions).
- If building decanting to a dedicated area is included in the design, safe CO_2 build up limits within the occupied spaces must be considered over the duration of a bushfire event. This could limit the bushfire occupancy to certain spaces.

7.7.8 Electrical Requirements

Requirements:

- Mechanical Services Switchboard (MSSB) must have a minimum 2B segregation, and an IP Rating of 43 for indoor MSSB's and 56 for outdoor MSSB's.
- MSSB's are to be mounted inside the building where practical. If they cannot be mounted inside, they must be provided with weather protection overhang roof.
- MSSB's must comply with AS/NZS 61439.
- MSSB's must be provided with a lamp test switch, and where fire trips are implemented, a fire trip indicator light.
- Mechanical equipment fire trips must be provided in compliance with the current applicable regulation. Where fire trips are required, MSSB's must include all relevant relays to implement the fire trip.
- MSSB's must include provisions for mechanical controls.
- Mechanical electrical and controls wiring must comply with AS 3000.
- All mechanical equipment must be provided with local isolator switches
- The electrical trade is to provide submain power supplies for all MSSB's complete with metering.
- Table below outlines the required power supplies for standard mechanical ventilation plant.

Table 7.7.4 Mechanical Electrical Connections

Space	Power Supply	Manual / Off / Auto	Run / Fault Indicator Lights
Outside Air Ventilation Fans	MSSB	Yes	Yes
Minor Single Phase Exhaust Fans less than 200 L/s	MSSB if available, otherwise from Electrical DB	Yes, if powered from MSSB, otherwise No	Yes, if powered from MSSB, otherwise No
Other Exhaust Fans	MSSB	Yes	Yes

Wood Dust Extraction	MSSB	Yes	Yes
Wood Dust Filtration	From Electrical DB	No	No

7.8 Heating and Cooling

7.8.1 General

Preamble:

Mechanical system designs must integrate the heating and cooling, ventilation and sustainability strategies within the EFSG.

Requirements:

- Provide a fully integrated solution with the ventilation design.
- Be coordinated with the project acoustic design.
- Have detailed heat load calculations using appropriate modelling software such as Camel or Carrier must be conducted to size heating and cooling plant.
- Must not employ gas fired, or other fossil fuel based heating.
  - An exception may be proposed only if no other practical option exists.
  - In such cases, a formal departure request must be submitted and approved in writing by the Senior Project Director or equivalent Project Lead prior to proceeding.
  - Any approved fossil fuel heating scheme must comply with current applicable regulation.
- Where existing heating or cooling plant is modified, remove existing gas heating infrastructure and replace it with a heating system in compliance with this section. Include provision to cap off / remove gas and make good building works.
- Water based cooling towers and evaporative coolers are not suitable in schools. Where refurbishment works do not involve modification of existing evaporative coolers they may remain. If they require relocation or significant work, they must be removed and replaced with heating and cooling systems in compliance with this section.
- Have safe, accessible servicing provisions for mechanical equipment.
- All new and existing ductwork systems modified as part of the project work must be cleaned prior to occupation in accordance with AS/NZS 3666.2, and standard industry practice.
- Where habitable rooms are mixed mode (both naturally and mechanically ventilation present) the space must at a minimum meet the requirements of AS1668.4 and the mechanical ventilation system must be designed so that if the CO2 levels within the spaces increase above 800ppm for a period of 10 minutes or more the system must bring the CO2 level down to 700ppm. The system design for this to occur whether windows/louvres are open or not, and only operate when the space is occupied.
- All new and modified mechanical systems must be fully commissioned prior to handover.
  - Heating and cooling systems for heritage buildings must be designed with care and a clear understanding of a building's heritage requirements. Seek coordination from the Senior Project Director or equivalent Project Lead to consult with DoE Heritage.
  - For heritage buildings, plant must not be located on the frontage area, significant building elevations, or in window openings.

- Where air conditioning condensers are to be provided for heritage buildings, they must be grouped together in location(s) approved suitable in writing by the Senior Project Director or equivalent Project Lead in consultation with the DoE Heritage Team, and their quantity must be minimised by employing multi-head systems where practical.
- All indoor and outdoor air conditioning unit locations must be approved by the Senior Project Director or equivalent Project Lead in consultation with the DoE Heritage Team.

7.8.2 Design Conditions

Requirements:

Heat load calculations for the purpose of sizing heating and cooling plant must incorporate the following design conditions:

- Summer external design temperature: The external summer design temperature must be the average peak temperature, based on the most recent and accurate climatic data available from a recognised source e.g. AIRAH, and the Bureau of Meteorological data for the location of the proposed project. Designers must review the latest available data and calculate the average peak temperature, excluding the 10 highest temperatures as detailed AIRAH DA09 methodology for establishing design temperatures.
- Winter external design conditions must be based on the most recent AIRAH DA09 data.
- Space internal design temperatures in cooling mode: 24°C+/- 1°C, in heating mode: 21°C+/- 1°C. Sizing must be based on the upper limit of the range for cooling, and the lower limit for heating.
- Comms spaces, cooling only 23°C+1°C
- Outdoor ventilation rates are to comply with requirements within the EFSG and current applicable regulation.
  - Occupancy rates must be based on the design occupancy for each space. Refer to Section 3.1.5 Occupancy Numbers. Where design occupancies are not listed, they must be based on the indicated seating plan, or if that is not available, the occupancy data per unit area provided in AS1668.2 Table A1.
  - 10% safety factor to be incorporated into the calculations.

7.8.3 Heating and Cooling by Space Type

Requirements:

Table 7.8.1 Heating and Air Conditioning by Space

NV=Natural Ventilation **MV**=Mechanical Ventilation **MM**=Mixed Mode Ventilation

Space	Heating	Cooling / Air Conditioning	Plant
Permanent Learning Spaces, and Libraries	Yes	Yes / MM	VRF/VRV concealed ducted fan coil
Small withdrawal / group learning spaces	Yes	Yes / MM	Air grille from main learning space ducted fan coil unit No direct control proposed for this space
Circulation Areas	No	No	N/A Considered as transient spaces

Halls and Gymnasiums	Yes	No	Electric radiant heating
Offices, Staff, and Administration areas	Yes	Yes	VRF/VRV wall mounted or cassette fan coil Where windows for NV are not available, provide MV with concealed ducted fan coil units
Sick Bays / Clinics	Yes	Yes	VRF/VRV or individual split wall mounted or compact cassette fan coil Life safety item – refrigerant concentration must comply with AS 5149
Canteens	Yes	Yes	Single split cassette fan coil
Hospitality and Food Tech	Yes	Yes / MM	VRF/VRV concealed ducted fan coil
Comms Spaces Solar Inverter cupboards, and AV cupboards	No	Yes	Single split wall mounted fan coil, or thermostatically controlled MV exhaust Provide cooling only air conditioning where internal cooling loads exceed 1.5 kW sensible, or the outdoor design condition exceeds 35C, otherwise consider MV exhaust for heat rejection
Amenities	No	No	N/A
Accessible Toilets / Showers	Yes	No	Electric heat lamp switch activated with timer
Laundries	No	No	N/A
Store Spaces	No	No	N/A
Wood Workshops	Yes	Yes / MM	VRF/VRV concealed ducted fan coil Locate return air grille away from dust producing plant, provide removable pre filter in return air grille plenum box
Printer Spaces	Yes	Yes	VRF/VRV or split wall mounted fan coil
Laboratories	Yes	Yes / MM	VRF/VRV concealed ducted fan coil
Chemical Stores	No	No	N/A
Ceramic Kiln Spaces	No	No	N/A

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Metal Work and Welding	Yes	Yes / MM	VRF/VRV concealed ducted fan coil
Dark Rooms	Yes	Yes	Single split compact cassette fan coil Wall controller must be located outside of space

7.8.4 Equipment

Preamble:

Mechanical heating and cooling systems are to be selected based on project-specific requirements including capacity, sustainability, and acoustics.

Common system types used in school infrastructure projects are outlined below. Alternative systems may be proposed but must be supported by a whole-of-life cycle cost analysis.

Requirements:

- Heating and cooling systems must be rated by the manufacturer to operate under full load conditions from -10°C to 46°C.
- For interior spaces in heritage buildings, compact wall mounted units are to be used.

Variable Refrigerant Flow / Volume (VRF/VRV)

Requirements:

VRF/VRV systems use central air-cooled condensers to serve multiple indoor fan coil units. Two types are available:

Heat Recovery:

- increased efficiency, waste heat from indoor units operating in cooling mode is applied to units operating in heating, and vice versa.
- allows simultaneous heating and cooling operation from indoor units connected to a common condenser

Heat Pump:

- indoor units connected to the same condenser must operate in the same heating or cooling mode, simultaneous operation in different modes Is not supported.
- requires one indoor fan coil to be nominated as the master unit to set the heating and cooling mode for others.
- provides a cost savings over heat recovery systems
- suitable only for areas with similar load conditions and operating schedules, for example an open space library with multiple fan coil units

Fan Coil Options:

- Includes concealed ducted, ceiling cassette, wall-mounted, bulkhead, floor mounted, and under-ceiling units.

Applications:

- Buildings with total cooling loads up to ~1 MW. For higher loads, provide chilled water / heating water system.

Requirements:

The following must be provided for VRF/VRV system design:

- For capacities of 65 kWr and below achieve a 10% improvement over MEPS, and for capacities greater than 65 kWr a 10% improvement over the minimum energy efficiency ratios in current applicable regulation.
- Specify high-quality systems from reputable manufacturers with local support and warranties.
- VRF/VRV systems must be heat recovery type, except as noted below.
- Heat pump systems may be employed for: large open spaces with multiple fan coils, small spaces with similar exposure and usage, where reduced refrigerant charge is needed for AS 5149 compliance, and instances where the distance between the indoor fan coil and condenser is too large for a single split DX system.
- Heat recovery systems must be provided with sufficient branch control boxes to ensure effective zoning.
- Outdoor air temperature for condenser sizing, project design DB temperature + 5°C, to a maximum of 46°C.
- Apply a 10% safety factor to system sizing.
- Systems must operate up to 46°C DB.
- Each fan coil must serve a single space/space, with the exception of small withdrawal / group learning spaces which may be served by the associated general learning space fan coil system
- For coastal sites (<5 km from coast), provide special purpose corrosion-resistant coil coating
- Minimise refrigerant pipe runs; account for performance derating.
- Use acceptable refrigerants (e.g., R410A, R32) and use low-GWP alternatives where feasible. Preference is to be given to refrigerants that can be more easily replaced with low GWP options in the future.
- Design refrigerant concentrations to avoid the need for monitoring and comply with AS/NZS 5149.1. R32, and other low GWP refrigerants are more restricted under this standard due to their increased flammability.
- Pressure and vacuum test all refrigerant systems to manufacturer requirements before system charging.
- Condenser locations must comply with the following:
  - the air conditioning manufacturer clearance requirements
  - for configurations not covered in the manufacturer literature, the manufacturer must provide CFD modelling to confirm adequate heat rejection.
  - meet manufacturer ventilation requirements
  - have safe service access, including minimum 1000mm clear for egress pathways
  - Where condensers enclosures are roof mounted, include provision to transport heavy gas bottles to the roof, preferred options permanent stairs, or lift, a drop down ladder alone is not sufficient.
  - isolated from building users by their location or a purpose built non climbable plant enclosure
  - located to not cause disturbance to building occupants acoustically, or due to heated discharge airflow
  - aesthetics must be considered; plant cannot be installed in locations that will negatively impact building frontage
  - for heritage buildings, condenser enclosures must be approved suitable in writing by the Senior Project Director or equivalent Project Lead in consultation with the DoE Heritage Team.

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- Installations in low ambient temperature areas with winter design temperatures below 0°C (example: alpine zones) must consider the following:
  - Expected indoor fan coil air on temperature, electric duct heaters may be needed to pre-heat the outside air
  - System defrost mode - the indoor fan coil units will automatically shut down periodically when in defrost mode
  - risk of freezing of outdoor condenser condensate discharge, condensate piping must be well graded, insulated, and not discharge to non-permeable surfaces. May require electric heat tracing.

Single Split DX Systems

Preamble:

Single split DX air conditioning systems consist of a single indoor fan coil unit connected to a single air cooled outdoor condenser. Indoor fan coil units can be wall mounted type, ceiling cassette units, concealed ducted units, and under ceiling units. Reverse cycle systems provide both heating and cooling options.

The refrigerant piping distance between the indoor fan coil unit and outdoor condenser is typically limited to between 20 to 30m. This forces condensers to be located near the indoor fan coil unit.

Single split systems, in particular wall mounted fan coils, provide a cost effective option for air conditioning small spaces, and back of house areas.

Applications:

Where mechanical air conditioning and heating is needed for small spaces, such as comms spaces, and small offices.

Requirements:

- Inverter type systems
- Reverse cycle operation, except for cooling only application such as comms spaces
- The same as for VRF/VRV systems, refer to the previous section.

Electric Radiant Heaters

Preamble:

Radiant style heating is suitable for spaces where only heating is to be provided (no mechanical air conditioning).

This option is fully electric.

Heat is delivered directly to occupants, rather than heating the air in the space. This makes them especially effective for high ceiling areas.

Current applicable regulation limits electric radiant heating installed capacity.

Requirements:

Electric radiant heating must be:

- wall or ceiling mounted with heater manufacturer supplied mounting brackets
- fitted with low glare reflectors to minimise light output
- heater exterior body to be corrosion resistant extruded aluminium
- mounted at the height, spacing, and with the service clearance nominated by the heater manufacturer

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- mounted in locations, and with appropriate manufacturer supplied impact guards, to eliminate the risk of building occupant accidental contact with hot surfaces, and impact damage
- provided with manufacturer supplied proprietary controls to allow variable control of heater output, and scheduling
- heater capacity and installation must be compliant with current applicable regulation.

Other Systems

Preamble:

Potential alternative mechanical heating and cooling systems are presented for the designer's consideration. This is not an exhaustive list.

Where the alternatives to the typical systems are proposed, the designer must provide the Senior Project Director or equivalent Project Lead with justification for the proposed alternative, and a whole of life cycle analysis cost comparison of the proposed alternative relative to the relevant typical systems.

- **Air cooled simultaneous cooling / heating chillers** – produce chilled water for cooling and heating water for building heating, may be suitable when building cooling load exceeds 1MW
  - Increased complexity over VRF/VRV requires a higher level of mechanical contractor, increased building maintenance, and a building management system (BMS) for controls
  - Chillers must achieve a 10% improvement over the energy efficiency ratios and integrated part load efficiency ratios in NCC 2022 Section J6D11, until NCC 2025 takes effect.
- **Cooling Towers –** water based evaporative cooling towers must not be used.
- **Pumps -** each installed pump must achieve a 10% improvement over the energy efficiency index listed in NCC 2022 Section J6D8, until NCC 2025 takes effect, and comply with NCC 2025 Section J once it takes effect.
- **Air cooled packaged units** – are suitable for large standalone spaces where the cooling load exceeds 40 kW
  - may require economy cycle operation for NCC section J compliance.
  - For capacities of 65 kWr and below achieve a 10% improvement over MEPS, and for capacities greater than 65 kWr a 10% improvement over the minimum energy efficiency ratios in NCC 2022 Section J6D12 until NCC 2025 takes effect, and comply with NCC 2025 Section J once it takes effect
- **Electric duct heaters** - could be employed in situations where it is necessary to pre-condition outside air
  - the design capacity must comply with the NCC Section J,
  - a pressure differential switch must be provided in the ducting to prove airflow prior to activating the electric duct heater,
  - the associated ventilation fan must continue to run until the heater cools following the shutdown of the heater.
- **Hydronic radiant heating** - consists of either floor mounted radiant heaters, or in floor radiant heating, suitable for areas with heating only requirements. Underfloor should not be installed under timber floors due to risk heat damage to flooring
- **Electric heating lamps** - must only be provided for small areas where localised heating is required. The design capacity must comply with current applicable regulation.

7.8.5 Controls

Preamble:

The mechanical controls must be suitable for controlling the mechanical equipment. This includes controls for mechanical ventilation systems noted in the EFSG.

Requirements:

- Control systems must consist of a combination of proprietary air conditioning controls, and third party control systems
- Control systems must be wall mounted control panels or temperature or CO_2 sensors must be installed with their centres at 1500mm above the finished floor level, and coordinated with other switching within the space.
- Control panels will typically be located near space entries and grouped with light switching. Temperature and CO2 sensors must be located in the space to reasonably reflect the actual space temperature and indoor air quality (CO2), be readily accessible for maintenance, and have provision for recalibration post installation.
- Sensors must be wall or column mounted, not on the ceiling.
- Temperature sensors must not be mounted in locations exposed to direct sunlight.
- CO2 sensors must be mounted away from windows and doors.

Outside enthalpy sensors must be mounted at high level, and in a location not impacted to direct sunlight or radiant effect from adjacent building fabric.

Temperature sensors must have an accuracy of +/- 0.3°C over a temperature range of 18°C to 25°C, and not require re-calibration for at least 12 months.

CO2 sensors must have a sampling range of 0-2000 ppm, an accuracy of +/-5%, and not require re-calibration for at least 12 months.

Where vandal proof enclosures are provided for sensors, they must be tamperproof lockable cages that allow airflow, and do not interfere with the sensor operation.

- A Building Management System (BMS) is not required for school projects with some exceptions.

Permanent Learning Spaces and Libraries

Preamble:

This section sets out the mixed mode control strategy for permanent learning spaces, libraries, hospitality and food tech, student workshops, and labs.

Requirements:

- Provide a custom built third party wall mounted controller for each space to control the air conditioning and monitor the CO_2. It must include:
  - Engraved brushed stainless steel facia 145mm x 145mm
  - A manual on/off push button
  - LED indicator lights with cone bezel
  - Green light to highlight to occupants when conditions are suitable to open windows and doors to utilise natural ventilation (18°C - 24°C and below 70% RH), as sensed by a building outdoor enthalpy sensor.
  - Blue light to highlight to occupants when the air-conditioning is operating.
  - Yellow light to highlight to occupants when CO_2 levels within the space are above the acceptable threshold (800 PPM)

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  - The lights and on/off button are to be clearly labelled with a metal engraved plate as follows: On / off button - “Air Conditioning On / Off”, Green light: “Outdoor Conditions Favourable Open windows turn AC off”, Blue light: “
    Air Conditioning Operating, close windows”, Yellow light: “CO_2 Level high open windows or turn on the AC”.
- Controls must be properly labelled and suitably located in the space (preferably near the light switch)
- For VRF/VRV and single split DX systems:
  - proprietary wired air conditioning controllers for servicing and commissioning purposes are to be installed within the ceiling void, mounted adjacent to the fan coil and accessed via a ceiling access panel.
  - A VRF/VRV proprietary central air conditioning controller for central override of the building air conditioning systems must be provided in a secure area.
  - The VRF/VRV central controller must have full secure online access. A comms point must be provided adjacent to the controller to implement online access.
- Once air conditioning is activated via the manual on / off switch within the space it are to continue to run until it is either shut off at the switch or the space is un-occupied for a period of 30 minutes as proven by occupancy sensors within the space. For cases such as designated computer spaces with constant internal heat gain, the occupancy interlock can be disabled, and units will run based on the on/off button and a time schedule.
- The outside air ventilation fan must start when its respective air conditioning fan coil is called to start. The system must maintain CO_2 levels below 800 ppm. Once activated, the fan must run at half speed. Should the CO_2 level rise above 750 ppm for a period of 5 minutes, the fan speed is to increase to provide the maximum commissioned outside air rate. Once the CO_2 level drops below 750 ppm for a period of 5 mins, the fan is to return to half speed.

Other Air Conditioned Spaces

Preamble:

For other air conditioned spaces including offices, staff and administration areas, sickbays, canteens, comms spaces, printer spaces, and Dark Rooms EFSG 3rd party controllers as required for permanent learning spaces and libraries are not required.

Requirements:

The following minimum requirements must be provided:

- Provide a local wired wall mounted air conditioning controller for each fan coil. Do not provide wireless remote controllers. It is acceptable for a single controller to serve multiple fan coils within the same space.
- For VRF/VRV and DX split systems provide proprietary controllers interfaced with the VRF/VRV central controller.
- In general air conditioning during normal school hours must be manually activated / deactivated by the local controller. It must automatically shut down at the end of normal business hours. If the air conditioning is activated outside of normal business hours it must shut down automatically after 1 hour (adjustable) operation.
- Comms space and Dark Room air conditioning is to run continuously.

School Halls and Gymnasiums

Preamble:

Halls and gymnasiums are naturally ventilated with electric radiant heating.

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Requirements

School hall and gymnasium heating controls must include:

- A wired proprietary or 3rd party wall mounted controller with the following features:
  - On/off, temperature setpoint, and scheduling control
  - Code lockout provision
  - Impact protected
  - Space temperature sensing
- Where halls and gymnasiums are provided with large roller shutter doors which do not meet the current applicable regulation, requirements for automatically closing doors to conditioned spaces. A performance solution with reed switches to automatically shut down the heating may be required. The mechanical designer must review this with the certifier.
- Should the hall or gymnasium require mechanical ventilation, CO_2 control is required: Provide a custom built third party wall mounted on/off switch with running indicator light to control the ventilation system. The system must maintain CO_2 levels below 800 ppm. Once activated the fan should run at half speed. Should the CO_2 level rise above 750 ppm for a period of 5 minutes, the fan speed is to increase to provide the maximum commissioned outside air rate. Once the CO_2 level drops below 750 ppm for a period of 5 mins, the fan is to return to half speed.
- The ventilation fan must be provided with a 3 hour (adjustable) run on timer for auto shut down.
- Controls must be properly labelled and suitably located in the space (preferably near the light switch).
- For high level relief (roof ventilators or operable windows / louvres, provide a wall mounted toggle switch labelled “High Level Ventilation”, “Summer-Open”, “Winter – Closed.

7.8.6 Building Management System

Preamble:

A Building Management System (BMS) is a comprehensive tool to control and monitor building operation. It provides automatic controls, scheduling, monitoring, alarms, and operating trends for building services. Building services integrated into a BMS include:

MECHANICAL SERVICES

- Energy management system (EMS) – takes inputs from electricity and water metres

SMART / INTELLIGENT LIGHTING CONTROL

- Security system
- PV inverters
- Hydraulics services
- Lifts
- Fire services

BMS functionality can be further augmented by smart applications which analyse data gathered by the BMS and employ it to optimise building performance. Examples include using ambient temperature conditions and building AC data to optimise building startup timing, comparing actual building energy usage to benchmarked values and providing notification when performance is outside of expected norms, and using historical servicing data to provide automatic notification of future servicing requirements.

Requirements:

A BMS is not required for school projects. Exceptions where a BMS must be installed are:

- where chilled water / heating water air conditioning systems are provided
- there is a mandate to integrate the different building services and energy monitoring into one platform
- there is a requirement for a global control / monitoring scheme for multiple sites or buildings
- to provide enhanced energy efficiency through optimisation of building operation

Where provided a BMS must include:

- An open source protocol, that allows multiple BMS providers to supply and service the BMS
- control of the mechanical systems
- its own locally hosted BMS with a global or cloud interface for global integration between sites, and backup
  - standalone control on each site that is independent of internet / online access, sites can continue to operate should internet connectivity be lost
- full security protected online remote access for control and monitoring
  - different levels of access for different users ranging from monitoring only, the ability to make minor changes to setpoints, to full control and editing access
- A simple intuitive user interface
- provision for trend logs and alarms
  - An EMS to monitor electricity and water meters
  - Interface to monitor and control the smart / intelligent lighting control
- Interface to the security system
  - Interface to monitor the PV inverters
  - Interface to monitor and control Hydraulics services
  - Interface to monitor and control Lifts
  - The designer must provide a high level brief of the proposed system for review at SD phase.

7.8.7 Bushfire Operation

Preamble:

Current applicable regulation sets out bushfire tenability requirements for school buildings. The mechanical portion of the tenability consists of mechanical cooling and ventilation. This section sets out typical cooling requirements.

Typical measures needed for compliance are provided; it remains the responsibility of the designer to provide a fully compliant design.

Requirement:

All impacted buildings are to:

- Comply with current applicable regulation.
- Confirm internal tenability thermal performance compliance with the NCC Specification 43 by CFD modelling incorporating bushfire data from the bushfire consultant, building envelope information, and the mechanical air conditioning system design. CFD modelling must be prepared by a specialist consultant, typically separate to the mechanical consultant.
- Mechanical air conditioning condensers and heat rejection plant must be located such that their exposure to bushfire is minimised.

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7.8.8 Electrical Requirements

Requirements:

- For Mechanical Services Switchboard (MSSB) details refer to Electrical Requirements for Ventilation.
- Mechanical electrical and controls wiring must comply with AS 3000.
- All mechanical equipment must be provided with local isolator switches
- The electrical trade is to provide submain power supplies for all MSSB's complete with metering.
- Table below outlines the required power supplies for standard mechanical heating and cooling equipment.

Table 7.8.2 Mechanical Equipment Electrical Connections

Space	Power Supply	Manual / Off / Auto	Run / Fault Indicator Lights
VRF/VRV Condensers Ducted Air Conditioning Fan Coils	MSSB	No	Yes
VRF/VRV Ducted Air Conditioning Fan Coils	MSSB	No	No
VRF/VRV Ceiling Cassette and Wall Mounted Fan Coils	MSSB	No	No
Non Ducted Single Split DX Condensers	MSSB if available, otherwise from Electrical DB	No	No
Non Ducted Single Split DX Fan Coils	Wired from Condenser	No	No
Ducted Single Split DX Condensers	MSSB	No	Yes
Ducted Single Split DX Fan Coils	Wired from Condenser	No	No
Electric Radiant Heating	MSSB	Yes	Yes
Air Cooled Packaged Units	MSSB	Yes	Yes

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7.9 Hydraulic Services

7.9.1 Wastewater

Preamble:

General compliance with National Construction Code (NCC), relevant Australian Standards (AS), and local authority requirements. Education specific requirements include drainage systems for all associated pipework and services to remove and dispose of sanitary waste.

Requirements:

Provide for the following wastewater services within schools.

- Waste water drainage
- Trade Waste Solution
- Pumping solutions where required
- Be readily accessible and serviceable, allowing for efficient maintenance with minimal disruption to school operations.
- Stack-work/elevated drainage is to be provided with cleaning access at each level. Provide access panels at all clear-out/inspection locations where located in ceilings, walls or boxed out.
- Avoid the design/installation of externally exposed wastewater pipework. Where unavoidable, route pipes through secondary spaces and enclose within cupboards/risers.
- Requirements of the Geotechnical Report, to confirm items such as:
  - Soil reactivity: Use of swivel joints to meet reactivity classification
  - Filled ground: Structural lintel supports provided with approval from a Structural Engineer.
- Safety shower floor wastes: A floor waste are to be provided underneath each safety eyewash shower to prevent flooding and for testing.
- All new underground drainage systems are to be CCTV inspected and provided following installation, along with a digital report to the Senior Project Director or equivalent Project Lead.
- Mechanical Tundishes: Tundishes are to be located as required to drain condensate water from equipment. Tundishes are to drain into the riser of a continuously charged sewer waste pipe trap or to garden beds. Where a trap is provided in the system including a waterless trap, an access panel are to be installed directly in front for maintenance purposes of the trap.
- Plant Room drainage: Provide coordinated Floor Wastes to drain plant spaces containing mechanical drainage. Locate adjacent to equipment.
  For external plant rooms where rainwater can enter the drains, these are to be connected to the stormwater system with overflows provided.
- Trade waste: Include appropriate trade waste treatment systems to ensure compliance with the local regulations and minimise the environmental impact.
- All pipe work is to be accessible for cleaning and maintenance purposes. All Inspection openings along the main lines, on all branch lines directly after the junction and prior to extending under a building are to be raised to the surface level.
- Where the pipe is located below concrete, paved areas, bitumen or any hard surface areas, clear-outs are to be extended to the finished surface level with vandal-proof metallic covers installed. These are to meet the load ratings for the surface.
- Where located in soft scaping, clear-outs are to be protected with concrete surrounds at the surface level to prevent mechanical damage.

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7.9.2 On-Site Wastewater

Preamble:

In areas where a connection for discharge to an authority sewer service is unavailable (unsewered area), an on-site wastewater treatment system will be required. Early engagement with the local authority is to be made.

Requirement:

The design and location of the onsite wastewater treatment system are to comply with the following:

- Locate a minimum of 50 meters from any active student areas such as learning spaces, playgrounds, lunch areas and main student thoroughfares.
- The plant must be appropriately located and secured to prevent unauthorised access by students, including the provision of tamper-proof fixings and lockable access points.
- Prevailing winds are to be considered to avoid odours drifting toward school facilities.
- Where irrigation is proposed, it is to be sub-surface and installed to non-trafficable areas.
- A wastewater management report is to be provided for the wastewater treatment plant for review and approval in writing by the Senior Project Director or equivalent Project Lead.

Note: The design of the Wastewater Treatment system is to be via either a Septic tank or Aerated Wastewater System (AWTS) as deemed most suitable for the site constraints and provided within a Wastewater management report (where required by the relevant authority) for approval by the Senior Project Director or equivalent Project Lead. As a minimum, compliance is to be achieved with current applicable regulation.

7.9.3 Pumped Wastewater Systems

Preamble:

Pumps are to only be used for the disposal of effluents where there are no other options and where disposal to gravity is not possible.

Requirements:

- Pump storage: Pumped drainage is to be designed with a minimum of 3 days storage to allow for contractors to attend for maintenance. Consultation and signoff in accordance with the Senior Project Director or equivalent Project Lead is required to be made to confirm if additional storage is to be supplied where a pumped system is required.
- Pump-sets: Dual submersible grinder pumps are to be provided in a duty-standby arrangement. These are to be provided on a guide rail system.
- Alarms: Pump stations are to be provided with visual and audible alarms to alert when pump failure occurs and maintenance is required.
- Remote notification: Pump failure and high level alarms are to trigger a remote notification function via SIM card to notify dedicated Facilities Maintenance (FM) staff and the School Infrastructure Call Centre of the issue to be investigated.
- Pump stations are to be located in areas suitable for ease of maintenance where a vehicle can access
- Pump stations are not to be located in an area where opening the pit lid will disrupt learning. Eg do not locate within a Main Entry or a main courtyard.

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7.9.4 Trade Waste

Preamble:

The information provided within this section relates to the use of specialised areas within the school that may generate trade waste. These details are to accompany all applications submitted to the relevant local authority for approval to discharge into the sewer infrastructure system.

Requirements:

Trade waste pre-treatment devices are to include the following:

- Designed capacity of the arrestor
- Estimated maximum discharge rate per hour and per day.
- Average daily discharge volume

NOTE: For Agricultural developments, consultation with the local trade waste authority is required to confirm any site specific requirements.

Table 7.9.1 Trade Waste by Space Type*

Space Type	Spaces	Trade Waste
Specialist Learning Hubs	Science Laboratory, Science Preparation, Apparatus Store Space, Chemical Store Space, Botany/Zoology Space	TW 1
Visual Arts Learning Hub	General Learning Space, Visual Arts Workshop,	TW 2
	Dark Room	TW 5
Special Education Learning Unit IO/IS/P (HS)	Shared Practical Activities Area - IO/IS/P	TW 2
Special Education Learning Unit - BD/CD/ED (HS)	Multipurpose Space - BD/CD/ED	TW 2
Wood + Metal Technology Learning Hub	Shared Outdoor Covered Workshop, Outdoor Covered Workshop	TW 6
Gymnasium + Canteen	Canteen	TW 4
	Canteen Office/Store	TW 4
HS Food + Textiles Learning Hub	General Learning Space, Domestic Kitchen, Semi Commercial Kitchen	TW 3

TW1 - Science Laboratories

Requirements:

Dilution pits are to be provided for the Science laboratories.

- A dilution pit is to be installed and positioned between the acid-resisting branch line and the main sewer line
- Waste systems are to be acid-resistant, consisting of HDPE piping/fittings with electrofusion welded joints

The main acids commonly used are typically received in the following concentrations:

Table 7.9.2 Dilution Pits Concentrations of Acids*

Acid	Percentage
Hydrochloric	32%
Sulphuric	98%
Nitric	70%

Note: The dilution for use in laboratory experiments is around 5-10% (1-2 molar concentrations), and approximately 500 – 1000 ml per practical period, which is up to 20 times per laboratory. The number of laboratory experiments are to be confirmed with the school before submitting the application to the authority. The size of the pit is to be calculated based on 14 litres per single or double water point throughout.

TW2 - Visual Arts

Requirements:

Plaster arrestors are to be installed in high school art spaces where clay-based activities are conducted to ensure proper waste material disposal.

The table below lists the clays used in schools:

Table 7.9.3 Clay Used in Schools*

Clay	Percentage
Terra-cotta	80%
Stoneware	20%

The table below lists the chemicals contained in Terra-cotta

Table 7.9.4 Chemicals Contained in Terra-cotta*

Chemical contains	Percentage
Iron (oxides)	80%
Aluminium silicates	20%
Non-toxic pigments	variable

TW3 - TAS Mat 1 – Kitchens

Preamble:

A Grease arrestor, bucket trap floor wastes and in sink arrestors are to be provided for the kitchens where the preparation and cooking of hot food is carried out.

Requirements:

- Grease arrestors are to be sized to the local Authorities requirements with a minimum of 1000L capacity to be provided.
- Lids are to meet the load rating of the surface area
- Water is to grade away from the lid to prevent unauthorised entry of rainwater
- Grease arrestors are to be located in areas suitable for ease of maintenance where a vehicle can access.
- In floor and in sink basket arrestors are to be provided to meet the local authority requirements

Note: Generally, a cooking class typically accommodate 18 to 25 students, and a typical 10-class session has 2 periods/classes of cooking and one period/class for demonstration per week. A minimum 1000L grease arrestor is to be provided with final calculations and meals prepared to be confirmed to determine if a larger capacity is required by the local authority.

TW4 - Canteen Food Service Unit

Requirements:

A grease arrestor, bucket trap floor wastes and in sink arrestors are to be provided for the Canteen where the preparation and cooking of hot food is carried out.

- Grease arrestors are to be sized to the local Authorities requirements with a minimum of 1000L capacity to be provided where deemed to be required.
- Lids are to meet the load rating of the surface area
- Water is to grade away from the lid to prevent unauthorised entry of rainwater
- Grease arrestors are to be located in areas away from students and accessible for vehicle access to undertake maintenance.
- In floor and in sink basket arrestors are to be provided to meet the local authority requirements

NOTE: Canteens are determined on a case-by-case basis by the local authority. Depending on what food is prepared, cooked and provided within the canteen will determine the requirements for each specific project. Determine what food preparation activities will be undertaken within the canteen and liaise with the relevant authority to confirm if a grease arrestor is required.

TW5 - Dark Room

Requirements:

A Dilution pit is to be provided for the film processing.

- Dilution pits are to be sized to the local Authorities requirements with a minimum of 500L capacity to be provided. Larger dilution pits may be required pending the daily usage and via consultation and approval with the local trade waste authority.

The two most common chemicals will be:

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- Fixer (Boric acid) - diluted for use 1-4
- Developer (Bromide developer) - diluted for use 1- 8.

Note: Waste solutions will have been diluted first for use within the class and again via the dilution pit upon disposal. Disposal volumes are typically not more than 2-3 litres of diluted chemicals discharged per week. Waste solutions will have been diluted first for use within the class and again via the dilution pit upon disposal

TW6 - Outdoor Covered Workshop Unit

Requirements:

- Drainage is to be provided to the Bucket sink.
- An in-sink basket arrestor is to be provided to the drainage outlet.

7.9.5 Equipment Life-Cycle Calculation

Preamble:

For new schools, and when replacing or updating sewer pump stations or wastewater treatment equipment, a simple life-cycle cost analysis is to be conducted.

Requirements:

When assessing the total cost of ownership, the following factors are to be included in the calculation:

- Initial Capital Cost: The purchase and installation cost of the asset.
- Operational Costs: Estimated costs of water, power, or other resources each year.
- Maintenance and Servicing Costs: Required maintenance frequency, nature of servicing, and associated costs.
- Provide for each year over a 10 year period including plant replacement at end of life.

7.9.6 Water

Preamble:

The water system requirements for school facilities consists of the following:

- Cold and heated water services
- Water storage or break tanks
- Hot water plant
- Warm water temperature control
- Pumping solution
- Authority recycled water services (where available)

Beyond the mandatory requirements of current applicable regulation, the completed system is to also comply with local authority requirements.

Requirements:

- All authority meters and valves, including potable cold water, fire water and recycled water, are to be provided in accordance with the local authorities' requirements. This are to be contained within a dedicated locked enclosure with 003 lock or as required by the local Authority.

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- Isolation valves are to be installed adjacent to the potable cold water meter and backflow device, on both the inlet and outlet sides.
- Vandal Resistance:
  - Avoid and minimise the design/installation of externally exposed pipework.
  - All external valves and equipment must be enclosed within vandal-proof and lockable enclosures.
  - Use key-operated vandal-proof hose taps throughout. Provide 1 x key per hose tap.
- Isolation valves are to be installed at all main branch off-takes serving each wet area and be readily accessible via access panels or lockable wall boxes 1500mm AFGL.
- Water service pipes are not to be embedded or cast into concrete structures.
- Each building's incoming supply pipe must have an isolation valve installed: Where installed below ground: Install brass quarter-turn isolation valves within a cast iron path box at finished surface level.
- Where installed above ground: Install brass lockable ball valves.
- Where flexible hoses are installed, they must remain fully accessible for maintenance and must not be concealed such as within wall cavities.
- Isolation valves (mini cistern taps or similar) must be installed to isolate the supply side to any flexible hose.
- Where connections to fixtures are external to fixture such as a cistern, they are to be hard-piped (chrome plated copper).
- Flexible hose connections are to not be used unless integrated within the fixture such as a flexible hose connected to a sink tap body.

GROUND WATER

- Connect ground water (bore water) supply in remote or drought-affected areas, where rainwater is the main source of water supply and no authority reticulation mains supply is available.
- An application must be submitted to the Department of Climate Change, Energy, the Environment and Water (DCCEW) to assess the feasibility for connecting to potential groundwater/bore-water systems.
- The ground water supply (bore water) is to be used to supply the sites irrigation and Toilet flushing requirements.

Note: Where approved, the system is to comply with current applicable regulation to be designed and constructed with water storage and filtration to meet the above requirements.

AUTHORITIES RECYCLED WATER SUPPLY

Applicable where an authority recycled water main is available for site connection, in addition to an authority potable water supply

- A separate approval is to be made to the Senior Project Director or equivalent Project Lead prior to commencement of any work.
- Recycled water is to be installed and used for the sites rainwater reuse system top-up, supplying irrigation and Toilet flushing only.
- Lilac piping and recycled water signage are to be installed to all outlets.

7.9.7 Water Supply Materials

Requirements:

- All materials proposed for use are to be issued for approval to the Senior Project Director or equivalent Project Lead and fully supported by local Australian warranties.
- All underground potable main water supply must be either:
- Type B copper tube with silver soldered or pressed fittings with polyethylene wrapping and marker tape located a minimum 150mm above, or
- Polyethylene (PE) electrofusion welded pipe/fittings coloured with stripes for service identification, and with continuous marker tape embedded with trace wire installed 150mm above the pipe.
- All above-ground water supply installations are to be installed as follows:
  - Main lines 40mm and larger:
- Type B Copper tube with silver soldered or pressed fittings.
  - Main lines and rough-ins to wet areas 32mm and smaller:
- Type B Copper with silver soldered or pressed fittings, or
  - Cross-linked polyethylene (PEX) pipe and fittings.
- Cross-linked polyethylene (PEX) systems must be either compression sleeve or copper crimp type.
- Circulated hot water flow and return pipe systems:
  - All piping for main lines (flow and return), and a minimum of 500mm from any branch off-take, are to be installed in Type B copper with silver-soldered or pressed fittings, and be fully insulated with 32mm insulation. Extension may then be via Copper or PEX.
- PEX systems with fittings consisting of push fit, screwed compression or clamped systems are to not be installed.
- PEX systems are to be warranted to withstand 60°C continuously for 24hours, 7 days per week.

Note: Confirmation are to be supplied with appropriate warranties confirming the above. Hot water piping that is unable to meet this requirement are to not be used.

As heated water can have detrimental effects on PEX piping and with many differing brands and suppliers on the market, this ensures the materials installed are fit for purpose and longevity.

7.9.8 Metering

Requirements:

- Where a new water supply is installed or the supply is upgraded to any refurbished building, private water meters are to be installed for the following:
  - For each building
  - For each major plant supply (hot water plant, rainwater reuse backup, mechanical water supply, as required to meet the sustainability requirements for the project).
- All water meters are to support pulse metering and be connected to the Energy Monitoring System (EMS) or Building Management System (BMS) where installed within a school.

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NOTE: Where existing buildings do not have an EMS or BMS system, the meters are to be installed with pulse metering ability so that they may be connected in the future.

7.9.9 Pumping

Preamble:

In areas where the water pressure from the authority main is insufficient to meet the minimum requirement of 150 kPa at the probable simultaneous flow rate for the development or building, or where on-site water storage or break tanks are provided, a water pressure boosting pump-set are to be provided.

Requirements:

- Pump set: As a minimum, dual pumps are to be provided in a duty-standby, variable speed arrangement.
- Alarms: Pump stations are to be provided with indicators to alert when a pump failure occurs and maintenance is required.
- The pump control panel are to be connected to the site's EMS/BMS system (where installed) to advise on run or failure and energy usage. If no BMS/EMS system is installed, the control panel are to be capable for future connection.
- Locations: The Pump-set are to be in a weatherproof enclosure and located to comply with the acoustic report.

7.9.10 Potable Water Tanks

Preamble:

Potable water tanks are to be installed where the flow from authority water mains is insufficient and/or where tanks are mandated as a requirement by the Authority.

The installation and use must comply with the local authority's requirements and NSW Health's requirements for water safety and quality.

Requirements:

- Suitable tanks for drinking water include above-ground zincalume and polyethylene tanks, with a preference for polyethylene due to its versatility for both above and below ground installations.

Tanks must comply with AS/NZS 4020 – Products for use in contact with drinking water.

Note: Copper pipes must not be connected to galvanised, zincalume or Aquaplate lined water tanks or where corrosive soils or water are present. If copper outlet pipes are involved, there must be at least 2 metres of stainless-steel or PE pipe between the tank and copper piping.

- Tanks are to not exceed a height of 2.4m from ground level.
- An overflow is to be provided and connected to the site's stormwater system.
- Mosquito proofing is to be provided for the tanks, particularly inlets and overflows, which require fine mesh.
- Cover all tanks with tight-fitting lids to keep out birds and animals, which can introduce contaminants, and to exclude sunlight, which can degrade the liner and encourage the growth of algae.
- Above-ground tanks are to be installed on a concrete plinth with a minimum depth of 200mm and 600mm clearance around.
    - Tanks are to not be installed over or immediately adjacent to a water or sewer main.

— Tanks are to be located behind the front building alignment.
— Tanks are to be located at least 500mm from any property boundary.
— Confirmation on the water quality is to be obtained and suitable filtration installed.

Note: Locate tanks in accessible but shady positions to reduce the effects of the heat and away from trees from which leaves and debris could clog the strainer or contaminate the water.

Confirmation that the tanks comply with AS/NZS 4020 – Products for use in contact with drinking water are to be provided. Obtain manufacturers' written certification for all tanks, certifying that all coating materials used inside the reservoir are suitable for drinking water and obtain a guarantee against liner leakage for a period of 20 years.

7.9.11 Hot Water

Requirements:

- Heat pump units are the preferred energy source to minimise energy consumption.
- All hot water storage heaters are to be installed with a copper safety waste tray connected to a drain and installed on a poly-slab to allow water to flow below to the drainage outlet.
- Storage hot water heaters are to not be installed in habitable areas. They are to be contained within cupboards, plant spaces or externally with protection to prevent unauthorised access.
- All valves and fittings are to be fully insulated at the hot water plant to prevent loss of heat.
- Hot water heaters are to not be mounted at High Level, for health and safety. They are to be installed at the finished surface level.

Note: For all refurbishment projects: if the work of work includes domestic hot water systems, they are to avoid, or replace at the end of life, the use of gas-fire or of other fossil fuel based water heating systems

Table 7.9.5 Hot Water Unit Sizing Guide

2 No of Showers	Delivery 50oC in 10 min	75 Recovery L/Hr
2	100 L	75
3-4	180	180
5-7	280	300
8-10	400	500
11-13	550	670
14-20	750	1000
21-30	1000	1200

Hot Water Circulating Pumps

Preamble:

Hot water return/circulating pumps are to be provided where the hot water service pipework includes extended runs, to ensure prompt delivery and minimise heat loss.

Requirements:

- Pump set: Dual pumps are to be provided in a duty-standby arrangement via a control panel.
- The control panel are to be connected to the buildings EMS/BMS system if supplied OR be provided with capacity for future connection.
- Alarms: Pump stations are to be provided with audible alarms to alert when a pump failure occurs and maintenance is required.
- The temperature differential between the outgoing supply from the heater and the circulated return water back into the heater are to not exceed 5° C.

Thermostatic Mixing Valves

Preamble:

Thermostatic Mixing Valves (TMV's) in schools are required where warm or hot water is provided to areas accessible by children or other at-risk users.

TMV's regulate the water temperature to meet the temperature requirements as nominated within current applicable regulation to ensure scalding is prevented.

Requirements:

- TMVs are to be set to a maximum 45 degrees Celsius to any outlet for use by students (basins, showers, wash areas, student kitchens, science labs).
- TMV's are to be set to a maximum 50 degrees Celsius to any sanitary outlet for use by staff (basins, showers).

NOTE: Kitchen areas and cleaners sinks not accessible by students may be supplied at 60 degrees Celsius

- TMVs are to comply with current applicable regulation, and are to only be altered by a trained and authorised person.
- TMVs are to be sized to serve all fixtures simultaneously.
- TMVs are to be located a maximum of 6m from the outlet.
- The TMV must include a hot water flush facility.
- Location: Thermostatic mixing valves are to be located:
  - Enclosed within a proprietary lockable stainless-steel enclosure/box, complete with stainless steel brackets and fasteners, recessed into a wall and inaccessible to students.
  - Installed below joinery where doors are installed with locks.
- Mounting heights for TMVs are to be 1200mm to the bottom of the valve box or located underneath joinery in a fully accessible location for maintenance.

Note: Comply with microbe disinfection requirements - "Code of Practice for Thermostatic Mixing Valves NSW" as approved by the NSW Health Department.

Tempering Valves are not to be installed on any School Infrastructure project.

Note: TMVs offer more precise temperature control (within +/- 1 degree) and respond faster to temperature changes. Tempering valves are less accurate (within +/- 3 degrees) and slower to respond and thus, are not to be used.

7.9.12 Gutters and Downpipes

Preamble:

The stormwater system within a school facility includes gutters, downpipes, drainage, rainwater reuse and connection to the Open Space stormwater collection system.

NOTE: All designs are to use the most recent Bureau of Meteorology (BOM) data for the Annual Rainfall Intensities (ARI) to provide resilience in design and compliance at time of design, above and beyond the tables contained within AS3500 to exceed industry best practice.

Requirements:

- The roof drainage system is to be designed using gravity principles to comply with the following:
- The maximum catchment area for each downpipe are not to be greater than 100m^2, per the limitations within current applicable regulation.
- A performance solution are to be provided for any scenario greater than 100m^2.
- Siphonic roof drainage systems are to not be provided for the roof drainage in any scenario.

NOTE: Seek coordination from the Senior Project Director or equivalent Project Lead to consult with DoE Heritage for review of roof water systems, including layout, upsizing and materials for Heritage Schools.

Gutters:

Requirements:

- Only eaves gutters are to be used on schools.
- When a higher roof drains to a lower roof, detail and locate the spreader to avoid the concentration of water.
- Roof guttering must be outside the line of the external walls.
- The outer gutter edge of any eaves gutter is to be lower than the back edge to allow the overflow to occur over the front/outer edge of the gutter and to avoid blockage back-flows into the buildings.
- All overflows must be outside the envelope of the external walls.
- Allow for expansion and contraction of all rainwater goods.
- Provide removable metal leaf guards where buildings are located within 20 metres of any tree, whether existing or proposed.
- All leaf guards must be removable and easily reinstalled for maintenance and cleaning.
- Where leaf guards are not installed, ball domes must be installed at the downpipe locations.

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- Box gutters are to not be designed in any scenario, except where already present on heritage buildings.
- Concealed gutters behind parapet walls are not suitable in schools, except where already present on heritage buildings.
- Eaves gutters that overflow via the rear (behind brackets) or via slotted front overflows are to not be used.
- In locations where gutters are installed at a low height and subject to interference located within trafficable pedestrian areas, additional brackets are to be provided. Where a gutter is installed less than 3000mm above the adjacent ground level, the number of brackets are to be increased by 50%.
- Internal fitting gutter brackets must not be used as these lead to additional blockages.

Notes: Gutter size are to be calculated based on the AS3500.3 requirements. The use of valley gutters is to be minimised. Where used, the valley gutter is to be designed to the requirements of current applicable regulation.

Downpipes

Requirements:

- Downpipes are to be round to provide greater flow capacity and require less maintenance.
  - PVC downpipes are to only be installed for charged systems. They are to be sewer grade, with priming fluid and glue (solvent cement) installed.
- Downpipe sizes are to be calculated by the methods within current applicable regulation. A performance solution is to be provided where this is exceeded for review and approval in writing by the Senior Project Director or equivalent Project Lead.
  - Downpipes are not to connect directly into stormwater pipes, but have the bottom splayed 30 Degrees with the lowest edge closest to the supporting column or wall and finishing above the pipe collar (with an external sliding sleeve extending down to the grate) for cleaning access.
- Grates associated with downpipes must be secured with fixings to prevent unauthorised removal. Pipe collars are to be surrounded by concrete to prevent mechanical damage. These are to avoid possible splashing or flooding of surrounding areas by providing a 300mm diameter dish, min 50mm deep around the grate.
- Downpipe must be circular, except where required on existing heritage buildings containing rectangular/square downpipes.
- Acceptable downpipe materials are zincalume (colorbond), Upvc (charged systems only).
- Where zincalume steel downpipes are used, they must be a minimum of 1mm thick.
  - Where PVC downpipes are used on charged systems, they must be a minimum of 100mm sewer grade.
  - Copper downpipes may only be used for the replacement of existing heritage downpipes. Copper downpipes must not be specified for new buildings.
- Protection for light-gauge downpipe material is required below 2100mm Above Finished Floor Level with a metal guard of minimum 1.6mm thickness, independently fixed where downpipes are accessible.
- Fix downpipes hard against the wall or column if possible. Where downpipes are supported by cleats off columns or walls, the gap between the downpipe and supporting element poses a risk

of entrapment. Refer to the Safety DTR for acceptable gap sizing to mitigate against entrapment risks or include a metal guard as noted above.

- Fix Astragals of similar material at a maximum of 1800mm centres to downpipes in addition to supports.
- Locate downpipes away from vehicular routes or provide protection with bollards.
- Downpipes must be fixed at the top and bottom of each storey of the building.

NOTE: This excludes charged downpipes connected to rainwater tanks, which are a closed system. See the rainwater reuse section below.

- Square or rectangular downpipes are not to be used on school buildings (except where heritage compliance mandates this).
- Downpipes must not be recessed into brickwork in school buildings.
- Internal downpipes must not be provided in school buildings.
- Downpipes must not be cast in concrete or hidden in the construction fabric of school buildings.

7.9.13 Gutters and Downpipes for Heritage Buildings

Requirements:

- Match downpipe material, shape and colour to existing historic downpipes wherever possible. Round profile downpipes are preferred.
- Copper and galvanised downpipes are suitable for use for Heritage Buildings. PVC downpipes are not to be used for Heritage Buildings.
- Downpipes are to direct the collected water into the stormwater drainage system. Where no stormwater system exists, they are to be kicked out at the bottom above the ground to ensure water does not collect at the building base.
- Upsizing of gutter and downpipe systems to accommodate climate change is to be considered at the time of repair of roof water systems, in consultation with DoE Heritage

7.9.14 Stormwater Components

Requirements:

- Pits and chambers are to be either pre-cast concrete or cast-in-place concrete, complete with lids to meet the trafficable class rating.
- Pit lids are to enable lifting by specialist equipment and be compliant with OHandS requirements.
- Pit lids are to be lockable to prevent unauthorised access.
- Pit lids are to be non-slip and heelproof.
- Trench drain grates are to be lockable to prevent unauthorised access.
- Trench drain grates are to be non-slip and heelproof.
- Open elevated walkways and areas subject to wind driven rain: Where elevated walkways and areas are uncovered and open to rain or subject to wind driven rain, rainwater drainage outlets are to be installed to collect rainwater and disperse it via downpipes to the civil stormwater network.
- Overflows are to be designed off the edge of the balcony/walkway to external.

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NOTE: A performance solution may be submitted to the Senior Project Director or equivalent Project Lead for approval to fall the water over the surface to the external edge of the balcony to the external stormwater network. These solutions are to be restricted to a rise of 3 storeys to avoid waterfall effects from levels above.

- Threshold drains: Are to be provided at doorways where the required set-down from internal to external areas is not achieved.

NOTE: A performance solution may be provided to achieve compliance for Waterproofing and drainage where threshold drains are not installed.

- Overflows: Are to be provided under the balustrade. Rectangle hole section overflows or breaks in the hobs are to be provided where balustrades do not permit water to pass underneath.
- Stormwater pump stations are to only be installed if a gravity solution is not achievable and as a last resort.
- Where installed, stormwater pump-sets are to be installed as follows:
- Pump-sets: Dual pumps are to be provided in a duty-standby arrangement These are to be provided on a guide rail system.
- Alarms: Pump stations are to be provided with visual and audible alarms to alert when pump failure occurs and maintenance is required.
- Remote notification: Pump failure and high level alarms are to trigger a remote notification function via SIM card to notify dedicated Facilities Maintenance (FM) staff and School Infrastructure Call Centre of the issue to be investigated.
- Pump stations are to be located in areas suitable for ease of maintenance where a vehicle can access.
- Pump stations are not to be located in an area where opening the pit lid will disrupt learning. Eg do not locate within a Main Entry or a main courtyard.

7.9.15 Rainwater Tanks

Preamble:

Roof water harvesting and storage are to be included in all new school projects and refurbished school projects, to reduce the demand on drinking water supplies.

Requirements:

Rainwater tank sizing is to meet the requirements of current applicable regulation. The final tank volume is then to be confirmed via the local weather rainfall using data from the Bureau of Meteorology, the roof water collection area and the expected water usage. (The size of the tank is to reduce the potable water demand by at least 15% using the Green Star Potable Water Calculator (based on the local rainfall data).

- Suitable tanks for rainwater storage are zincalume/colorbond or polyethylene for above-ground tanks and polyethylene tank or reinforced concrete for below-ground tanks.
- Provide all tanks with mosquito proofing, particularly inlets which require fine mesh.
- For charged systems, a maintenance pit must be installed at the low point of the system to flush out the line.

- Install first-flush diverters prior to rainwater drainage into the rainwater tank. This are to be sized to meet the local authority/council's requirements or 0.5litres/m2 of roof area, should a minimum volume not be specified.
- First flush diverters are to be vandal proof and located out of student accessible areas or provided within a cage to prevent unauthorised access.
- Locate tanks to allow easy connection to the roof drainage system and avoid blocking windows, inhibiting pedestrian circulation, and student supervision.
- Tanks are to be located with separation of approx. 125mm from the building, where located adjacent to allow for cleaning between but not allow students to hide.
- Direct tank overflow into the civil stormwater system; the size of the overflow pipe are to be the same as the rainwater inlet pipe.
- Water sample points: Provide water sample points on the inlet and outlet sides of all rainwater tanks for water quality monitoring.

Note: Generally, the larger the tanks, the more effective it is in conserving water and reducing stormwater run-off, providing the roof harvest area is large enough and the location for rainfall is sufficient to replenish it.
Water tanks are to be sited in discreet locations. Within heritage schools must be sited away from significant view lines. Seek coordination from the Senior Project Director or equivalent Project Lead to consult with DoE Heritage.

7.9.16 Rainwater Reuse

Requirements:

Rainwater reuse is to be supplied within new and school upgrades (where appropriate) and is to comply with the following:

- A rainwater connection and/or taps are to be extended to locations as nominated by the irrigation consultant and provided for connection to the irrigation system for the adjacent landscape/garden areas. The irrigation system is to be designed and installed by the irrigation consultant/contractor.
- Rainwater reuse systems are to be designed and installed to provide flushing for Toilets and Urinals.
- Pump-set: A dual pump-set are to be provided for the rainwater reuse system.
- Alarms: Pumps are to be provided with audible alarms, connected to a control panel to alert when a pump failure occurs and maintenance is required.
- The control panel are to be connected to the buildings EMS/BMS system if supplied OR be provided with capacity for future connection.
- Enclosure: The pump and filtration system are to be contained within a weatherproof, lockable enclosure to prevent unauthorised access and located in compliance with the Acoustic requirements of the project.

Filtration systems are to meet the following minimum requirements:

- Water sample points: Provide water sample points on the inlet and outlet sides of all filtration plant, for water quality monitoring.

For Irrigation and Toilet flushing the following are required:

- A packaged 2-stage filtration system are to be provided. The system are to include:

  - Dual duty/standby self-cleaning screen backwash filters with pressure differential and timer control.
  - Inline Cartridge filter, filtering water to 50 microns.
  - Installed with an automatic changeover solenoid valve with suitable backflow protection connected to the potable mains water/bore water or recycled water supply when the rainwater tank is empty or pumps fail.\

Where stored rainwater is the only available water source:

- A packaged 4-stage filtration system are to be provided. The system are to include:
  - Dual duty/standby self-cleaning screen backwash filters with pressure differential and timer control.
  - Inline cartridge filter.
  - Inline carbon filter (to remove colour within the water and prevent staining of fixtures).
  - Water is to be filtered down to 50 microns.
  - Ultra-violet disinfection (health risk minimisation – to reduce microbial risks).
  - Separate piping is to be extended to irrigation and Toilet flushing if backed up with Bore or Recycled water sources. These are to be installed with an automatic changeover solenoid valve with RPZD backflow protection when the rainwater tank is empty.

NOTE: The water quality is to be reviewed on each specific project where used for potable consumption and is to comply with current applicable regulation.

7.9.17 Gas

Preamble:

The NSW Net Zero Government Operations Policy 2025 (Net Zero GO Policy) requires that all new buildings with estimated development costs above $10 million must be all-electric. This includes:

- Electrification of science labs (electrical Bunsen burners).
- Electrification of Food Technology and VET kitchens (induction cooktops).

This transition future-proofs school facilities, improves indoor air quality, and reduces both upfront and ongoing energy costs.

Interim Provision: (Projects under $10 million not subject to Greenstar requirements)

Pending full electrification by 2035, limited bottled LPG gas may be installed in specific learning spaces (science labs, VET kitchens, and workshops) where required for curriculum delivery.

The design of all facilities must allow for future transition to 100% electrification, including provision of sufficient electrical capacity to replace gas appliances and removal of gas reticulation.

Transition to Electric

- All designs must:
  - Size electrical loading to allow removal of LPG appliances by 2035.
  - Ensure gas reticulation can be capped off and decommissioned.

Provide layouts and services compatible with all-electric operation. to 1 turret on science lab demonstration bench in each science lab to carry out experiments. The gas to the turret is bottled LPG that is stored external to the building. The 50% gas cooktops being from bottled LPG that is stored external to the building. To future proof the VET kitchens, the electrical loading for the

kitchens is to be sized to replace the 50% gas cooktops with all electric cooktops, the gas reticulation could be capped in the future, LPG bottles removed, and gas cooktops replaced.

Requirements:

- Any use of gas is to be submitted to the Senior Project Director or equivalent Project Lead for approval in the initial planning stages.
- Connection:
  - All appliances and fixtures must use hard piped connections.
  - Flexible hose connections are prohibited in school projects.
- Safety Controls
  - Main quarter-turn isolation valves must be provided at the point of entry to the space.
  - An electrically operated solenoid valve is to control the gas supply, linked to a timing device for automatic shutoff.
  - An emergency stop button are to be installed at the space entrance, with a key-operated reset function after power restoration.
  - Signage above the stop button must read:

"GAS ISOLATION: Turn off when gas is not in use or in an emergency. Before turning on, ensure all appliances are turned off."

  - Downstream installations must be pressure-proved before gas is restored.
- Storage
  - LPG cylinders must be stored externally, in a well-ventilated, secure enclosure with at least three openings.
  - Bottles must be chained within a cage or enclosure, with Gas Hazard signage displayed.
  - Minimum bottle size: 45kg.
  - At least two bottles required for changeover to ensure continuous supply is provided.
  - LPG bottles may be located adjacent to buildings if:
    - More than 1 m from openings or ignition sources, and
    - In bushfire-prone areas (BAL rating), either 10 m from buildings or against a fire-rated wall.
  - Gas piping must maintain 50mm clearance from other services and be installed underground to the building from the supply location.

Science Laboratories

Gas Type: Bottled LPG only.

Provision:

- Demonstration benches only (1 gas turret per bench).
- Student benches to remain all-electric.
- Controls:
  - A manual ball valve at each turret.
  - An emergency stop button at each lab entrance, with signage ("Gas Emergency Stop").
  - Quarter-turn valve, solenoid valve, pressure proving under demonstration bench.
- Supply:

  - LPG bottles piped from external storage to the lab.
  - Bottles must not be stored or brought into the laboratory.

VET Kitchens

- Gas Type: Bottled LPG only.
- Provision:
  - Up to 50% of cooktops may be gas-fuelled (interim measure).
  - Electrical supply must be sized to allow future full electrification.
- Controls:
  - Same as Science Labs (quarter-turn valve, solenoid valve, emergency stop, signage, pressure proving).
- Supply and Storage:
  - Bottled LPG stored externally and piped to the kitchen.
  - No bottles to be stored or brought into the kitchen.

Workshops (Metal Work)

- Gases Used: Oxygen and Acetylene
- Storage:
  - Gas cylinders: provide an external, covered, ventilated, segregated and secure store with restraints and signage. Separate incompatible gases per AS 4332; locate near a safe drop-off/exchange point. Maintain ≥3 m separation between oxidising/inert and flammable cylinders, or provide a compliant non-combustible fire-rated barrier. Provide a dry-chemical extinguisher within 5 m and vehicle access for cylinder exchange.
  - Oxygen and Acetylene (or Oxygen and LPG) must be stored at least 3 m apart or separated by a fire-rated wall.
  - Acetylene may be stored in the same area as LPG.
- Operation:
  - Bottles transported by trolley from storage to workshop and returned after use.
  - No permanent piping for Oxygen or Acetylene.

Other Uses

- BBQ Facilities
  - LPG bottles for BBQs may be stored in the same external storage area as bottles for Science Labs and VET Kitchens.
  - Bottles must be returned to storage immediately after use.

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7.10 Fire Protection

7.10.1 General

Preamble:

This section details requirements for fire protection services for schools. The design, supply and installation of fire service systems are to be in accordance with current applicable regulation in addition to the requirements within the following sections.

7.10.2 Fire Hydrant System

Preamble:

In areas where the water pressure from the authority main is not sufficient to meet the minimum requirement of the most hydraulically disadvantaged hydrant outlet, where a tank is required due to insufficient flows or as required by the local water authority, fire hydrant pump/s are to be provided. These are to meet the following requirements:

Requirements:

A Fire Hydrant System is to comply with the following:

- An authority backflow device (Double Detector Check Valve) with metered bypass is to be provided for the dedicated fire water supply at the boundary of the site. This are to be locked open via a 003/PWD keyed lock.
- Future Capacity: All new fire hydrant mains installed throughout the development site are to be sized at a minimum of DN150 from the booster outlet to the building being protected, to consider for future site capacity and reduce frictional losses.
- Fire hydrant valves are to comprise 65mm nominal diameter standard landing valves (all bronze components) with approved aluminium “Storz” quick couplings, suitable for connection by the local fire brigade.
- Position the fire hydrant valve outlet directed towards the building being protected.

Note: All physical pressure and flow tests are to be witnessed by the Senior Project Director or equivalent Project Lead.

- Prevent unauthorised use of fire hydrant outlets by installing locked covers over all landing valves with 003 keyed locks installed.
- All external valves and equipment must be enclosed within vandal-proof and lockable enclosures via 003 keyed locks.

Note: The placement of the hydrants is to avoid potential collision by the students. Do not locate external hydrants in areas next to ovals or playgrounds where students may collide with the hydrant upstands. Seek coordination from the Senior Project Director or equivalent Project Lead to consult with DoE Heritage regarding fire Upgrades to Heritage buildings.

- Fire hydrant pipework is to be installed in the following materials:
  - In-ground: Pipe and fittings are to be red stripe polyethylene PN16 with electrofusion welded joints to meet the internal dimensions of the required pipe sizes.

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NOTE: Typical sizes for Polyethylene Piping are as follows:

DN125 for 100mm pipes, and DN180 for 150mm pipes.

- Above-ground: Pipe and fittings are to be Galvanised mild steel or Stainless steel where located within 1km of a coastal area.
- Detectable Tape stating “FIRE MAIN” with trace wire bound within are to be installed a minimum 150mm above and continuously along the length of the pipe and at all tees. This are to be bound to the riser extending 100mm above finished ground level for all in-ground installations.
- All support brackets are to be fire-rated where not sprinkler protected or within a fire-isolated stair or corridor.

HYDRANT PUMP

If a Hydrant Pump is required, the following apply:

- A dedicated masonry pump space is to be provided.
- In specific locations, a prefabricated pump enclosure may be proposed and accepted suitable if it is reviewed and approved suitable in writing by the Senior Project Director or equivalent Project Lead. Formal approval is to be sought from the Senior Project Director or equivalent Project Lead for any metallic pump enclosure proposed.
- Prefabricated metallic pump enclosures are not to be installed within 10km of a coastal exposure zone or within hot and humid corrosion zones.
- Where an internal pump space is provided:
  - 1 meter clearance are to be provided around all sides of the pumps.
  - A floor waste is to be provided within the fire pump space.
  - A 600 x 600 x 600mm pit are to be provided in the corner of the pump enclosure for testing of the pump/s.

7.10.3 Fire Hose Reels

Preamble:

This Section details the education-specific requirements for the fire hose reel system, which are to be provided throughout all areas for the school, beyond the mandatory requirements of NCC and regulatory requirements.

In areas where the water pressure from the authority main is not sufficient to meet the minimum requirement of the most disadvantaged fire hose reel (220kPa), a pump is to be provided on the potable cold water supply.

Requirements:

- The fire hose reel is to be supplied from the metered potable water supply.
- Any valve that can isolate the water supply to a fire hose reel are to be locked open and tagged in accordance with current applicable regulation.
- Avoid and minimise the design/installation of externally exposed pipework in schools.
- Fire hose reels are to be provided within a cabinet or cupboard in schools.
- Reticulated above-ground pipe and fittings to be copper type “B” with press-fit joints or silver solder welded.

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7.10.4 Fire Tanks

Preamble:

In areas where the water pressure from the authority main does not achieve 150kPa at the booster under the required pressure/flows, and/or where a tank is required due to insufficient flows and/or as required by the local water authority (break tanks), fire tanks are to be provided.

Requirements:

- Fire water supply tanks are to be zincalume/colorbond or stainless-steel panel tanks externally bolted, complete with access ladders, lockable access covers, drain and visual water level indicators.
- The concrete plinth are to be provided for the fire tanks with a minimum 200mm thickness.
- A minimum 600mm clearance around the tank are to be provided.
- A minimum 1000mm clearance above the tank are to be provided.
- Fire test water is to be reused or re-circulated back into the fire tanks to reduce water consumption on site.

7.10.5 Fire Extinguishers

Preamble:

This design guide outlines the criteria for the selection of portable fire extinguishers and fire blankets and sets out the design intent and performance expectations for the selection, location, installation and distribution of portable fire extinguishers and fire blankets within schools.

Designers must comply with the National Construction Code (NCC) and relevant Australian Standards, and associated regulations applicable to the installation of portable fire extinguishers and fire blankets.

Where a specific space is not covered in the location tables the installation of portable fire extinguishers and fire blankets must still align with the intent and principles outlined in this design guide and the applicable Australian Standards.

Requirements:

- Portable fire extinguishers must be mounted at no greater than 1200mm from top of extinguisher to floor, and no less than 100mm from bottom of extinguisher to floor.
- Extinguisher location signs and location discs must be supplied and installed for each extinguisher. Signs are to be positioned as to be clearly visible to persons approaching the extinguisher.
- If portable fire extinguishers are installed within a cabinet or enclosure, the door of the enclosure are to be marked with the words “FIRE EXTINGUISHER” in letters at least 32mm high in a colour contrasting with the door.
- Within Dust Extraction Space in High School wood workshop, signage must be provided at the portable fire extinguisher to advise school staff not to open Dust Extraction Space doors if a fire occurs.
- Portable fire extinguishers must not be mounted inside of electrical distribution cupboards or directly within switch spaces unless a minimum 2m separation is achieved between the extinguisher and the switchboard.
- All installed fire extinguishers must be marked with a classification and rating which indicates the class and size of fire for which they have been successfully tested. Extinguishers must be selected for their capability for us on the fire risk that is to be protected.
- Portable fire extinguishers must be provided within buildings to cover Class A fire risks in learning spaces and associated corridors in Public and High Schools not provided with fire hose

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reels, and in any normally occupied fire compartment less than 500m2 which is also not provided with fire hose reels.

- To achieve the requirements of current applicable regulation for extinguishing Class A fires, 9L Water Portable Fire Extinguishers are to be used, which achieve a rating of 3A.
- Portable fire extinguishers are to be distributed within a building such that a single 9L Water Fire Extinguisher covers a maximum floor area as follows:

Table 7.10.1 9L Water Fire Extinguisher

Fire Hazard	Maximum Floor Area per extinguisher (m2)
Light	450m2
Ordinary	300m2
High	200m2

- These required portable fire extinguishers must:
  - Be located in conspicuous and readily accessible positions.
  - Be located along normal paths of travel or near exits.
  - Be located in Communal Spaces, Stairways/Circulation Corridors providing access to learning spaces, Gymnasiums/Halls which are not provided with Fire Hose Reels.
- Water fire extinguishers need not be provided within every space provided maximum floor area coverage requirements are achieved with extinguishers in communal or circulation areas.
- The fire services designer is to determine the appropriate fire hazard rating for each space in line with the requirements of current applicable regulation.
- In addition to the requirements of current applicable regulation portable fire extinguisher provisions, additional supplementary fire extinguishers are to be provided within spaces. These supplementary extinguishers are to be installed no greater than 20m from the entry/egress point of the space.
- Supplementary extinguishers in Public Schools must be installed in accordance with Table below.
- Supplementary portable fire extinguishers must be located in High Schools in accordance with Table below:

Table 7.10.2 Fire Extinguisher Schedule: Public Schools

Location	Size	Class of Fire	Type of extinguisher	Number
Workspace	3.5 kg	5B:E	Carbon Dioxide	1
Library	5 kg	5B:E	Carbon Dioxide	1
Learning Commons	5.0 kg	5B:E	Carbon Dioxide	1
Communal Kitchen	3.5 kg	5B:E	Carbon Dioxide	1
Canteen	5 kg	5B:E	Carbon Dioxide	1
Cleaning Supplies	3.5 kg	5B:E	Carbon Dioxide	1

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General Assistant / Bulk Delivery	3.5 kg	5B:E	Carbon Dioxide	1
Garden Store	3.5 kg	5B:E	Carbon Dioxide	1
Electrical Switch Room	5 kg	5B:E	Carbon Dioxide	1 – Between 2-20m from switchboard
GLS	3.5 kg	5B:E	Carbon Dioxide	1 / GLS
Kiln Area	3.5 kg	5B:E	Carbon Dioxide	1
Supported Learning Hub	3.5 kg	5B:E	Carbon Dioxide	1
Comms Space	5 kg	5B:E	Carbon Dioxide	1
Multipurpose	3.5 kg	5B:E	Carbon Dioxide	1 / Space

Table 7.10.3 Fire Extinguisher Schedule: High Schools

Location	Size	Class of Fire	Type of extinguisher	Number
Staff Study, Staff Lounge, Preparation/Printing	3.5 kg	5B:E	Carbon Dioxide	1
Library Main Area	3.5 kg	5B:E	Carbon Dioxide	1
Administration	3.5 kg	5B:E	Carbon Dioxide	1
Multipurpose Space	5.0 kg	5B:E	Carbon Dioxide	1
Movement Studio	5.0 kg	5B:E	Carbon Dioxide	1
Control Space	3.5 kg	5B:E	Carbon Dioxide	1
Dark Room	3.5 kg	5B:E	Carbon Dioxide	1
All Learning Spaces (GLS)	3.5 kg	5B:E	Carbon Dioxide	1
Multimedia Workshop, Multimedia Studio	3.5 kg	5B:E	Carbon Dioxide	1
Computer Learning Space	3.5 kg	5B:E	Carbon Dioxide	1
Science Preparation	3.5 kg	5B:E	Carbon Dioxide	1
Science Laboratory	3.5 kg	5B:E	Carbon Dioxide	1
Chemical Store	3.5 kg	5B:E	Carbon Dioxide	1

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Wood + Metal Workshop	3.5 kg	5B:E	Carbon Dioxide	1
Materials Workshop	3.5 kg	5B:E	Carbon Dioxide	1
Materials Learning Space	3.5 kg	5B:E	Carbon Dioxide	1
Kitchen – Domestic Kitchen – Semi Commercial	3.5 kg	5B:E	Carbon Dioxide	1
Outdoor Covered Workshop	2.5 kg	A B(E) min	Dry Chem Powder	1
Shed Workshop	2.5 kg	A B(E) min	Dry Chem Powder	1
Visual Arts Workshop	3.5 kg	5B:E	Carbon Dioxide	1
Canteen	3.5 kg	5B:E	Carbon Dioxide	1
Cleaning Supplies Store	3.5 kg	5B:E	Carbon Dioxide	1
Bulk Store	3.5 kg	5B:E	Carbon Dioxide	1
Garden Store	3.5 kg	5B:E	Carbon Dioxide	1
Supported Learning Hub	3.5 kg	5B:E	Carbon Dioxide	1
Comms Space	5 kg	5B:E	Carbon Dioxide	1

Supported Learning Hubs are to meet the following additional requirements:

- The fire extinguisher is to be located in the nearest secure store to that space.
- The door is to have appropriate signage and the key is to be held by the assigned class teacher.
- The locked store is to be provided with a frangible panel to provide access to the latching device or extinguisher. The panel are to be not less than 150x150mm.

7.10.6 Fire Blankets

Requirements:

- Fire Blankets must be located in a conspicuous and readily accessible position, co-located with the spaces portable fire extinguisher.
- Fire blankets are to be located along normal paths of travel or near exits.
- Fire blankets must be a minimum size of 1.8m x 1.2m and made of woven fibreglass fire resistant fabric.
- Fire blankets are to be provided in a hard case/hard pouch and well sealed to prevent dirt, dust, insects etc from getting inside.
- Fire Blankets must be installed at 1500mm to the centre of hook or handle.
- Fire blankets must be installed to withstand the loads imposed when removing the fire blanket from its container.

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- Sufficient space are to be allowed so that the fire blanket can be quickly removed without impedance from nearby obstructions.
- Fire blanket location signs must be supplied and installed for each fire blanket.

Table 7.10.4 Fire Blankets Locations

Location	Number
Staff Space (PS)	1
Staff Lounge (HS)	1
Staff, Preparation Printing (HS)	1
Communal / MPC Kitchen if provided (PS + HS)	1
Dark Room	1
Practical Activities Area (PS) (Craft and/or cooking Area)	1
Services Learning Space	1
Multi Media Workshop	1
Science Preparation	1
Science Laboratory	1 each LS
General Learning Space	1 each LS
Materials Workshop	1 each LS
Materials Learning Space	1 each LS
Kitchen	1 each LS
Visual Arts Workshop	1
Outdoor Workshop	1
Canteen (PS+HS)	1

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8

Fitout, Furniture and Equipment

8.1 Supply
8.2 Fixtures
8.3 Joinery
8.4 Cubicle Partitions
8.5 Fittings
8.6 Window Coverings
8.7 Furniture
8.8 Signage

8.1 Supply

8.1.1 General

Requirements:

- Fitout, Furniture and Equipment (FFE) are to be selected from Department contracts and NSW Procurement catalogues where available.
- Furniture must be selected from the Government Contracts e.g. C771 Furniture Contract
- Schools undergoing upgrades are to consider replacing equipment and appliances through the Energy Savings Scheme.
- For new build and refurbishment projects, Fitout, Furniture and Equipment Schedules provided by an Architect or Interior Designer are to include the following information:
  - Furniture item code in accordance with EFSG Part C.
  - Furniture model number and/or name,
  - Description: Size, dimensions, finish, colour.
  - Group number (refer to supply group description below)
  - Suppliers name and contact details,
  - Certification
  - Quantity
  - Lead times for ordering
  - WELs ratings where applicable
  - Energy ratings where applicable

8.1.2 Supply

Requirements:

All items must be scheduled with a group number to indicate who is responsible for the item according to a construction industry accepted description as follows:

Table 8.1.1 Supply Group Descriptions

Group	Description
1	Provided and installed by the Contractor
2	Provided by School Infrastructure and installed by the Contractor
3	Provided and installed by the School Infrastructure
4	Provided by the school

Group 1 and Group 2 Items

Requirements:

- Only items specifically scheduled as fixed are to be fixed in position.
- When delivered, except as specified within the FFE Schedule, Group 2 items will be in a finished state and should not require any further finishing on the site. It is the contractor's responsibility

to touch up blemishes to match the general finish, where blemishes occur in the process of installation.

- Group 1 and 2 items are to be placed by the contractor in accordance with the Furniture and FFE drawings provided by the project Architect or Interior Designer.

Group 3 Items

- For new school and refurbishment projects the Architect and Contractor are to be made aware by the school or by School Infrastructure of any Group 3 items intended to be installed.

8.1.3 Installation

Requirements:

- Install all Fitout, Furniture and Equipment items accordance with manufacturer's instructions.
- Carry out operational testing of the items as specified in this DTR or as required by the manufacturer.
- Within refurbishment projects (i.e. upgrade of canteens) select electrical appliances in preference to gas.

Restrictions:

- Gas equipment is not to be specified within new build projects.

Delivery and Handling:

- FFE are to be delivered to the site at a contractor and supplier-agreed delivery point, suitable for off-loading.
- Upon delivery, promptly inspect FFE for quantity accuracy, order conformity, and damage from transit.
- Document and immediately report any defects or damages to the carrier and the Senior Project Director or equivalent Project Lead.
- Once acknowledged as being in good order, the contractor assumes full responsibility for the condition and replacement of FFE at their own expense if subsequent defects are identified.
- The contractor must sign all delivery dockets upon receipt.

Placement and Finalisation:

- FFE items are to be positioned as shown on the provided plans or schedules.
- Furniture must be loosely placed for ease of rearrangement by school staff.
- Remove and responsibly dispose of all packaging and wrapping.

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8.2 Fixtures

8.2.1 General

Preamble:

Robust sanitary fixtures and tapware within schools are essential for ensuring hygiene, safety and functionality within student Toilets.

Requirements:

- If their work includes new fixtures and water-using appliances all new work is to implement water-efficient fixtures to reduce potable water demand. They must meet the following minimum WELS ratings and other requirements:
  - Taps – 5 Star WELs Rating
  - Urinals – 5 Star WELs Rating
  - Toilets – 4 Star WELs Rating
  - Showers – 3 Star WELs Rating
- Taps with timed flow are to be used to minimise water usage and wastage in student amenities.
- No urinals are to be included in new works; existing urinals may remain in refurbishments where removal would reduce fixture numbers or is otherwise impractical. Departures may be considered on a case-by-case basis.
- Urinals are to not be included within new school facilities due to privacy and safety considerations and to align with anti-bullying designs.
- If a departure is approved, urinals are to be either troughs or individual wall mounted urinal pans with screen dividers and have a 5 Star WELs Rating.

8.2.2 Mounting Heights

Table 8.2.1 Sanitary Fixture Mounting Heights

School Type	Height	Comment
Preschool Wash Troughs	550mm	To top of trough
Public School Basins	650mm	To top of basin
Public School Wash Trough	650mm	To top of trough
High School Basins	820mm	To top of basin
High School Wash Trough	700mm	To top of trough
Staff Basins	820mm	To top of basin
Accessible Basins	In accordance with AS1428.1	
Kitchen Sinks	900mm	To top of sink
Cleaner's Sinks	500mm	To top of sink
Bucket Sinks	700mm	To top of sink

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Preschool Drinking Trough	TBC	To top of trough
Public School Drinking Trough	700mm	To top of trough
High School Drinking Water Dispenser	900mm	To top of Drinking Water Dispenser
Stop Tap – Washing Machine	1000mm	To centreline
Tundish – Washing Machine	750mm	To centreline
In Wall Tundish	1500mm	To top of tundish
Thermostatic Mixing Valve	1200mm	To underside
Shower Control	1000mm	To centreline
Shower Control - Accessible	In accordance with AS 1428.1	

Table 8.2.2 Toilet Pan Heights

User Type	Height: Floor to Top of Seat	Comment
Preschool - Students	385mm	
Public School - Students	400mm	
High School - Students	400mm	
Staff	400mm	
Ambulant – Staff and Students	In accordance with AS1428.1	
Accessible – Staff and Students	In accordance with AS1428.1	

8.2.3 Toilets

Requirements:

- All toilet pans and cisterns are to be either:
  - Vitreous china and white in colour or
  - Stainless steel type 304 or type 316.
- Cisterns are to be close coupled.
- Anti-vandal kits are to be included to Toilet cisterns.
- Seats within Student Toilets are to be single flap.
- Seats within Toilets for adults are to be double flap.
- Trap types are to be universal.
- Systems must comply with AS1172.
- Concealed cisterns are not to be used.
- Ensure colour selection of wall and floor tiles achieves luminous contrast to seat to AS 1428.1

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8.2.4 Basins

Preamble:

Basins for hand washing are required throughout schools.

Requirements:

- All Toilet basins are to be vitreous china and white in colour.
- Edges are to be rounded for ease of cleaning.
- Trap: Concealed trap and shroud.
- Waste outlet is to be vandal resistant and chrome plated brass or similar where exposed.
- Installation: Built into vanity bench or wall mount fixing. For student areas, basins must be fixed into solid substructure and be vandal resistant.
- Mounting height: In accordance with Table 01.
- Minimum size: 500 W x 410 L nominally.
- An overflow outlet must be integrated into the basin.
- Where basins are located within accessible facilities the basin specification and its installation must be compliant with AS1428.1.
- Basin specification and installation must comply with AS 1976.
- Bottle traps must not be used.
- Basin plugs are not to be specified for student hand wash basins to avoid the risk of flooding.

8.2.5 Sinks

Requirements:

- All sinks must be stainless steel, grade 304 minimum.
- Corners and edging:
  - Radius rounding finish to all corners including internal corners,
  - Return folds to remove all exposed leading edges.
- Sharp edges are not accepted.
- Installation: Built into benchtop.
- Mounting heights: In accordance with Table 01.
- An overflow outlet must be integrated into the sink.
- Minimum sink sizes are as follows:
  - Canteen: 2 bowls, 21 litres each. 2 drainers.
  - Kitchenette: 1 bowl, 21 litres. 1 drainer.
  - Food Tech: 1 bowl, 21 litres. 1 drainer.
- The following is required for sinks within Staff Kitchenette, SSPs and SLHs:
  - The maximum bowl depth for sinks is 150mm.
  - A knee recess is to be provided beneath the sink with the clearance compliant with the requirements for washbasins in AS 1428.1.
  - The underside of the sink bowl, exposed pipes, taps and fittings are to be installed to avoid burns to the user.

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8.2.6 Troughs

Preamble:

This section outlines the requirements are applicable to wash troughs, practical activities troughs and drinking troughs.

Requirements:

- All troughs must be stainless steel, grade 304 or grade 316, no 4 finish, minimum 1.2 mm thick.
- Installation: Built into benchtop or mounted on a metal frame. Mounting heights to be in accordance with Table within this section.
- Corners and edging:
  - Radius rounding finish to all corners including internal corners,
  - Return folds to remove all exposed leading edges.
  - Sharp edges are not accepted.
- Outlet: 50mm, Stainless Steel grate.
- An overflow outlet must be integrated within the trough.
- PVC piping or PVC waste pipes or traps or flexible piping are not suitable to be used in Schools.

Drinking Troughs

Requirements:

- Drinking troughs are to have drinking outlets at centres of nominally 450mm.
- Designs are to prevent rainwater entering sewer via the outlets associated with external drinking fixtures. Drinking troughs must be protected from the weather via one of the following methods:
  - Located within an undercover area, such as indoors or within a COLA or walkway (preferred method)
  - Protected by a lockable hood or lid mounted to the drinking trough.
- Drinking toughs which are located undercover do not require hoods or lids as standard but may include them where risk justifies (e.g. vandalism, birds).
- Drinking troughs which are mounted against walls must have a splashback:
  - Minimum height: 300mm

Wash Troughs

Requirements:

- Wash troughs are to have taps at centres of nominally 450mm.

Visual Arts Trough

Requirements:

- Within Visual Arts learning spaces where clay is used:
  - Inset stainless steel, with extended standing drain outlet, and
  - Include under-bench clay interceptor traps.

Science Laboratory Trough/Sink

Requirements:

- Trough or sink is to be designed and fabricated to facilitate cleaning.
- Troughs / Sinks and traps must be acid resisting.

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Dark Room Trough

Requirements:

- Trough to be design and fabricated to facilitate developing photographs.
- Troughs and traps must be acid resisting.

8.2.7 Drinking Water Dispensers

Preamble:

Accessible, potable water is critical to the wellbeing, health and safety of students. All new buildings, and refurbishment projects (where feasible), are to implement readily available and maintained dispensers for drinking water.

Requirements:

- Provide at least one Drinking Water Dispenser on each floor that includes regularly occupied space located within a 30 metre walk distance of all regularly occupied floor area and in all staff-space areas (except in areas where the presence of drinking water dispensers is forbidden by building codes or applicable regulations).
- Drinking Water Dispensers must be dispersed throughout the school playgrounds in convenient areas near locations where physical activities occur, such as active play and sports areas, and located within 20 metre walking distance of canteen serveries.
- Location and / or placement of Drinking Water Dispensers regarding potential damage to floors and safety issues arising from splashing.
- Drinking water are to be provided based on one tap per 30 students within Public and High Schools.
- Drinking Water Dispenser mounting heights must be appropriate to the age and height of students.
- All newly installed Drinking Water Dispensers are to be designed for water bottle-refilling.
- Water delivered by the dispensers are to be directly piped through the building's water supply or be stored in containers designed for refilling.
- Chilled drinking water systems may be specified west of 33 deg Isotherm with approval in writing from the Senior Project Director or equivalent Project Lead.
- Accessible Drinking Water Dispensers must be specified and installed in compliance with current applicable regulation including AS 1428.
- At each location where Drinking Water Dispensers and water coolers are provided, at least one outlet is to be in installed to be universally accessible in accordance with current applicable regulation including AS 1428.
- Drinking Water Dispenser controls to Accessible Water Dispensers are to either be centrally positioned at the front of the unit or if positioned at the side, be on both sides and not more than 180mm from the front of the unit. Ensure controls are installed to meet the requirements of current applicable regulation.
- Controls operable by one hand to Accessible Drinking Water Dispensers are to require an operating force of not more than 19.5N.
- A foot-operated control to Accessible Drinking Water Dispensers is acceptable if installed in addition to, but not instead of hand operated controls.
- Where an Accessible Drinking Water Dispenser is recessed, in addition to complying with the clearance requirements of current applicable regulation for universal accessibility, a clear width of space underneath the unit of not less than 800mm are to be provided.
- The height of the operative components of water cooler cup dispensers for Accessible Water Dispensers is not to be more than 1100mm above the trafficable surface.

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8.2.8 Taps

Preamble:

The durability and ease of use of tapware within schools are critical factors in the specification of tapware for health and safety considerations and to maintain a clean environment. Given the frequent use of school facilities, tapware must be constructed from robust materials that can withstand daily wear and tear, as well as potential misuse.

Requirements:

- All tapware must be robust: either tamper proof or vandal resistant.
- Taps with timed flow are to be used in student amenities (except accessible facilities) to minimise water usage and wastage.
- All products that come into contact with drinking water must be lead-free (≤0.25% Pb), including:
  - Tapware (all types of taps used for drinking water)
  - Drinking outlets
  - Piping systems, fittings and breeches (all pipes carrying drinking water)
  - Thermostatic mixing valves
  - Boiling water units
- Colour indicators must be provided to tapware aligned to water temperature provided as follows:
  - Cold taps: Blue
  - Cold and warm water: Blue and yellow
  - Cold and hot water: Blue and red
- Where hot water is provided for hand washing the water is to be delivered through a mixing spout.
- Where separate taps are provided for hot and cold water, the hot tap is to be placed to the left of the cold-water tap and where located vertically, located above the cold-water tap.
- Taps with capstan handles are to be not less than 50mm from an adjacent vertical surface that could restrict hand movement.
- Outlet types must fit the specified basin or sink.
- Outlet clearances above the rim of the sink must comply with statutory regulations. If required include an adaptor within the fittings to raise the outlets to the required height.
- Laboratory-type tapware must be high goose-neck type, bench-mounted or sink-mounted, and must be acid resistant to suit the application.
- Thermostatic Mixing Valves mix hot and cold water to regulate the water temperature using a single hand control.

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Table 8.2.3 Basin, Sink and Trough Tapware

Refer to all locations noted on drawings in EFSG Part C in combination with this Table for full extent of location of each tapware code.

Code	Item	Location	Requirements	Minimum Water Efficiency Targets
TAP-101	**Basin Tapware**	Staff Kitchenette Admin Kitchen Sick Bays First Aid Clinics Textiles GLS Kitchen GLS Workshop GLS Preparation Area	Type: Basin mixer with handle Finish: Bright chrome plate Isolation valve: Warm and cold water Flow rate: 6 l/min minimum	5 Star WELs Rating
TAP-102	**Basin Tapware - Accessible**	Accessible Toilets Student Toilets – SSPs All Accessible Basins Canteen	Type: Single lever basin mixer, extended handle compliant with AS1428.1 Finish: Bright chrome plate Isolation valve: Warm and cold water Flow rate: 6 l/min minimum	5 Star WELs Rating
TAP-103	**Basin Tapware**	Staff Toilets – All Schools Student Change Rooms	Type: Basin mixer with handle Finish: Bright chrome plate Isolation valve: Warm and cold water Flow rate: 6 l/min minimum	5 Star WELs Rating
TAP-105	**Laundry / Bucket Sink Tapware**	Laundry Sinks Cleaners Sinks	Type: Wall mounted with swivel outlet, school pattern handle Finish: Bright chrome plate Isolation valve: Hot and cold water	5 Star WELs Rating
TAP-106	**Laboratory Tapware**	Science Laboratories	Type: School laboratory water tap with fixed gooseneck, jumper valve outlet, schools pattern handle and tube nozzle. Spout: 200mm reach spout, vandal resistant tube nozzle Finish: Bright chrome plate	5 Star WELs Rating

			Isolation valve: Cold water Flow rate: 6 l/min minimum	
TAP-108	Basin and Wash Trough Tapware	Student Toilets – Preschool, Public, High School	Type: Push button timed flow, Aerator Timed flow: 6 seconds Finish: Bright chrome plate Isolation valve: Cold water	5 Star WELs Rating
TBC	Sink Tapware	Visual Arts	Type: Laboratory tap, aerator, school pattern handle Finish: Bright chrome plate Isolation valve: Cold water Flow rate: 6 l/min minimum	5 Star WELs Rating
TBC	Commercial Kitchen Sink Tapware	VET Kitchen	Type: Ultra-rinse food service unit with exposed lever mixer assembly, nominal 220mm reach pot filler Finish: Bright chrome plate Isolation valve: Hot and cold water Flow rate: 6 l/min minimum	5 Star WELs Rating

Table 8.2.4 Shower Tapware

Refer to all locations noted on drawings in EFSG Part C in combination with this Table for full extent of location of each tapware code.

Code	Item	Location	Requirements	Minimum Water Efficiency Targets
TBC	Accessible Shower Mixer	Accessible Showers	Type: Single lever shower mixer, brass spindle, with extended handle. Finish: Bright Chrome Plate Isolation valve: Warm + cold water. Warm water supply via TMV sensor Compliance: AS1428.1	N/A
TBC	Shower Outlet and Rail	Accessible Showers	Outlet Type: Access hand shower with handset, 1500mm long reinforced nylon hose Rail Type: 900mm long heavy-duty stainless-steel grab rail with sliding wall bracket Compliance: AS1428.1	3 Star WELs Rating

TAP-104	Shower Mixer	Change Space Showers – Staff and Students	Type: Single lever shower mixer, brass spindle Finish: Bright Chrome Plate Isolation valve: Warm + cold water. Warm water supply via TMV sensor	N/A
SHD-103	Shower Outlet	Change Space Showers – Staff and Students	Type: Anti-ligature shower outlet Finish: Bright Chrome Plate Isolation valve: Warm + cold water. Warm water supply via TMV sensor	3 Star WELs Rating

Table 8.2.5 Drinking Water Dispenser Tapware

Refer to all locations noted on drawings in EFSG Part C in combination with this Table for full extent of location of each tapware code.

Consult with the local health authority, Water supply Authority, private Water supplier and the Senior Project Director or equivalent Project Lead, for requirements for infectious disease control for drinking water outlets and water bottle filling outlets at the school.

Code	Item	Location	Requirements	Minimum Water Efficiency Targets
TBC	Drinking Bubbler Tapware	Drinking Troughs	Type: Drinking bubbler tapware with rubber bumper outlet and timed flow push button action. Outlet: Rubber mouthguard Finish: Chrome Isolation valve: Cold water Comments: Mouthguard must be AS 4020 approved, have high resistance to fungal and be UV stable.	
TBC	Bottle Filler Tapware	Bottle Filler	Type: Bottle filler tapware with timed flow push button action. Outlet: Gooseneck Finish: Chrome Isolation valve: Cold water	

Table 8.2.6 Hose Cocks and Equipment Tapware

Refer to all locations noted on drawings in EFSG Part C in combination with this Table for full extent of location of each tapware code.

Code	Item	Location	Requirements
TBC	Internal Hose Cock	Internal locations, as required	Type: Key handle operated, 20mm hose cock Finish: Bright chrome plate

			Size: 25mm hose thread Mounting: 450mm above finished ground / floor surface Comments: Provide one loose key for each internal hose cock installed
TBC	**External Hose Cock**	External locations as required	Type: Key handle operated, 20mm hose cock, Finish: Brass Size: 25mm hose thread Mounting: Each unit to consist of 20mm copper riser with a back plated elbow to be fixed to the wall with 3 x 20mm brass screws, screwed into 20mm x 6mm expanding plastic plug. Where not against a wall, the back plated elbow to be fixed with gal steel screw bolts and nuts to a 50 x 25ms fixing stake. The hose cock standpipe to have a 300mm square and 100mm thick concrete base surround. Comments: Provide one loose key for each external hose cock installed
TBC	**Boiling Water Unit Cock**	Canteens HS Kitchen Domestic + Semi-Commercial	Type: Right angle school pattern handle, jumper valve cistern cock, school pattern handle and button, M+F 15mm chrome check valve Finish: Bright chrome plate Isolation valve: Cold 15mm right angled stop valve and union
TBC	**Washing Machine Cistern Cock**	Laundry	Type: Washing machine cock, school pattern handles Finish: Bright chrome plate Isolation valve: Hot and cold water
TBC	**Cistern Cock**	All Toilets	Type: Right angle school pattern handle, Jumper valve cistern cock Finish: Bright chrome plate Isolation valve: Cold water
TBC	**Dishwasher Cistern Cock**	Location of Dishwashers	Type: Right angle school pattern handle, jumper valve cistern cock, school pattern handle and button Finish: Bright chrome plate Isolation valve: Hot + Cold water in accordance with appliance requirement

Table 8.2.7 Safety Wash

Refer to all locations noted on drawings in EFSG Part C in combination with this Table for full extent of location of each Safety Wash code.

Code	Item	Location	Requirements

TBC	**Handheld Eyewash**	HS Outdoor Covered Work Area at Wood/Metal Workshop	Type: Handheld eyewash and body spray Finish: Bright Chrome Plate, SS wall bracket Valve: Stay open ball valve during operation Compliance: ANSI Z358.1, AS4775 as a Public eyewash station
SHD-102	**Safety Shower**	HS Science Laboratory	Type: Combination free standing emergency shower + eyewash station, yellow epoxy coated activation pull rod + push handle, stay open ball valves Outlet Type: 200mm shower head, 2 x aerated eye wash outlets Connection Type: Drinking water 25mm Waster outlet 38mm Min 210 kPa pressure Min 93 l/min flow rate Finish: Stainless steel Valve: Stay open ball valve during operation Compliance: ANSI Z358.1, AS4775 as a Public eyewash station

Table 8.2.8 Fume Cupboard Tapware

Refer to all locations noted on drawings in EFSG Part C in combination with this Table for full extent of location of each tapware code.

Code	Product	Location	Requirements
TBC	**Laboratory Water Outlet**	HS Science Laboratory	Type: Bench mounted Laboratory water outlet with tube nozzle, remote laboratory control valve, stainless steel flexible hose Connection Type: Non-drinking water 15mm Finish: Bright Chrome Plate, or White Powdercoat Valve: Stay open ball valve during operation

8.3 Joinery

8.3.1 General

Preamble:

Joinery and metalwork include finishes, hardware, coordination with services, required fixings, skirtings, mirrors, and associated trims, conduits or recesses, and gaps for electrical equipment, integral lighting, wiring, data cabling and the like, including built-in GPOs, data outlets, audio visual outlets and inputs, and all necessary support and sub-framing necessary to complete the works.

Provide appropriate functionality for the location and use of the area: Joinery boards, finishes and associated fixtures must in general be in accordance with the overall sustainability requirements, be non-toxic and low carbon. Specifically, they must be in accordance with the relevant project level sustainability requirements for Upfront Carbon Reduction, Responsible Finishes.

Sufficient support must be provided when fixing joinery to prevent injury.

Requirements:

- Low-formaldehyde engineered wood products: At least 95% of all building's engineered wood products are required to be within the specified formaldehyde emission limits.
- All loose joinery units must be fixed to walls unless intended to be mobile.
- Within Science Laboratories, Science Prep Areas and Dark Rooms all laminate finishes must be chemical resistant.
- Use standard industry sizes where possible (e.g., 400mm / 600mm / 1200mm wide modules).
- Cut-outs for fixtures (such as sinks and hand basins) and equipment (including fridges, microwave ovens, and similar items) must consider the necessary equipment dimensions, installation tolerances, and any additional clearances specified by the manufacturer.
- Where roller shutter doors and/or grilles need to be accommodated within joinery, the dimensional requirements must be taken into consideration.
- Accessories and trims that are required to complete joinery installations must be installed.
- All voids at the backs of joinery units must be sealed with silicone beads for hygiene requirements.
- All full height, cupboards or overhead shelving must have a bulkhead extending to the ceiling to enclose the space above cupboards/shelving.
- Ventilation requirements to joinery containing services are to be reviewed with the services consultants.
- Where joinery is positioned against windows, openings must be restricted to prevent falls from height.

For heritage buildings, consultation is required through the Senior Project Director or equivalent Project Lead with DoE Heritage for fixed Joinery and metalwork installations.

- Securely, mechanically fix joinery to walls.
- Joinery units must be fixed to structurally adequate substrates.
- Stud Walls:
  - Fix into studs and/or install noggings or supports as required.
- Masonry Walls:
  - Do not fix into mortar.
  - Use metal expanding bolts except where otherwise stated by manufacturer.

- All mechanical fixings, screws, nails, bolts, anchors, brackets, adhesives and other fixing devices required for neat and secure fixing throughout are to be provided and must be concealed from sight in the finished work.
- Use of wooden plugs for fixing to substrates is not suitable in schools.

8.3.2 Benches

Requirements:

- The luminance factor of the vertical surface is not to be less than 30% different from the adjacent horizontal surface.
- Bench surfaces are to be smooth for easy cleaning and of a non-glare finish.
- Benchtops must be silica free.

Laminated Benches

Requirements:

- Material: 32mm thick high moisture resistant (HMR) particle board.
- Finish: High-pressure decorative laminated sheet
- Laminate finish thickness: 0.7mm.
- Edge: 2 mm ABS edge strips to match benchtop finish.

Stainless Steel Benches

Requirements:

- Material: 32mm thick HMR particleboard bench top with seamless stainless-steel finish and aluminium zinc coated steel sheet backing to the underside of the benchtop.
- Stainless steel finish:
  - Type 316 in food preparation areas
  - Type 304 in showers, Toilets, and similar wet areas.
- Thickness: 1.2mm
- Fascia: 50mm (minimum) x 15mm return at bottom, returned to underside of bench top, to form a complete seal.
- Fabrication:
  - The complete bench top (including HMR particleboard core) is to be fabricated off-site.
  - The aluminium zinc coated steel backing sheet must not come in direct contact with stainless steel.

Bench Support Frames

Preamble:

Working surfaces of typical joinery are to be supported by either joinery beneath, or by metal legs in accordance with the requirements below:

Requirements:

- Fabrication: Form frame from mild steel angles comprising of vertical members and a horizontal frame for supporting bench top and trough as shown on drawing. Pre-drill members, weld together and hot dip galvanise after fabrication.
- Vertical Members: 50 x 50 x 5mm.

- Horizontal Frame: 50 x 50 x 5mm.
- Height: 750mm (Top of bench to finished floor level).
- Installation: Fix securely through vertical members to wall at 150mm centres.

8.3.3 Shelves

Requirements:

- Maximum shelf height: 1700mm Above Finished Floor Level
- Shelves must be adjustable, suit the intended use, and secured in place to avoid rolling.
- Shelf thickness and provision of supports must ensure the shelf can support applied loads without excessive deflection (more than 3mm in 1.0m).

8.3.4 Doors

Requirements:

- Doors must open and close easily and shut tightly to a neat line and flush finish.
- Doors to cupboards taller than bench height must be no more than 600mm wide.
- Doors to cupboards above benches must be no more than 450mm wide.
- Doors to cupboards below benches must be no more than 600mm wide.
- Sliding doors on cupboards are to be used within SLHs and SSPs.
- The number and type of hinges specified must withstand weight of door leaf and anticipated heavy use.
- Doors to cupboards taller than bench height must have 4 hinges.
- Under bench joinery must have 3 hinges per door.
- Joinery doors must be hung on 110°or 180°fully concealed and adjustable hinges with catching action.
- Hinges must be of commercial standard and have a cam for height adjustment, not a slotted screw.

8.3.5 Drawers

Requirements:

- Provide heavy duty drawer runners with soft close mechanism.

8.3.6 Handles

Requirements:

- Joinery door and drawer handles must be easy for any user to operate. D-handles compliant with AS1428.2 are to be provided.
- Handles must be robust, simple, satin finished metal, and sourced from generally available production lines.
- Joinery door and drawer handles and pulls must have no sharp edges or protrusions that may cause injury.
- Handles are to be clearly identified by colour with luminance contrast to their background of not less than **30%.**
- Knobs on bolts and snibs are to be designed so that they provide an easy grip.

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8.3.7 Accessible Joinery

Preamble:

All critical controls, areas of operation and storage of equipment commonly used by most members of the school will be placed within the zone of common reach and have appropriate circulation to provide accessibility.

Requirements:

- Toe recesses are to be provided along the front of benches.
- Accessible knee recesses compliant with AS1428.2 must be provided to the following joinery items within all schools:
  - Sinks within Staff Kitchenettes and Tea points.
  - At least one Practical Activities Trough within each Learning Commons.
  - Sinks within SSPs.
  - Reception counters.
  - Library counters.
- Within SSPs and SLHs drawers or slide-out baskets are to be provided, rather than large open cupboards.
- Reach requirements associated with joinery depths and heights are to meet the requirements of AS1428.2.
- Where a counter is provided for general use, a length of the counter of not less than 900mm are to be provided. A clear floor space of 2250 x 2250mm are to be provided in front of the counter.
- A clear floor space of not less than 800 x 1300mm that allows either a forward or parallel approach by a person using a wheelchair are to be provided at accessible storage facilities.

8.3.8 Dimensions

Requirements:

Joinery heights are to be in accordance with the following requirements:

Table 8.3.1 Joinery Heights

Joinery Type	Height	Comment
Preschool – Practical Activities Bench	550mm	
Public School – Practical Activities Bench	650mm	
High School – Practical Activities Bench	700mm	
Reception Counters	Two heights to be provided to each reception counter, compliant with AS1428.2: Height from Finished Floor Level to the top of unit o 1st unit 750mm +/- 20mm o 2nd unit 850mm +/- 20mm	

Library Counters	Two heights to be provided to each reception counter, compliant with AS1428.2: Height from Finished Floor Level to the top of unit o 1st unit 750mm +/- 20mm o 2nd unit 850mm +/- 20mm	
Staff Benchtops	870mm	
Canteen, Food Prep and Food Tech Benchtops	900mm	Allow for a person to either stand or be seated on a stool

Joinery assemblies within existing buildings are to achieve the following minimum lengths:

Table 8.3.2 Joinery Lengths

Joinery Type	Length	Comment
Reception Counter	3000mm	
Practical Activities	3000mm	
Kitchenette	4500mm	
Tea Point	1800mm	
Demonstration	4500mm	
Sick Bay / Clinic	1200mm	
Bag Storage	As required for 30 bags per GLS	

8.3.9 Specialist Joinery Items

Public School GLS Teaching Wall

Requirements:

- The teaching wall within Public School General Learning Spaces must accommodate the following, which may be associated with joinery if spatial configurations permit:
  - A Main Learning Display (Interactive Screen), either mobile or fixed, which must be located in a central position on the teaching wall
  - Whiteboard/writable surfaces adjacent to the Main Learning Display (to either cupboard doors or wall surfaces)
  - Minimum of 20 linear metres of shelving either within cupboards or drawers
  - Minimum of 30 low-height cubby holes for bag storage.
  - Optional device charging element.
- Drawers are to be provided as opposed to open shelves below 1000mm above the Finished Floor Level (Finished Floor Level).
- Provide a bulkhead above full height joinery where ceiling heights are below 3000mm Above Finished Floor Level.
- The cupboards are to be lockable and keyed alike.

High School GLS Teaching Wall

Requirements:

Within High Schools movable FFE shelving are to be used instead of joinery to achieve the required 20 lineal meterage of shelving.

Food Preparation Joinery

Preamble:

Joinery is to meet the requirements of AS4674. Compliance with this standard ensures that the joinery meets rigorous hygiene and safety requirements, which help prevent food contamination and keep the food preparation area clean.

Requirements:

- Joint sealing: Fill all joints with waterproof sealant. Match finish.
- Provide escutcheon plates where required for vermin proofing.

Benchtop:

- Benchtops of food preparation joinery are to have stainless steel finishes
- Wet bench perimeter: Raised bead with fascia, 45 degrees splayed bead 20mm high, 25mm wide.
- Height: 900mm Above Finished Floor Level

Benchtop support frame:

- Legs: 31.8 x 31.8 x 1.6mm stainless steel square hollow section (SHS), spaced a maximum of 900mm apart.
- Rails between front and back legs: 31.8 x 31.8 x 1.6mm stainless SHS welded to legs at 300mm Above Finished Floor Level
- Parallel rails: Two parallel rails for the full length, positioned 150mm in from the front and back legs
- Fixing plates: Weld stainless steel fixing plates to the tops of all legs
- Adjustable stainless-steel feet to all legs
- Securely attach to the floor and the underside of the benchtop using pre-drilled holes.

Shelf (island benches only)

- Dimensions: Full length x 335mm wide.
- Height: 300mm from top of benchtop to top of small shelf

Servery Joinery

Requirements:

- Joint sealing: Fill all joints with waterproof sealant. Match finish.

Benchtop:

- Benchtops of Canteen Servery are to have are to have stainless steel finishes
- Height: 900mm Above Finished Floor Level

Benchtop support frame:

- Legs: 31.8 x 31.8 x 1.6mm stainless steel square hollow section (SHS), spaced a maximum of 900mm apart.
- Fixing plates: Weld stainless steel fixing plates to the tops of all legs
- Adjustable stainless-steel feet to all legs

- Securely attach to the floor and the underside of the benchtop using pre-drilled holes.

Accessories:

- Cash Drawer: Plastic insert fitted into top drawer resting on screw fixed PVC film laminated battens to sides of drawer.

Metalwork to Joinery:

- Visible fixings are to be vandal resistant.
- Cut edges, drilled holes, joints, and surfaces must be clean, neat, and free from burrs, sharp edges and indentations.
- Surface finish, colour, and texture are to be continuous and consistent.
- Fixing methodologies must comply with the galvanic compatibility of metal finishes.
- Stainless Steel items must be:
  - 304 grade minimum within showers, Toilets, and similar wet areas
  - 316 grade minimum within food preparation and food handling areas.
- Additional noggings or structural support must be provided to partition walls as required for fixing and support of wall mounted items.
- Adjacent materials and products, including adhesives and sealants, must not stain, contaminate, or cause defects in nearby materials.

Table 8.3.3 Metalwork by Space

Code	Fixture	Location	Requirements
TBC	**Cover Panel to Ovens**	Food Technology	Where ovens are located back to back provide a metal capping strip with turned down flanges to the top of the stove upstands and down the sides to 90mm above floor. Material: Stainless Steel grade 316 Width: 203mm Thickness: 1.2mm Fabrication: Turn down flanges, 6 mm on all edges, neatly form and solder joints, buff edges to remove sharp projections.
TBC	**Shelving – Animals and Plants**	Science Agriculture	Fabrication: Form shelving frame from M.S. angles comprising of a vertical member and a horizontal member with M.S. bearing plates welded on each member to enable solid bearing and fixing to wall and floor. Prepare horizontal angle to receive either timber batten finished top or floor grating finished top all as detailed. Pre-drill fixing holes, weld all together and hot dip galvanise after fabrication. Vertical Member: 50 x 50 x 6mm M.S. angle.

	Height: 900mm. Horizontal Member: 50 x 50 x 6mm M.S. angle. Length: 600mm (From wall to outside edge of frame). Spacings: Shelving frame 600mm centres. Floor Bearing Plate: 80 x 50 x 8mm M.S. plate.

8.4 Cubicle Partitions

8.4.1 General

Preamble:

Toilet cubicles within schools play a crucial role in maintaining hygiene and providing students with a sense of privacy and comfort.

Requirements:

- Cubicles are to be proprietary systems
- Board: 13mm Compact Laminate
- Colour: To be from the manufacturer's standard range
- Low-formaldehyde engineered wood products: At least 95% of all building's engineered wood products are required to be within the specified formaldehyde emission limits.
- For increased robustness, the leading/front panels of cubicle systems in SSPs, Public, and High Schools are to be secured at the top and bottom using angles or channels to improve stability. Intermediate panels must be attached to walls using channels or angles.
- Within Preschools cubicle partitions must be anchored to the floor and fixed at the wall.
- Cubicle systems which are mounted on legs may only be specified with permission from DoE School Infrastructure.
- Side/perpendicular impact loads on partitions must be considered in design and specification.
- End wall of cubicle facing entries or likely impact zones are to be full height walls of either masonry, concrete or fibre cement construction. Tiles are to be applied to such walls aligned to the height of tiling elsewhere within the space.

8.4.2 Toilet Cubicle

A major concern for children is the fear of others looking over or under Toilet partition walls and doors. Therefore, consideration is to be given to providing some full-height partitions or single-occupancy ("airline") Toilets if no readily accessible single-occupancy option exists for the student population.

Requirements:

Cubicle Depth

- Preschool Cubicle Depth: **1200 to 1800mm**
- Typical Cubicle Depth: **1600 to 1800mm**

- Ambulant Cubicle Depth: Minimum depth must achieve the pan clearances required in accordance with AS1428.1.

Cubicle Partition Height

- Preschool Partition Height: **1100 to 1300mm**
- Standard Partition Height: Minimum partition height **1900mm** Above Finished Floor Level to doors and intermediate partitions, with floor clearance of nominally 200mm
- Full height cubicle partitions may be specified if not readily accessible single-occupancy option exists for the student population.

Cubicle Door Height

- Cubicle Door Height for Standard Height Partitions: Nominally **1900mm** Above Finished Floor Level
- Preschool Cubicle Door Height: **1100 to 1300mm**
- Cubicle Door Height for Full Height Partitions: Full height with 20mm off Finished Floor Level and 80-100mm off Finished Ceiling Level. Ensure sufficient gap at the top of door for lift-off hinges.

Cubicle Door Width

- Door Width Typically: Minimum **700mm** Clear Opening
- Ambulant Door Width: Minimum **700mm** Clear Opening

8.4.3 Shower Cubicle

Requirements:

- Partition Height: To match ceiling height. Maximum **2700mm**
- Cubicle Depth: Nominal **1800mm**
- Door Height: Full height with 20mm off Finished Floor Level and 80-100mm off Finished Ceiling Level
- Standard Door Width: Minimum **600mm** Clear Opening
- Ambulant Door Width: Minimum **700mm** Clear Opening
- Shower Seat: Nominal 300mm x 900mm.

8.4.4 Cubicle Doors

Requirements:

- Privacy: Shower and Toilet cubicles must have vertical rebates to both vertical edges of the doors (e.g. 45° bevelled stile/jamb systems).
- Where full height partition systems are specified, sufficient clearance must be provided to top of door to allow for lift off hinges.
- Locks: To allay students concerns around privacy, door locks are to have a large, coloured display on the outside of the cubicle, which is obviously green when vacant and obviously red when engaged.
- Specify heavy-duty, vandal-resistant locks, hinges and door stops
- Backing/plates and through-fixing: Include stainless backing plates behind locks/strikes to spread loads and prevent screw pull-through; allow through-bolting.
- Provide a vertical stainless channel for the lock strike/bumper on the front panel.
- Hinges: Lift off
- Finish: In accordance with cubicle partition manufacturer's standard.

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- Any modifications to include plates/channels are to be coordinated with cubicle system supplier to avoid voiding warranties.

Doors to ambulant water closets are to comply with the following:

- Outward opening doors are to have a hinge mechanism that holds the door in a closed position without the use of a latch.
- Inward-opening doors must be fitted with lift off hinges, a retractable stop or similar device to allow, in an emergency, the latch to be released and the door to swing outward, or the door to be removed.

8.5 Fittings

8.5.1 General

Preamble:

Durable fixtures within schools reduce the frequency of repairs and replacements, minimising disruptions to the learning environment and saving valuable resources.

The selection of fixtures must be based on a knowledge of the proposed use.

Requirements:

- Visible surfaces are to be capable of being easily cleaned and repaired if damaged.
- Installation of FFE items must be in accordance with the manufacturer's recommendations.
- Where FFE items are mounted to Toilet or shower cubicle partitions, the fixing methodology must be approved by both the partition supplier and FFE supplier.
- All FFE specified for Accessible facilities (Toilets and Showers), SSPs and SLHs must be specified and installed to comply with AS1428.1. Such products must be confirmed by the supplier as being compliant with AS1428.1 when installed in accordance with the standard.
- All FFE must be robust and of commercial grade.
- Stainless Steel items must be minimum 304 grade.
- Additional noggings or structural support must be provided to partition walls as required for fixing and support of wall mounted items such as grab rails.
- Provision of ceiling mounted hoists and ceiling hooks within SLHs and SSPs must be reviewed and / or designed by a Structural Engineer.
- Fixing methodologies must consider the galvanic compatibility of metal finishes.

8.5.2 Toilet Fittings

Requirements:

The following are requirements Toilet Fittings.

Table 8.5.1 Toilet Fitting Schedule by Space

Code	Item	Location	Group	Requirements
TBC	Toilet Paper Dispenser	Student and Staff Toilets and Accessible Toilets	1	Surface mounted 2 roll capacity Material: Satin Stainless Steel (SSS) 304 grade or 316 grade

				Lockable – all keyed alike AS1428.1 compliance is required when installed within accessible facilities
TBC	Soap Dispenser	Student and Staff Toilets and Accessible Toilets	1	Surface mounted Material: Satin Stainless Steel (SSS) 304 grade or 316 grade Vandal resistant key. All keyed alike Capacity: Nominally 1.18 to 1.2 litres Installed in a position over the trough/basin to prevent drips from the dispenser landing on the floor. The soap type must be nominated by the supplier/manufacturer of the soap dispenser and information relating to soap dispenser requirements must be displayed within Cleaner's Stores. AS1428.1 compliance is required when installed within accessible facilities
TBC	Hook for Clothes	Toilets and Accessible Toilets	1	Where installed to cubicle partitions the hook must be supplier by the partition manufacturer from their standard range. AS1428.1 compliance is required when installed within accessible facilities.
TBC	Hook for Clothes	Change Spaces	1	Where installed to cubicle partitions the hook must be supplier by the partition manufacturer from their standard range. Hooks are to be of staggered heights. Hooks must not have sharp edges. .
TBC	Folding Shower Seat	Accessible Showers	1	AS1428.1 compliance is required Folding shower seats must have fold out legs Frame: Satin Stainless Steel (SSS) 304 grade or 316 grade Seats are to be slatted.
TBC	Hand Dryer	Student and Staff Toilets and Accessible Toilets	1	Noise output are to be less than 80dB. System are to be hardwired. Automatic sensor operation. AS1428.1 compliance is required when installed within accessible facilities.
TBC	Grab Rails	Accessible Toilets and Showers	1	Surface mounted Material: Satin Stainless Steel (SSS) 304 grade or 316 grade

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				Product and installation must be AS1428.1 compliant. Screws/bolts to be stainless steel and supplied by the manufacturer including all accessories; fixed in accordance with the manufacturer's recommendations.
TBC	**Accessible Toilet Backrest**	Accessible Toilets and Showers	1	Type: Vandal resistant backrest for accessible Toilets Frame and mounts material: Satin Stainless Steel (SSS) 304 grade or 316 grade Product and installation must be AS1428.1 compliant.
TBC	**Polished Stainless Steel Mirror**	Student Toilets	1	Mirror finished PVC coated bright annealed stainless steel 304 grade or 316 grade Thickness: 0.9 mm Mirror to be folded on all sides, corners welded and buffed, backed with 12 mm thick glue fixed marine grade plywood and screw fixed directly to tiled finish/brickwork. Butt together where associated with wash troughs. Height, floor to bottom: 850 mm for Public Schools 1100 mm for High Schools
TBC	**Mirror**	Staff Toilets and Accessible Toilets	1	Height, floor to bottom: in accordance with AS1428.2
TBC	**Change Table**	Preschools	1	Child sized change table Padded wipe clean vinyl finish Mounted on joinery
TBC	**Curtain and Track for Accessible Shower**	Accessible Showers	1	Curtain fabric: Polyester or nylon – washable Height from finished floor level: 2000 mm Track finish: Anodised aluminium Height: From head support to 50 mm clear of floor. Installation in accordance with manufacturer's recommendations Product and installation must be AS1428.1 compliant.

8.5.3 Equipment

Requirements:

- Equipment and appliances are to be selected from Department contracts and NSW Procurement catalogues where available.
- Operation manuals must be provided for all appliances by the supplier.
- New buildings and refurbishment projects are to include appliances within one star of the best available rating when the equipment type is eligible for an Energy Star rating. Refer to https://calculator.energyrating.gov.au/ for eligible appliances.

Refer to:

Including but not limited to the following:

- Green Star Buildings Credit 25 – Water Use for detailed requirements of water use.
- 7 Services
- Other applicable sections within this document.

Table 8.5.2 Equipment Schedule

Code	Item	Location	Group	Requirements and Restrictions
TBC	Electric Oven	Canteen, Food Technology	1	Hardwired connection are to be provided. Oven width are to be sized to fit with bottom cabinetry widths of 600mm Fan forced Slide out grill Four hob elements Glazed door Gas ovens are not suitable in schools
TBC	Rangehood	Canteen, Food Technology	1	Hardwired connection are to be provided. Exhaust requirements must be reviewed with the project Mechanical Engineer to determine ducting requirements.
TBC	Microwave Oven	Canteen, Food Technology, Staff Kitchenette	1	Minimum capacity: 32 litres Power Rating: 1100 W Electronic touchpad operation Architect / Interior Designer must consider the microwave dimensions in conjunction with the associated joinery.
TBC	Boiling Hot Plate	Canteen	1	A minimum of 2 cooking elements required
TBC	Boiling Water Unit	Canteen, Food Technology	1	Minimum 5 litres Non-drip outlet

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				Filtration: 5 microns Triple Action Filter in accordance with NSF/ANSI Standards 42. Delivery Capacity: 30 cups at one time, 150 cups/hr minimum. Tank: Stainless steel Element Rating: 2.4 kW Position: Above sink draining surface.
TBC	Filtered Water Tap	Staff Kitchenette	1	Must instantly deliver both boiling and chilled filtered water
TBC	Dishwasher	Canteen, Food Technology, Staff Kitchenette	1	Must be freestanding Dishwasher width are to be sized to fit with bottom cabinetry widths of 600mm Dishwasher height are to be sized to fit beneath the benchtop. Inclusion must be reviewed with the project Hydraulic Engineer to determine drainage requirements. Energy Rating: 5 Star minimum WELs Rating: 5 Star minimum
TBC	Refrigerator / Freezer	Canteen, Food Technology, Staff Kitchenette	1	Must be freestanding Must be frost free Size options as follows: 220 litres (nominal) 300 litres (nominal) 500 litres (nominal) Refrigerator / Freezer must be considered within the design of any associated joinery Door may be left or right-handed operation. Energy Rating: 7 Star minimum
TBC	Refrigerator, Food and Beverage - Commercial	Canteen	1	Glass fronted Capacity (nominal): 1100 litres Doors: 2 Shelves: 4 shelves per door Finish (exterior/interior): Stainless steel Energy Rating: 7 Star minimum
TBC	Washing Machine	Laundry	1	Hot and cold water connections compete with flex and plug. Front load or top load. Capacity: 9 kg minimum

				Energy Rating: 4.5 Star minimum WELs Rating: 4 Star minimum
TBC	Clothes Dryer	Laundry	1	Front load Capacity: 9 kg minimum Energy Rating: 9 Star minimum

8.5.4 Sports and Fitness

Preamble:

The following Sports fixtures and equipment items are to be considered within the FFE schedule as required depending upon project brief and school type.

Requirements:

- Padding mats, and non-slip pads required for gym equipment must be specified.
- Padding must be specified for support frames associated with sports nets.
- Padding must be specified for any columns within sports courts run off zones.

Table 8.5.3 Gymnasium and Hall Schedule

Code	Location	Fixture	Group	Requirements
TBC	Gymnasium or Hall	Post sockets for floor mounted removable nets	1	Post socket and cover plate product are to be a proprietary item with a keyed removal mechanism. Post sockets must be coordinated with the project Structural Engineer. Cover plates must provide a flush finish. A rubber seal is required to the cover plate to avoid ingress of moisture when floors are cleaned.
TBC	Gymnasium or Hall	Removable Badminton Nets	1	Cover plates must be compatible with the post sockets. Pop-out type cover plates are not suitable in schools Specified proprietary system must be in accordance with the International Badminton Federation requirements.
TBC	Gymnasium or Hall	Removable Volleyball Nets	1	Must be compatible with the post sockets. Specified proprietary system must be in accordance with the Australian Volleyball Federation requirements. Net height must be adjustable.
TBC	Gymnasium or Hall	Removable Netball Nets	1	Must be compatible with the post sockets. Specified proprietary system must be in accordance with the Netball Australia requirements. Hoop height must be adjustable where specified for use in Public Schools.

				Each post is to be supplied with removable cylindrical shaped protective padding to a minimum height of 2100mm from base. Colour must contrast the background by nominally 30 LRV.
TBC	Gymnasium or Hall	Basketball Backboard and Hoop	1	Specified proprietary system must be in accordance with the FIBA requirements. Installation must be in line with manufacturers recommendations. Within Public Schools the hoop height are to be adjustable. Structural certification is required. This certification will cover all materials, connections, attachment points, fixings and installations including static and active loads.
TBC	Sports Courts	Basketball Backboard and Hoop	1	Specified proprietary system must be in accordance with FIBA requirements. Installation must be in line with manufacturers recommendations. Each post is to be supplied with removable cylindrical shaped protective padding to a minimum height of 2100mm from base. Colour must contrast the background by nominally 30 LRV. The reinforced concrete footing must be to the project structural engineer's design. The post or sleeve must be securely tied into the concrete to prevent any risk of the post rotating when under pressure from wind loading and/or live loads. All materials are to be appropriate for external use.
TBC	Sports Courts	Removable Netball Nets	1	Must be compatible with the post sockets. The post or sleeve must be securely tied into the concrete to prevent any risk of the post rotating when under pressure from wind loading and/or live loads. Specified proprietary system must be in accordance with the Netball Australia requirements. Each post is to be supplied with removable cylindrical shaped protective padding to a minimum height of 2100mm from base. Colour must contrast the background by nominally 30 LRV. The reinforced concrete footing must be to the project structural engineer's design. All metalwork are to be appropriate for external use.
TBC	Fitness Learning Spaces	Exercise Rail	1	Nominal size: 25mm diameter Material: Stainless steel Height: From Finished floor level: 750mm

				Installation: Securely fix to wall through pre-drilled holes in flange plates.
TBC	Dance and Movement Studios	Exercise Barre	1	Nominal size: 50mm diameter Double rail to be provided. Height: From Finished floor level to upper barre: 1055mm Material: Timber rail with powdercoated steel brackets. Installation: Fix securely to floor or wall
TBC	Sports Store	Rack for Javelin	1	Proprietary item Installation: Fix securely to floor or wall
TBC	Sports Store	Rack for Discus	1	Proprietary item Installation: Fix securely to floor or wall
TBC	Sports Store	Rack for Bats	1	Proprietary item Installation: Fix securely to floor or wall

8.5.5 Specialist Fittings

Requirements:

In addition to fittings noted within the previous tables, the following are required to be included within SLHs and SSPs spaces.

Table 8.5.4 SLH and SSP Fitting Schedule

Code	Fitting	Location	Group	Requirements
TBC	**Adult Change Table**	Adult Change Facilities (SLH and SSPs)	1	Adult sized change table Padded wipe clean vinyl finish Height adjustable via electronic control Floor mounted
TBC	**Towel Rail**	Adult Change Facilities (SLH and SSPs)	1	Surface mounted Material: Satin Stainless Steel (SSS) 304 grade or 316 grade Length to suit specific installations
TBC	**Drop Down Grab Rail**	Accessible Toilets and Showers	1	Surface mounted Material: Satin Stainless Steel (SSS) 304 grade or 316 grade Product and installation must be AS1428.1 compliant.

				Screws/bolts to be stainless steel and supplied by the manufacturer including all accessories; fixed in accordance with the manufacturer's recommendations.
TBC	Ceiling Hook for Swing	SLH and SSP GLS	1	Material: Stainless steel hook Fixing: Fix securely to ceiling structure or concrete soffit Performance: Capable of supporting the following weight: 300kg (minimum)
TBC	Ceiling Hoist	SLH and SSP GLS Where nominated	1	Fixing: Fix track securely to ceiling structure or concrete soffit Operation: Motorised Location: Track to connect SLH and SSP GLS with adjacent Change Room / Toilets which include adult sized change tables Performance: Capable of supporting the following weight: 300kg (minimum)

In addition to fittings listed within the previous tables, note that the following are required to be included within their applicable specialist spaces.

Table 8.5.5 Miscellaneous Fitting Schedule

Code	Item	Location	Group	Requirements
TBC	Hook for Bags	Circulation and GLS	1	Hooks are to be of staggered heights. Hooks must not have sharp edges.
TBC	Letterbox	Located within close proximity to Administration	1	Type: Proprietary metal letter box Corrosion resistant, weatherproof body, weather protected letter slot, lockable-hinged door, School street number or identification Specification and installation to Australian and New Zealand Standards (AS /NZS) 4253. Rear opening with built in key locking system Internal space: 390 x 230 deep x 160mm high minimum Aperture dimensions: In accordance with Australian and New Zealand Standards (AS /NZS) 4253.
TBC	Hanging Lines for Artwork	As indicated on drawings	1	Wire rope: stainless steel, nylon coated. Diameter: 1 mm (minimum) Length: To be determined based on the ceiling height

				Fixing to be in accordance with the Manufacturer's recommendations To be mounted at the junction between the wall and ceiling.
TBC	Hanging Lines for Prints	Dark Rooms	1	Wire rope: Stainless steel, nylon coated. Diameter: 1 mm (minimum) Rows: 3 evenly spaced (200mm nominal) Height from floor: 1800mm
TBC	Kiln	Visual Arts	1	Size: 145 litre capacity Temperature: Max 1280 C Power: 3 phase, 415 V, 15 amps, 10.8kW Refractory: LBK 23 Bricks Frame: Mild Steel Outer Casing, 304 Stainless Steel
TBC	Guitar Racks	Music	1	Hooks for display of guitars. Installation: Fix securely to wall.
TBC	Hooks for Hoses	Garden Store	1	Fabrication: Two M.S. pipes bent and welded to M.S. plate with capping on open end of pipes hose supports. Pre-drill fixing holes weld all together and hot dip galvanise after fabrication. Wall Plate: 6mm thick M.S. 250mm x 300mm drilled to receive four 10mm fixing bolts. Hose Supports: 40mm NB M.S. pipe bent upwards at a radius of 100mm.Provide capping on open end of pipes. Number: Two Length: 300mm measured from the inside edge of the pipe upturn to outside edge of plate. i.e. 300mm clear space for hose storage. Spacings: 150mm centres fixed 50mm from edge of plate to centre of pipe and 150mm from top of plate to top of hose support pipe bracket. Protective finish: Heavy galvanizing. Installation: Fix securely to wall.
TBC	Separating Frames	Garden Store	1	Fabrication: Mild steel bent tubular frame with 75 x 6 mm plate fixed to front face and welded pre-drilled fixing flanges. Hot dip galvanise after fabrication. Frame Size: 900 mm high x 325 mm from wall Diameter: 40 mm N.B Protective finish: Hot dipped galvanised

	Flanges: 100 x 100 x 10 mm M.S. plate Centres: 600 mm Fixing: Bolt each flange securely into masonry wall and concrete floor with three 10 mm diameter masonry anchors. Plate fixed to front face of frame with M8 x 65 mm galv. bolts.

8.6 Window Coverings

8.6.1 General

Requirements:

- Window Coverings are to be in accordance with the applicable requirements of 2.1 Sustainability and Building Performance.
- External windows of all spaces require window blinds to facilitate brownout, control glare, and provide visual privacy. This excludes store spaces, services spaces and similar.
- Blinds, within regularly occupied areas, must provide glare reduction to at least 95% of the area of facade glazing and skylights.
- Blinds and curtains must be controllable.
- Blinds must have a visual light transmittance (VLT) of less than or equal to 10%
- Blinds must be anti-ligature.
- Curtains which are associated with external walls or shower curtains must be anti-ligature.
- Window coverings associated with external walls must have a fire retardant incorporated in their manufacture in accordance with AS/NZS 1530.3.
- Vertical blinds are not suitable in schools.
- Venetian blinds are not suitable in schools.

LOCKDOWN PROCEDURES

- As part of lockdown procedures, all glazing that can be looked through from an adjacent external surface must be screened. Screening may be provided by one of the following methods:
  - Roller blinds (preferred)
  - Curtains
  - Privacy film to external glazing where use of blinds or curtains is not practical.
- Blinds / curtains must not cover hardware on doors used for egress. Provide privacy film to glazed external doors.
- Provide blinds to internal windows associated with offices and administrative spaces.
- Provide frosting or privacy film to glazing within overhead doors associated with halls and gymnasiums.

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8.6.2 Roller Blinds

Requirements:

- Blinds must be complete with brackets, fixing screws, lath or aluminium rail, stainless steel ball chain, and chain drive units, including all mandatory safety devices.
- Roller blind drive unit and chain position (either left or right) must be nominated on the Architect or Designers drawings.
- Blinds with a cord or chain must be installed in such a way that a loose cord cannot form a loop 220mm or longer at less than 1600mm Above Finished Floor Level. Chains or cords must be secured with either tie-downs (cleats) or tension devices that enclose cords and chain loops at a minimum height of 1600mm Above Finished Floor Level.
- Window coverings with cords or chains must not be installed in learning areas with reduced supervision such as sensory spaces and withdrawal spaces.
- Allow two turns around top of roller on each blind over the size of the required drop.
- Blind fabric is to be PVC free
- Width (preferred maximum): 1800mm
- Roller blinds with metal components and other robust systems with few moving parts are preferred.
- Within existing buildings where blinds are located over gas space heaters then both chain and blind must be sized to finish above the heater in accordance with the supply authority requirements.

8.6.3 Curtains

Requirements:

- Where associated with external windows without blinds, curtains must facilitate brownout.
- All heavy curtain systems, such as stage curtains, must be reviewed with the project Structural Engineer.
- Curtain Tracks:
  - Track specification is to be based on function and weight of curtain.
  - Fixing methodology of the track must be determined based on the curtain weight.
  - All curtain track specifications must be reviewed by the associated curtain suppliers to confirm suitability for the weight and drop of the curtain specified.

Table 8.6.3 Curtain Types by Space

Code	Item	Location	Group	Requirements
TBC	**Typical Curtain for Internal and External Glazing**	As required by the EFSG	1	AS 1530.2 and 1530.3 compliant and comply with the following indices: • Flammability Index: not more than 6 • Spread of Flame Index: not more than 6 • Smoke developed Index: not more than 5 • Weight: nominally 260gms per sqm

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				• Minimum Martindale cycles: 40,000 Provide each curtain with a tear resistant label outlining cleaning methodology.
TBC	**Stage Curtain, Back Drop Curtain and Stage Masking Curtains**	Gymnasium and Hall	1	• AS 1530.2 and AS1530.3 compliant • Must be inherently flame retarded • Composition: 100% wool • Weight: 500gsm minimum • Must be suitable for spot cleaning • Curtain track specification must be reviewed by the curtain supplier. • Provide each curtain with tear resistant labels as required by current applicable regulation.
TBC	**Track for Stage Curtains and Curtain over Mirror**	Gymnasium and Hall	1	• Open truss steel track with low friction ball bearings type wheeled master carriers and runners. • Provide single runners for every 300 mm of track, capable of carrying a minimum weight of 12 kilograms. • The leading edge of each curtain is to have an overlapping master carrier to provide a 100mm overlap. • The track is to be hand drawn operation.
TBC	**Curtain to Cover Mirror**	Movement Studio	1	To match Stage Curtain. AS 1530.2 and AS1530.3 compliant Must be inherently flame retarded
TBC	**Welding Curtain**	TAS Workshops	1	• Proprietary translucent heavy duty flexible welding curtain/s and track system that provides protection against hazardous radiation with matching track. • Welding Curtain: To AS 3957 • Thickness: 1mm • Clearance from floor: 300mm • Mounting height: 2100mm above finished floor level. • Installation of the track to be in accordance with the curtain manufacturer's current written recommendations.

TBC	**Curtain to Finishing Area**	TAS Workshops	1	• Fire retardant industrial PVC heavy-duty flexible curtains with matching track to effectively screen the whole Finishing Area of the Materials Workshop. • Curtains to be UV stabilised, alkali and acid resistant. • Clearance from floor: 100mm • Colour: clear • Hem: Electronically welded, 50nmm all four sides • Eyelets: Electronically welded eyelets at 200mm centres at top and 600mm centres sides and bottom. • Fire retardant: To AS1441.13 • Installation of the track to be in accordance with the curtain manufacturer's current written recommendations.
TBC	**Curtain**	Dark Room	1	• 100% pure cotton fabric lined with cotton sateen lining • Dimension: 11/2 times the full width of opening. • Pencil pleated curtain top. • Hem: provide a 150 mm high hem at bottom and finish at finished floor level to prevent the transmission of light. • Track: Industrial track complete with pulling cords, weights, nylon gliders/hooks and fixing brackets • AS 1530.2 and AS1530.3 compliant
TBC	**Curtain**	Fitting Space – Textile	1	• C100% pure cotton fabric lined with cotton sateen lining • Width: Double fullness • Height: From head support to 50mm clear of floor. • Hemming: 100mm base hem. • Side hemmed 50mm heading hem • AS 1530.2 and AS1530.3 compliant • Provide each curtain with a tear resistant label outlining cleaning methodology

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8.7 Furniture

8.7.1 General

Preamble:

Well considered furniture selection facilitates a variety of teaching methods and learning styles, enabling educators to create flexible environments that cater to the needs of all students.

Movable tables and chairs allow for easy reconfiguration of learning space layouts, promoting didactic teaching, collaborative work, group discussions, and individual study.

By incorporating a range of furniture options, such as tables of varying heights, a variety of seating options including upholstered seating areas, and multifunctional spaces, schools can be dynamic learning environments that support effective pedagogy and accommodate the diverse needs of learners.

The appropriate selection of furniture in learning environments plays a crucial role in promoting flexibility and accommodating diverse pedagogical styles. It enables educators to create flexible environments that cater to the diverse needs of all students and creates a more responsive and dynamic educational setting.

The furniture layouts shown in EFSG Part C are based on the specific requirements of each stage of learning and the different learning environments in which students and teachers spend time.

Modular, mobile and adaptable furniture shown in these layouts allow spaces to be easily reconfigured to support a range of teaching methods - from explicit instruction and group collaboration to independent learning. By enabling flexibility between layouts, furniture can enhance student engagement and improved learning outcomes. Educators can take advantage of the flexibility to design activities that are inclusive, engaging, authentic and connected.

For examples, lower seating and activity tables are included within the Learning Commons (LC) of Kindergarten – Year 2 for group practical activities. While for Years 7-10, there are options for high tables supporting collaborative work or options of individual desks for independent work.

Requirements:

- The colour and finish of furniture items are to be chosen from the supplier's standard range, with no custom colours, unless a justified exception is approved in writing by the Senior Project Director or equivalent Project Lead, including details on lead time and cost impact.
- Frames of chairs and tables must be in accordance with the original factory finish. Over coating of original powdercoat finishes are not suitable in schools as this may void warranties.

Refer to:

Including but not limited to the following:

- EFSG Part C
- Applicable sections within this document.

8.7.2 Tables

Preamble:

The specification of tables is to consider the intended function of the learning setting.

Requirements:

- Working surface provision:
  - Each student must be provided with a table space measuring a minimum of 600mm x 600mm. This must not be shared between students.

- Tabletop thickness:
  - Student tables with 4 legs are to have a minimum board thickness of 18mm and a metal subframe are to be provided.
  - Flip top tables are to have a minimum board thickness of 25mm.
- Tabletop finish:
  - Tabletop board are to be E0 rated within SSPs, Public Schools and High Schools
  - Tables within preschools are to be plywood or timber.
  - Tabletop finishes/colours are to be one of the following:
    - Whiteboard finish
    - Timber effect
    - White
    - Neutral colour
  - Laminate table surfaces within Science Laboratories and Dark Rooms must be chemical resistant.
- Tabletop detail:
  - Tabletop corners are to have a radius of nominally 20mm.
  - An ABS edge strip are to be provided to laminate tabletops.
- Table frames:
  - All student desks are to be height adjustable via a manual system.
  - Powdercoating to the legs of tables must be factory finish and from the supplier's standard range.
  - Powdercoat finishes to table legs are to be between 60 and 80 microns.
- Highly vibrant or bright colours that cause visual fatigue or overstimulate must not be used for table surfaces.

8.7.3 Workstations

Requirements:

- Workstations are to be a minimum size of 1500 long x 700mm deep.
- Fixings must be concealed.
- The components of the system must be capable of being demounted and reassembled.
- Allow for provision of privacy screens, monitor arms, cable trays and gromets within the furniture schedule as required.
- Where equipment requiring connection to power, data, or the like services is shown on the Drawings or specified to be installed as part of the workstation system make the necessary connections to the appropriate building service systems

8.7.4 Seating

Preamble:

The specification of seating is to consider the intended function of the learning setting and support individual preferences of learners.

Requirements:

- Chairs within GLS spaces are to typically be fully moulded polypropylene with backs.

- Seating within Learning Commons and Workshops are to support either the intended discipline, or informal learning. This may include:
  - Low height wobble stools
  - High stools with back for bench height tables
  - Upholstered lounge seating
  - Upholstered ottomans.
- Plastic chairs which are often used in direct sunlight or frequently used externally within covered learning areas are to be UV stabilised.
- Where used, powdercoating to chair legs must be factory finish and from the supplier's standard range.
- Chairs used for audience seating, i.e. within halls and gymnasiums, must have linking devices.
- Chairs used within spaces with timber flooring, such as halls and gymnasiums must have plastic caps to the legs to minimise scratching of floor finishes.
- Seat height must consider the age and height range of students.
  - Within existing schools seat height are to be informed by the School Principal.
  - Within new schools seat heights are to be referenced from the seating supplier's information and approved suitable in writing by the Senior Project Director or equivalent Project Lead.

8.7.5 Upholstery

Preamble:

To promote longevity of use, the finish of upholstery within schools must be robust and easily cleanable.

Requirements:

- Upholstered seating within student areas must be of a vinyl finish.
- Upholstered seating within staff areas may be of either a vinyl finish or other fabric from the furniture supplier's standard range.
- All upholstery must be of commercial heavy grade
- Upholstery must have a Martindale test of at least 125,000.
- Upholstery must comply with AS1530.3 and AS5637.1
- Where a specified vinyl or fabric is not from the furniture supplier's standard range, furniture supplier must confirm the proposed vinyl or fabric is appropriate for the intended application and the Senior Project Director or equivalent Project Lead must approve the custom selection with reference to cost and justification.

8.7.6 Storage

Preamble:

Storage furniture is to be specified aligned to the type of items being stored.

Requirements:

- Storage furniture must be fixed to walls to prevent toppling. Follow manufacturer's instructions.
- Laminate storage furniture board colours are to be from the furniture supplier's standard range.
- All Laminate storage furniture is to have 2mm ABS edge strips.
- Laminate board are to be E0 rated.
- Shelving is to be adjustable where possible.

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- Top shelves are to be no higher than 1700mm.
- Cabinets are to be lockable and keyed alike.
- Metal storage furniture is to be powdercoated between 60 and 80 microns. Specified powdercoat colours are to be from the supplier's standard range.

Placement of storage furniture must not block egress routes or restrict door swings.

Table 8.7.1 Storage Schedule

Code	Furniture Item	Location	Group	Requirements
TBC	**Flammable Liquids Cabinet**	Various Store Spaces	1	Proprietary cabinet compliant with AS 4452 with all sides, roof and liquid tight floor sump fabricated in double walled zinc coated steel sheet construction including self-closing, sequentially closing, key lockable doors. Must be suitable for the storage of all Class 3 flammable liquids. Regulations of Work Cover Authority, Chemical Safety Unit Capacity: 250 litres /100 litres Graphics: Provide text and graphics in accordance with relevant regulations.
TBC	**Security Key Cabinet**	Security Store	1	Heavy duty mild steel security key cabinet. Capacity: 140 keys; non-standard size. Lock: Security lock. Hinge: 16mm diam. fixed pin mild steel Surround: Anti-jemmy. Fixing height (nominal): 1110 mm Installation: To manufacturer's recommendations.
TBC	**Steel Safe**	Security Store	1	Fire resistant (fire resistant rating 1 hour) steel security safe complete with removable shelf and a lockable drawer/s. The safe is to be secured by pick resistant key lock Lock: 6 lever pick resistant lock Drawers: 1 or 2 lockable drawers Dimensions (nominal): 610H x 560W x 515D Weight: 300kg (nominal)

8.7.7 Bins

Table 8.7.2 Bins Schedule

Bin type	Public	Secondary	# Bins
Learning Space	24L Murfe stackable bins: General waste: red Paper and cardboard: blue		1 per type per learning space
	7L organic food scraps caddy	Organic caddies not recommended as no sip and crunch!	1 per learning space (Public only)
Playground	80 or 120L wheelie bins: General waste: red Co-mingled: yellow Return and Earn: white		1 per 75-100 students OR 1 per common area
Office/Staff Room	40 or 60L MultiSort bins: General waste: red Paper and cardboard: blue Co-mingled: yellow Return and Earn: white Note: Murfe bins may be more suitable in smaller areas		1 per Office / Staff Room
	7L organic food scraps caddy		Staff Kitchenette
Library	40/60L MultiSort bins: General waste: red 60/90L MultiSort bins: Paper and cardboard: blue		1 of each type by area
Canteen	40/60L MultiSort bins: General waste: red Paper and cardboard: blue		1 per office (canteen office
	Organic food waste: 7L food scraps caddy OR 23L depending on the volume of waste generated. More than 23L is not recommended due to the weight of organic waste.		Up to 2

8.8 Signage

Note: **This Section is being updated.**

Until the updated Section is published, the requirements the following pages of content unchanged from EFSG 2025 are to apply.

CONTENT UNCHANGED FROM EFSG 2025

0581 Signage

STATUS: This Section includes content unchanged from EFSG 2025.
It is retained for continuity and completeness until further development in future EFSG versions.

Until an updated version is published, the requirements set out below are to continue to apply.

00 Design Reference

0.02 Introduction

Appropriate Signage

This is required to identify the school, elements within the school and to assist students and visitors in finding their way about the school.

Statutory Signage

This is also required by building regulations, including the Building Code of Australia and the National Construction Code (NCC), to provide advice or direct occupants to specific function areas. All statutory signage is to be provided and installed to meet the requirements of the current building regulations.

Statutory Signage includes:

- Braille and Tactile signage to all Toilets, change spaces, showers etc. designed and fixed in location in accordance with the NCC requirements.
- directional signs to lifts
- Signage to entertainment venues
- Spaces within an Entertainment Venue
- Main electrical switch space
- Fire indicator panel, emergency evacuation plan and procedures

Signage is also to be provided to doors of services plant spaces such as electrical cupboards, communications cupboards, fire indicator panels and the main switch space.

Provide signage at the entrance of the site to indicate the location of the main electrical switch space and main fire panel, if not immediately obvious.

Signs are to be:

- Attached in appropriate highly visible locations.
- Provided to direct visitors to the school Administration Offices
- Securely screw or bolt-fix signs to a solid base.
- Ensure a strong contrast between lettering colour and background for best visibility. (minimum 30% light reflectance is recommended to enable visibility)

0.03 School Sign

Name of School with the year of completion in a prominent position at the approach to the school in relation to the main Entrance Zone (may be part of the fence).

Letters are to be a minimum 150mm high.

0.04 School Plan

The school plan signage shows the main block layout of the school and is located either:

- Adjacent to the car park and in a relevant position near the front of the school to assist visitors in finding their way to the Administration; or

CONTENT UNCHANGED FROM EFSG 2025

- Inside the school fence along the Main Entry path/pedestrian access to the Administration; or
- On the Administration front wall if close to the main Entrance Zone; or
- Located near the main car park (site specific)

0.05 Building Block Identifiers

Provide signs to identify each building block. The sign are to be attached to the building in highly visible location.

Block identification sign

- Overall sign height minimum 300mm
- Block letter i.e. A, minimum 250mm

Provide signs to identify specific core facilities (i.e. Administration, Library, Gymnasium, Communal Hall, Canteen)

The signs are to be attached to the building in highly visible location.

Core facility sign

- Overall sign height minimum 150mm
- Name "CANTEEN" minimum 100mm

Door Signs

Two (2) types of signs are required to doors:

- Fixed Room Identification Signs (AMS Door Signs)
- Variable Room Identification System

The intention is of the door signage is to easily identify each space for visitors, and asset management personnel.

Fixed Room Identification System (AMS Door Signs)

The AMS (Asset Management System) sign provides a reference used in DoE facility data collection.

Identification required e.g. AR0006 ('A' = Block A, 'R0006' = Space number)

Variable Room Identification System (AMS Door Signs)

The Variable Room Identification System is the public means of identifying spaces for school users.

Variable Room identification Sign Fixing should allow later interchange by the school.

- Public
  - Learning spaces to be numbered sequentially across the site e.g. 01, 02 etc.
- Secondary:
  - A sequential alphabetical code is to be given to individual blocks.
  - Learning spaces are to be numbered sequentially within each block e.g. B1, B2 etc. SEMINAR B1, SEMINAR B2 etc. and INTERVIEW B1, INTERVIEW B2 etc.
  - Stores are to be numbered sequentially across the site independently of the block i.e. STORE 1, STORE 2 etc.

0.06 Notice and Safety Signs

Provide notice and safety signs where required. Refer to Spaces Data Sheets for details of signs required.

04 Selection Specification

In accordance with current NATSPEC except as follows:

4.1 General Signs

GUIDE NOTE: Delete subclause "General Signs" in NATSPEC Building Template/ Worksection and replace with the following text.

Fixed individual characters

GUIDE NOTE: Include location on drawings. If location is not shown on drawings amend text below "Location" accordingly.

Sign: School Name

Location: Refer drawings

Characters:

- Material: Aluminium

GUIDE NOTE: E.g. “cast”. Check with manufacturers of aluminium signs for preferred method.

Method of forming:

GUIDE NOTE: Finish – powder coat (e.g. white), anodised or any other durable proprietary compatible finishing system

Finish:

- Minimum sign height: 200mm

Size:

- Letter height (minimum): 150 mm (check if sign/site is suitable for length of text)

GUIDE NOTE: Thickness can vary, depends on desired appearance. Check thicknesses available from sign manufacturers.

Thickness:

Typeface: Gill Sans. Upper and lower case

Fixing Method:

- Fix sign with concealed mechanical fasteners (screw or bolt) to a solid base.
- Mechanical fasteners: Minimum, 3 per letter.

GUIDE NOTE: Alternative free-standing pipe sign to be specified in metal fixtures.

GUIDE NOTE: Include door sign schedule if applicable. Nominate position (height from floor) of door sign to suit door type (E.g. glass panel door, flush door)

Sign: Engraved plates

GUIDE NOTES: Braille and tactile signage to be included in each access sanitary facility and each space with a hearing augmentation system. Refer to the Education Facilities Standards and Guidelines for project specific locations

Sign: Braille and Tactile signage

NCC reference: D3.6 (Amendment No.10).

Symbol: to comply with AS 1428.1

- International symbol of access to identify each access sanitary facility.
- International symbol of deafness to identify each space with a hearing augmentation system.

Sign: Student Toilets: Boys and Girls

Description

- Material: Engraved colour filled aluminium plate
- Thickness (minimum): 1.6mm
- Clear anodised surface finish
- Characters: Block Letters “BOYS” and “GIRLS”
- Characters in black
- Dimensions (nominal)
- Sign plate: 350 wide x 150 high
- Letter height: 75mm

Installation

- Screw and adhesive fix to a solid base
- Adjacent to entry/entries
- 1800mm from finished surface level to underside of sign

Sign: Labelling of buildings (eg “Enquiries”)

Description

- Material: Engraved colour filled aluminium plate
- Thickness (minimum): 1.6mm
- Clear anodised surface finish
- Characters: Block letters Signs: E.g. “ENQUIRIES”
- Characters in black

Dimensions (nominal)

- Sign plate (minimum): 100mm high
- Letter height (minimum): 70mm

Installation

CONTENT UNCHANGED FROM EFSG 2025

CONTENT UNCHANGED FROM EFSG 2025

- On buildings as documented
- Screw and adhesive fix to a solid base
- 1800mm from finished surface level to underside of sign

Sign: Signs on doors

NCC reference: D2.23 Signs on doors

GUIDE NOTE: AMS Door Signs door signs are permanently fixed generally consisting of 5 or 6 characters.

Sign: Fixed Room Identification System (AMS door signs)

Plate

- Material: Laminated plastic with contrasting coloured layers to match “Door Sign/s”
- Size (nominal): Text Width x 30mm (nominal)
- Finish: Depth of engraving sufficient to cut through top layer to reveal lower laminate

Characters

- Letter Height (nominal): 16mm
- Typeface: Microgramma bold extended / Helvetica medium / Helvetica Bold extended / Folio medium extended

GUIDE NOTE: Select one of the above typefaces.

Fixing Method: Slide-in fit to holder, centred on door. To secure plate, crimp end of holder and apply suitable waterproof adhesive, capable of permanently fixing sign.

Sign: Variable Room Identification System (Door Signs)

Plate

- Material: Laminated plastic with contrasting coloured layers.
- Size (nominal): Door width (-20mm each side) x 30mm (nominal)
- Finish: Depth of engraving sufficient to cut through top layer to reveal lower laminate.

Characters

- Letter Height (nominal): 16mm
- Typeface: Microgramma bold extended / Helvetica medium / Helvetica Bold extended / Folio medium extended

GUIDE NOTE: Select one of the above typefaces.

Fixing Method: Slide-in fit to holder. To secure plate, crimp one end of holder and apply "spot" of suitable waterproof adhesive, capable of being removed if required by breaking adhesive seal.

Sign: Fixed Room identification system (AMS door signs)

Changeable Plate System

Holder:

- Material: Extruded aluminium
- Finish Natural satin anodised to 10 microns (minimum)
- Size: Width of text x 32mm (nominal)
- Fixing method: Drill flat section in 3 places. Glue and screw fix with 3mm diameter countersunk screws.
- Position: Centre on door frame at top of door

GUIDE NOTE: Include Door Sign Schedule if applicable. Refer to Education Facilities Standards and Guidelines. Nominate position (height from floor) of door sign to suit door type (e.g. Glass panel door, flush door)

Sign: Variable Room identification system (door signs)

Changeable Plate System Holder:

- Material: Extruded aluminium
- Finish Natural satin anodised to 10 microns (minimum)
- Size: Width of door (-20mm each side) x 32mm (nominal)
- Fixing: Drill flat section in 3 places. Glue and screw fix with 3mm diameter countersunk screws.
- Position: Within range of 850-1000 from bottom of door. Centred.

Sign: Reflective signs

Block identification sign

GUIDE NOTE: The reflective signs described below is based on "3ms" diamond pattern reflective material. Other proprietary reflective signs that comply with the specification requirements described below may also be acceptable.

Description

- Material: Aluminium
- Pre-drilled fixing holes in each corner
- Reflective:
- Block letters: 250mm minimum

Colour

- Background: Blue
- Lettering: White

Dimensions

- 300 x 300mm (overall) minimum

Installation

- Screw fix to wall in each corner of the sign through pre-drilled holes with compatible non-corrosive screws
- 2100mm from finished surface level to underside of sign

Sign: Core Facility Signage

CONTENT UNCHANGED FROM EFSG 2025

Description

- Material: Aluminium
- Pre-drilled fixing holes in each corner and at a maximum of 300mm intervals
- Reflective
- Characters: Block letters

Colour

- Background: Blue
- Lettering: White

Dimensions

Sign height (overall): 150mm minimum

GUIDE NOTE: Name example “Canteen”

- Name height: 100mm minimum

Installation

- Fixing: Screw fix to wall through pre-drilled holes with compatible non-corrosive screws
- 2100mm from finished surface level to underside of sign

Sign: Notice

AUTHORISED USE ONLY – ENSURE CLEAR OF PEOPLE

Type: Engraved plates

Fixing: Screw or bolt fixed to a solid base.

Location: Directly above the key switch that operates the motorised sectional overhead doors.

- White background
- Sign wording in black

Dimensions (nominal): 200 wide x 76mm high

Refer to section 6.10 Doors within this document.

Description

Sign: Screen printed or cast vinyl with anti-graffiti clear film

- Type A

Screen-printed lettering and symbols on a heavy gauge “colorbond” metal or a 1.6mm thick powder coated finish aluminium. The panels to have rounded corners and mount holes in each corner.

- Type B

Cast vinyl lettering and symbols on a heavy gauge “colorbond” metal or a 1.6mm thick powder coated finish aluminium finished with anti-graffiti clear film to whole of sign. The panels to have rounded corners and mount holes in each corner.

Fixing: Screw or bolt fixed to a solid base.

Sign: Notice

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NOT TO BE USED FOR STORAGE

Locations:

- EDBs
- MSB (main switchboard space and cupboards)

Class: Notice

Letters: To AS 1319

Description:

- White background
- “NOTICE” printed on top of sign, blue background white text
- Sign wording in black printed under “NOTICE”

Dimensions (nominal): 300 wide x 225mm high

GUIDE NOTE: Include the following when fire compartmentation is required.

HS - Science Learning Unit - Fire Rated Doors

NCC reference: D2.23 Signs on Doors

Sign: Notice

MAIN SWITCHBOARD

Location: On doors of main switchboard enclosure.

Class: Notice

GUIDE NOTE: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Letters: To AS 1319

Description:

- White background
- “NOTICE” printed on top of sign, blue background white text.
- Sign wording in black printed under “NOTICE”.

Dimensions (nominal): 300 wide x 225mm high.

Sign: Notice (other)

“_____”

Class: Composite notice

GUIDE NOTE: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Letters: To AS 1319

Description:

- White background
- “NOTICE” printed on top of sign, blue background white text
- Sign wording and symbol in black printed under “NOTICE”

Dimensions (nominal): 450 wide x 300mm high.

Sign: Notice

NO THOROUGHFARE

GUIDE NOTE: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Letters: To AS 1319

Description

- White background
- “NOTICE” printed on top of sign, blue background white text.
- Sign wording in black printed under “NOTICE”.

Dimensions (nominal): 300 wide x 225mm high.

Sign: Regulatory Mandatory

- Type A

EYE PROTECTION REQUIRED <plus symbol>

- Type B

ENCLOSED FOOTWEAR REQUIRED <plus symbol>

Location: HS - Science Learning Unit - Science Laboratory and Preparation

Class: Composite

Symbol:

- To AS 1319
- Type (a): Table B2; 421
- Type (b): Table B2; 427

Letters:

CONTENT UNCHANGED FROM EFSG 2025

- To AS 1319
- Placed below symbol

Colour:

- White background
- Black border
- Blue symbol with black text

Dimensions (nominal): 300 wide x 450mm high

Height from floor: 1600mm to underside of sign.

Sign: Emergency

EMERGENCY STOP

Location:

- HS - Science Learning Unit - Science Laboratory
- HS - TAS MAT 2 Wood and Metal – Wood and Metal Workshop
- HS - TAS MAT 2 Wood and Metal – Materials Learning Space - Type 1
- HS - Visual Arts Learning Unit – Materials Workshop - Type 3

GUIDE NOTE: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Class: Word message sign

Letters: To AS 1319

Colour:

- Red background
- White wording

Dimension (nominal): 300 wide x 225 high

Sign: Emergency Information

MASTER CONTROL

Location: HS - Science Learning Unit - Science Laboratory

GUIDE NOTE: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Class: Word-message sign to AS 1319

Dimension (nominal): 450 wide x 180mm high

Sign: Emergency Information

CONTENT UNCHANGED FROM EFSG 2025

SAFETY SHOWER AND EYE WASH

Location: HS - Science Learning Unit - Science Laboratory

Class: Word-message sign to AS 1319

Dimension (nominal): 225 wide x 300mm high

Sign: Notice

STAFF ACCESS ONLY

Location: HS - Science Learning Unit - Preparation

Class: Notice (doors)

GUIDE NOTE: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Description:

- White background
- “NOTICE” printed on top of sign, blue background white text.
- Sign wording in black printed under “NOTICE”.

Dimensions (nominal): 300 wide x 225mm high.

Height from floor: 1520mm to underside of sign

Sign: Notice

STORAGE OF CHEMICALS PROHIBITED

Location: HS - Science Learning Unit - Apparatus Store and Apparatus Storage

Class: Notice

GUIDE NOTE: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Letters: To AS 1319

Description:

- White background
- “NOTICE” printed on top of sign, blue background white text
- Sign wording in black printed under “NOTICE”

Dimensions (nominal): 300 wide x 225mm high.

Height from floor:

- Apparatus Store

CONTENT UNCHANGED FROM **EFSG 2025**

  - 1600mm to underside of sign
  - Door: 1520mm to underside of sign
- Apparatus Storage
  - 1600mm to underside of sign. Sign: Hazard/Danger
- Type A

ACID

- Type B: Door

HAZARDOUS CHEMICALS

Location: HS - Science Learning Unit - Chemical Store

Class: Danger sign to AS 1319

Dimensions (nominal): 300 wide x 225mm high.

Height from floor:

- Type (a): 1600mm to underside of sign.
- Type (b) Door: 1520mm to underside of sign.

Sign: Regulatory Prohibition

NO SMOKING < plus symbol to AS 1428.1>

Table B1; 401

Location:

- HS - Science Learning Unit - Chemical Store
- HS - Outdoor Covered Workshop – LPG Store
- HS - Storage – Bulk Store
- HS - Canteen – Canteen Types 1, 2 and 3
- PS - Canteen – Canteen Types 1, 2 and 3

Height from floor:

1600mm to underside of sign.

Door: 1520mm to underside of sign.

Sign: Hazardous Materials

FLAMMABLE LIQUID 3 <plus symbol>

Location:

- HS - Science Learning Unit - Chemical Store
- HS - Visual Arts Learning Unit – Visual Arts Store

CONTENT UNCHANGED FROM **EFSG 2025**

- HS - TAS MAT 2 Wood and Metal – Wood and Metal Materials Store Type 2
- HS - Visual Arts Learning Unit – Visual Arts Store
- HS - Outdoor Covered Workshop – Pottery Store
- HS - Staff – Preparation/Printing Types 1 and 2
- HS - Storage – Bulk Store
- HS and PS - Storage – Cleaning Supplies Store
- HS - Agriculture – Shed Workshop

Type: Composite,

Class: Class 3 diamond sign

Reference: WorkCover's guideline Dangerous Goods DG062

Height from floor, doors: 520mm to underside of sign.

Height from floor: 1600mm to underside of sign.

Sign: Notice

EYE PROTECTION REQUIRED <plus symbol>

Sign: Regulatory Mandatory

EYE PROTECTION REQUIRED <plus symbol>

Location:

- HS - Visual Arts Learning Unit - Visual Arts Workshop
- HS - Visual Arts Learning Unit – Materials Workshop Type 3

Class: Composite

GUIDE NOTE: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Symbol: To AS 1319 Table B2; 421

Letters: To AS 1319

Colour:

- White background
- Black border
- Blue/white symbol with black wording under symbol.

Dimensions (nominal): 300 wide x 450mm high

Height from floor: 1600mm to underside of sign.

Sign: Notice

ART TROUGH MUST NOT BE USED FOR SOLVENT BASED PAINTS

Location

- HS - Visual Arts Learning Unit - Visual Arts Workshop
- HS - Visual Arts Learning Unit – Materials Workshop Type 3

Class: Notice

GUIDE NOTE: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Letters: To AS 1319

Description:

- White background
- “NOTICE” printed on top of sign, blue background white text
- Sign wording in black printed under “NOTICE”

Dimensions (nominal): Type (b): 300 wide x 225mm high

Height: Fixed to wall above Art Trough, 1600mm to underside of sign.

Sign: Notice

Type A

KEEP WORK SURFACES CLEAN. CLEAN UP AFTER SPILLAGES

Type B: Door

CHEMICALS USED IN THIS AREA

Location: HS - Visual Arts Learning Unit - Dark Room

Class: Notice

GUIDE NOTE: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Letters: To AS 1319

Description:

- White background
- “NOTICE” printed on top of sign, blue background white text.
- Sign wording in black printed under “NOTICE”.

Dimensions (nominal):

- Type (a): 450 wide x 300mm high

CONTENT UNCHANGED FROM EFSG 2025

- Type (b): 300 wide x 225mm high

Height from floor:

- Type (a): 1600mm to underside of sign.
- Type (b) (door): 1520mm to underside of sign.

Sign: Regulatory Mandatory

Type A

EYE PROTECTION REQUIRED <plus symbol>

HEARING PROTECTION REQUIRED <plus symbol>

FOOT PROTECTION (ENCLOSED FOOTWEAR) REQUIRED <plus symbol>

Type B

GUARDS MUST BE IN PLACE BEFORE SWITCHING ON

Location:

- HS - TAS MAT 2 Wood and Metal– Materials Learning Space - Type 1
- HS - TAS MAT 2 Wood and Metal– Wood and Metal Workshop
- HS - Visual Arts Learning Unit – Materials Workshop Type 3
- HS - Outdoor Covered Workshop – Outdoor Workshop

Class:

- Type (a): Multiple Composite to AS 1319 (three signs on one panel)
- Type (b): Word message sign to AS 1319

Symbols: To AS 1319

- Eye Protection: Table B2; 421
- Hearing protection: Table B2; 425
- Foot protection: Table B2; 427

Letters:

- To AS 1319
- Placed below symbol

Colour:

- Type (a):
  - White background Black border

  - Blue/white symbol with black wording
- Type (b): To AS 1319

Dimensions:

- Type (a): To AS 1319
- Type (b): 300 wide x 450mm high

Height from floor: 1600mm to underside of sign.

Sign: Notice

KEEP AISLES CLEAR

Location:

- HS - TAS MAT 2 Wood and Metal – Wood and Metal Workshop
- HS - TAS MAT 2 Wood and Metal – Materials Learning Space Type 1
- HS - Visual Arts Learning Unit – Materials Workshop Type 3

Class: Notice

GUIDE NOTES: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Letters: To AS 1319

Description:

- White background
- “NOTICE” printed on top of sign, blue background white text
- Sign wording in black printed under “NOTICE”

Dimensions (nominal): 300 wide x 225mm high.

Height from floor: 1600mm to underside of sign.

Sign: Hazard Warning

SPRAY PAINTING IS STRICTLY PROHIBITED

Location: HS - TAS MAT 2 Wood and Metal– Wood and Metal Workshop

Class: Hazard warning sign to AS 1319

Dimensions (nominal): 450 wide x 300mm high.

Height from floor: 1600mm to underside of sign above or adjacent acid bay.

Sign: Notice

THIS AREA IS UNDER VIDEO SURVEILLANCE

Location:

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- HS - Library – Main Entry – Type 1 and 2
- HS - Administration – Clinic – Boys
- HS - Administration – Clinic – Girls
- PS - Administration – Sick Bay Type 2

Class: Notice

GUIDE NOTES: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Letters: To AS 1319

Description:

- White background
- “NOTICE” printed on top of sign, blue background white text.
- Sign wording in black printed under “NOTICE”.

Dimensions (nominal): 450 wide x 300mm high.

Height from floor: 1600mm to underside of sign. Sign: Notice

ASSISTANCE REQUIRED IN ACCESS Toilet WHEN BUZZER SOUNDS

Location: HS – Library Unit – Access Toilet

Class: Notice

GUIDE NOTES: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Letters: To AS 1319

Description:

- White background
- “NOTICE” printed on top of sign, blue background white text.
- Sign wording in black printed under “NOTICE”.

Dimensions (nominal): 300 wide x 225 high.

Height from floor: 1600mm to underside of sign.

Sign: Notice

Assistance required in Access Shower/Toilet when buzzer sounds

Location:

- HS - Administration – Access Shower/Toilet
- HS - Student Services – Access Shower/Toilet – Type 2

- PS - Communal Hall Unit – Access Shower/Toilet
- PS - Student services - Access Shower/Toilet/Change

Class: Notice

GUIDE NOTES: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Letters: To AS 1319

Description:

- White background
- “NOTICE” printed on top of sign, blue background white text.
- Sign wording in black printed under “NOTICE”.

Dimensions (nominal): 300 wide x 225 high.

Height from floor: 1600mm to underside of sign.

Sign: Symbol to AS 1428.1

<Insert International access symbol>

Location:

- HS - Library – Access Toilet
- HS - Movement Complex – Access Shower/Toilet HS and PS - Change – Type 2
- HS and PS - Laundry – Type 2
- HS and PS - Staff Unit - Access Shower/Toilet
- PS - Student Services Unit - Access Shower/Toilet/Change
- PS - Communal Hall Unit – Access Shower/Toilet

Sign: Hazard/Danger

ELECTRICAL EQUIPMENT - AUTHORISED PERSONNEL ONLY

Location:

- HS – Library Unit – Communications Space
- PS – Library Unit – Communications Space

Class: Danger sign to AS 1319

Dimensions (nominal): 300 wide x 225mm high.

Height from floor, (door): 1520mm to underside of sign.

Sign: Notice

This store is for PE/Sports Equipment or Chairs ONLY.

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Doors ONLY opened for removal/returning of Equipment/Chairs.

Keep doors closed during Performances/Meetings/etc.

Location:

- HS - Movement Complex – Large Equipment Store
- HS - Movement Complex – Chair Store Type 1 and 2
- PS - Communal Hall Unit – Chair Store Type 1
- PS - Communal Hall Unit – PE Store Types 1, 2 and 3

Class: Notice

GUIDE NOTE: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Letters: To AS 1319

Description:

- White background
- "NOTICE" printed on top of sign, blue background white text.
- Sign wording in black printed under "NOTICE"

Dimensions (nominal): 450 wide x 300mm high.

Height from floor: 1600mm to underside of sign.

Sign: Notice

Keep doors closed during Performances/Meetings/etc

Location: HS - Movement Complex – Movement Studio Store

Class: Notice

GUIDE NOTE: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Letters: To AS 1319

Description:

- White background
- "NOTICE" printed on top of sign, blue background white text
- Sign wording in black printed under "NOTICE"

Dimensions (nominal): 300 wide x 225mm high.

Height from floor: 1600mm to underside of sign.

Location:

- PS - Communal Hall Unit – Chair Store Types 2 and 3

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- PS - Communal Hall Unit – Performance Store Types 2 and 3

Sign: Notice

THIS STORE IS FOR CHAIRS OR PERFORMING ARTS EQUIPMENT ONLY

DOORS MAY ONLY BE OPEN DURING PERFORMANCES/MEETINGS IF NO FLAMMABLE MATERIALS ARE PRESENT

Class: Notice

GUIDE NOTES: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Letters: To AS 1319

Description:

- White background
- “NOTICE” printed on top of sign, blue background white text
- Sign wording in black printed under “NOTICE”

Dimensions (nominal): 450 wide x 300mm high.

Height from floor: 1600mm to underside of sign.

Sign: Notice

This store is for Chairs or Performing Arts Equipment ONLY

Doors are ONLY opened for removal/returning of Chairs/Equipment

Keep doors closed during Performances/Meetings etc

Location: PS - Communal Hall unit – Performance Store Type 1

Class: Notice

GUIDE NOTES: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable

Letters: To AS 1319

Description:

- White background
- “NOTICE” printed on top of sign, blue background white text.
- Sign wording in black printed under “NOTICE”.

Dimensions (nominal): 450 wide x 300mm high.

Height from floor: 1600mm to underside of sign.

Sign: Notice

PLATFORM DESIGN LOAD

>kg/m2 uniformly distributed or

>kg concentrated point load

Location: HS - Movement Complex – Demountable Platform

GUIDE NOTE: Include the stage loading requirements. Refer to Structural Engineer.

Class: Notice

GUIDE NOTES: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Letters: To AS 1319

Description:

- White background
- “NOTICE” printed on top of sign, blue background white text
- Sign wording in black printed under “NOTICE”

Dimensions (nominal): 300 wide x 225mm high.

Height from floor: 1600mm to underside of sign. In a conspicuous position

Sign: Regulatory Mandatory

- Type A

HAND PROTECTION MUST BE USED <plus symbol>

FOOT PROTECTION (ENCLOSED FOOTWEAR) MUST BE USED <plus symbol>

WELDING MASK MUST BE WORN <plus symbol>

Location: HS - Outdoor Covered Workshop - Welding / Hot Metals Area

Class: Multiple Composite to AS 1319 (three signs on one panel)

Symbols:

- Hand Protection: Table B2; 426
- Foot protection: Table B2; 427

GUIDE NOTES: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

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- Welding mask symbol

Letters: Placed below symbol

Colour:

- White background Black border
- Blue/white symbol with black text
- Dimensions: To AS 1319

Height from floor: 1600mm to underside of sign

Sign: Regulatory Mandatory

LPG STORAGE - MAX 300 KG

Location: HS - Outdoor Covered Workshop – LPG Store

Class: Word message sign to AS 1319

Letters: Placed below symbol

Dimensions: 300 wide x 450mm high

Height from floor: 1600mm to underside of sign.

Sign: Hazard Warning

HOT OBJECTS

Location: HS - Outdoor Covered Workshop – Kiln Space

Class: Hazard warning sign to AS 1319.

Table B3; 441

Letters: Placed below symbol

Dimensions (nominal): 300 wide x 450mm high.

Height from floor: 1600mm to underside of sign.

Sign: Hazardous Materials

FLAMMABLE LIQUID 2 <plus symbol>

Location: HS - Outdoor Covered Workshop – LPG Store

Type: Composite,

Class: Class 2 diamond sign

Reference: WorkCover's guideline Dangerous Goods DG062

Height from floor: 1600mm to underside of sign.

Sign: Information

ENQUIRIES

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Location:

- HS - Administration – Public Reception Type 1 and 2
- PS - Administration - Entry Vestibule Types 1, 2, 3 and 4

Letter Height: 50mm.

Height from floor: 1600mm to underside of sign.

Sign: Notice

BOILING WATER

Location:

- HS - Staff - Staff Lounge Types 1, 2, 3 and 4.
- HS - Canteen – Types 1, 2 and 3 HS - Tea space
- PS – Staff – Staff Space Types 1, 2, 3 and 4
- PS – Canteen Types 1, 2 and 3

Class: Notice

GUIDE NOTES: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Letters: To AS 1319

Description:

- White background
- “NOTICE” printed on top of sign, blue background white text.
- Sign wording in black printed under “NOTICE”.

Dimensions (nominal): 300 wide x 225mm high.

Sign: Notice

ENSURE VENTILATION SYSTEM IN OPERATION

Location:

- HS - Staff – Preparation/Printing Types 1 and 2
- PS - Administration – Clerical/Printing Types 1 and 2
- PS - Administration – Clerical/Printing/Workspace Types 1 and 2

Class: Notice

GUIDE NOTE: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Letters: To AS 1319

Description:

- White background
- “NOTICE” printed on top of sign, blue background white text.
- Sign wording in black printed under “NOTICE”.

Dimensions (nominal): 450 wide x 300mm high.

Height from floor: 1600mm to underside of sign.

Sign: Notice

DEEP FAT FRYING IS NOT SUITABLE IN SCHOOLS IN THIS FACILITY UNLESS A MINIMUM OF ONE WET FOAM EXTINGUISHER OF 7 LITRES CAPACITY OR GREATER (SPECIFICALLY FOR THE USE OF WITH COOKING FAT AND OILS) IS PROVIDED ADJACENT TO THE DEEP FAT FRYING APPLIANCE BEING USED

Location:

- HS - Canteen – Canteen Types 1, 2 and 3
- PS - Canteen – Canteen Types 1, 2 and 3

Class: Notice

GUIDE NOTES: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements. Vinyl cut signs are not acceptable.

Letters: To AS 1319

Description:

- White background
- “NOTICE” printed on top of sign, blue background white text.
- Sign wording in black printed under “NOTICE”.

Dimensions (nominal): 450 wide x 300mm high.

Height from floor: 1600mm to underside of sign.

Sign: Security Notice

Special “Enclosed Land” sign developed by the Department of Education (DoE) Schools Security Unit Proprietary item: Department of Education – Schools Security Unit.

Location: HS and PS - Site – Fencing – Boundary

Sign locations: Installed on boundary fencing adjacent all entrances/gates.

Type: Proprietary durable vinyl signs with a full self-adhesive backing complete with peel-off release paper.

Installation: Apply to a clean dry interior surface.

Sign: Notice

100 LITRE MAXIMUM FLAMMABLE LIQUID STORAGE

Location: HS - Science Learning Unit - Chemical Store

Class: Notice

GUIDE NOTE: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements.

Letters: To AS 1319

Description:

- White background
- “NOTICE” printed on top of sign, blue background white text
- Sign wording in black printed under “NOTICE”

Dimensions (nominal): 250 wide x 180mm high.

Height from floor: 1600mm to underside of sign.

Sign: Hazard/Danger

TOXIC

Location: HS - Agriculture – Shed Workshop

Class: Hazard danger sign to AS 1319

Dimensions (nominal): 250 wide x 180mm high.

Sign: Notice

FOR STORAGE OF PESTICIDES, HERBICIDES AND TOXIC CHEMICALS

Location: Agriculture – Shed Workshop

Class: Notice

GUIDE NOTE: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements.

Letters: Upper case to AS 1319

Description:

- White background
- “NOTICE” printed on top of sign, blue background white text
- Sign wording in black printed under “NOTICE”

Dimensions (nominal): 250 wide x 180mm high.

Sign: Notice (Symbol)

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<Hand wash symbol>

Location

- HS - Canteen – Canteen Types 1, 2 and 3
- PS - Canteen – Canteen Types 1, 2 and 3

Class: Notice

GUIDE NOTE: Based on kitchen hygiene symbol

Description: Blue/white symbol of hands being washed under a tap with running water.

Dimensions (nominal): 200mm diameter.

GUIDE NOTE: Extend schedule as required

Sign: Warning

<Symbol>

PINCH POINT - CAN CAUSE SEVERE PERSONAL INJURY

STAND BEHIND LINE WHEN DOOR IS IN OPERATION

Location: On the face of each counterweight cover for motorised sectional overhead doors.

Class: Warning

GUIDE NOTE: Text for some signs may not be a standard item and will have to be customised to suit DoE requirements.

Letters: Upper case to AS/NZS 1319

Description:

- Yellow background
- Sign wording in back printed under the symbol.

Dimensions (nominal): 250 wide x 180mm high.

Height from floor: 1600mm to underside of sign.

Refer to 0454 Overhead doors

CONTENT UNCHANGED FROM EFSG 2025

4.2 Statutory Signs

GUIDE NOTE: Refer to NATSPEC Building Template – for statutory signs.

Portable fire extinguishers

GUIDE NOTE: Refer to NATSPEC Building Template – for statutory signs - portable fire extinguishers.

Table 01: Schedule of Portable Fire Extinguisher Signage

Item	Description
Position	>
Message	>
Letter size	>
Sign type	>
Compliance	>

9

Specialist Spaces

9.1 Toilets
9.2 Canteens
9.3 Technology and Applied Studies
9.4 Waste Collection
9.5 End of Trip Facilities
9.6 Laboratories
9.7 Stages in Halls

9.1 Toilets

9.1.1 General

Preamble:

The design of Student Toilets plays an important role in promoting a positive school environment and supporting students and staff well-being. Layout of Toilets must balance the requirements of privacy against the need for passive surveillance.

The NCC provides details of the numbers and types of sanitary facilities that are to be included based on the number of students and staff within a school campus.

The number of facilities required by the Department of Education for schools exceeds the current NCC requirements at the time of publication.

Student toilets are to be configured with the majority located on ground floor (and in the hall) where they are used most during recess, lunch, and before and after school.

The standardised service core lays out gender specific toilets, unisex accessible toilets, and designated male and female ambulant toilets on the ground floor. On upper levels a small number of student toilets in both Public Schools and High Schools are provided as airline-style gender-neutral toilets to meet requirements of regulation.

Additionally, in High Schools airline style Toilets are to be

- lockable
- designated for use by gender-neutral students and visitors when located on the entrance and playing level of the school

This arrangement allows for the efficient use of space for the core to also accommodate the required mechanical and electrical services, staff end of trip facilities, cleaners and store room.

Fundamental Principles to comply with:

1. Passive surveillance from Admin and staffed areas and visual and acoustic privacy to be provided

2. Student Amenity numbers and Toilet configurations to suit population

3. Environmental Considerations impacting adjacent spaces

4. Provision of a variety of amenity types, located to respond to site specifics

Requirements:

- The entrance to banks of Toilets is to be easily supervised from common areas, circulation walkways and open play space.
- A direct line of sight from adjacent spaces are to be provided to the entrance of Toilet cubicles.
- There are to be no direct line of sight from adjacent spaces into a Toilet cubicle.
- Gaps between doors and wall or cubicle partitions are not suitable.
- Toilets may be either airline style or in banks with partitions.
- For airline style Toilets gaps between doors and floors are to be no more than 20mm.
- For airline style Toilets gaps between doors and ceilings are to be no more than 20mm.
- Urinals are not to be included within new school facilities due to privacy and safety considerations and to align with anti-bullying designs.
- Circulation spaces designated for adults, such as those leading to maintenance areas and cleaner's spaces, must be separate from confined and poorly supervised student spaces, including those leading to Student Toilet spaces.

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- Circulation spaces leading to Staff Toilets must be separate from circulation leading to Student Toilets.
- As a minimum, one accessible Student Toilet is required to be included per building, per floor, and at 50% of Toilet banks. Ensure provision of Toilet facilities meet the requirements of current applicable regulation.
- Ambulant Toilets are to be included in Toilet banks. Ensure provision of Toilet facilities meet the requirements of current applicable regulation.
- Alarm system compliant with AS 2999 must be included.
- Mechanical ventilation must be included.
- Drawn plan layouts must designate whether Toilets are for Students or Staff.

Refer to:

Including but not limited to the following:

- EFSG Part C for Toilet layout configurations.
- Applicable sections within this document.

9.1.2 Student Toilets

Requirements:

In addition to Requirements in 9.1.1 General within this section, the following are requirements for Student Toilets in Schools.

- Student Toilets are to be distributed around the school and be grouped in small banks.
- Most Student Toilets are to be distributed near the canteen and adjacent to the main open space and play areas for use during recess and lunch break times.
- For new build multi-level schools, Student Toilets are to be available on every level.
- For upper-level Student Toilets, access from external circulation corridors is preferred.
- Student Toilets are to be 'stacked' where possible where a School has multiple levels.
- Student Toilets which are used out of hours must have access to separate toilets for both students and adults including accessible facilities.

9.1.3 Pre-School Toilets

Requirements:

In addition to Requirements in 9.1.1 General within this section, the following are requirements for Pre-School Toilets in Schools.

- Student Toilets must be accessed from both the play rooms and playground
- A clear line of sight must be provided for Staff from where they will be located to the Student Toilet spaces.
- Low height cubicle partitions must be included for student privacy.

9.1.4 SLH and SSP Toilets

Requirements:

In addition to Requirements in 9.1.1 General within this section, the following are requirements for SLH and SSP Toilets in Schools.

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- Student Toilets must be provided within Supported Learning Hubs and within each SSP GLS building. Type of Toilet facilities within SLHs and SSPs must be reviewed by the Senior Project Director or equivalent Project Lead to confirm they are suitable.
- Some SSP/SLH students have difficulty regulating their body temperature and may spend prolonged time within the shower/Toilet space semi-naked. Treat the shower/Toilet space as a habitable space for thermal comfort.
- At least one Adult Change Facility must be provided within all SLHs and SSPs unless advised otherwise by School Infrastructure's Accessibility Team. The following must be included:
  - Adult Change Table
  - Accessible Shower
  - Peninsular style Toilet
  - Ceiling hoist
  - Laundry
  - Accessories associated with the items noted above.

9.1.5 Adult Change Facilities

Preamble:

These facilities which are for student use, located within SSPs and SLHs, include specialised equipment such as a height-adjustable, adult-sized change table, an overhead hoist, and a peninsular Toilet. Unlike standard accessible Toilets, these facilities are specifically designed to accommodate individuals with high support needs who require assistance from carers.

Requirements:

In addition to Requirements in 9.1.1 General within this section, the following are requirements for Adult Change Facilities in Schools.

Fixtures, fittings and equipment within these spaces typically includes the following key items:

- Change Table
- Peninsular style toilet with drop down grab rails
- Accessible shower
- Accessible basin
- Laundry
- Mechanical ventilation

9.2 Canteens

9.2.1 General

Preamble:

The design and construction of Canteens are required to comply with current regulation including food safety standards, to provide a hygienic environment commensurate with their intended use.

Requirements:

As part of best building practice, the following must be included in Canteens:

- Avoid potential contamination sources such as incinerators, waste/bin storage, Toilets, soil pipes, vermin and unhygienic accumulations, by adequate seals or separating by distance.
- Facilitate cleaning generally by providing accessible and appropriate sanitary fittings and adequate hot and cold water for the washing of floors, benches, utensils, hands and food.
- Reduce vermin access and infestation by avoiding openings, penetrations or cavity voids (false backs, bottoms or similar hollow spaces) which are neither adequately sealed nor reasonably accessible for inspection and cleaning.
- Reduce unhygienic areas by providing easy-clean finishes and by minimising any unsealed cavities, crevices, cracks, loosely-butted joints or horizontal ledges which could accumulate deposits of food particles, liquids, grease, dust or floor washings.
- Facilitate cleaning, access and visibility for any unsealed small spaces that could harbour or provide access for vermin or accumulate unhygienic deposits.

Refer to:

The following is non-exhaustive and may include:

- **Food Standards Code Legislation**

  For convenience, the most relevant parts applicable to Canteens include:

  - Standard 3.1.1 Interpretation and Application
  - Standard 3.2.2 Food Safety Practices and General Requirements
  - Standard 3.2.3 Food Premises and Equipment
- **AS 4674 Design, construction and fit out of food premises**

9.2.2 The Use of Canteens in Schools

The use of Canteens in Schools can vary depending upon the type of food preparation that is undertaken within the space as well as the type of food being stored.

Requirements:

The minimum functions of use undertaken within a school canteen, are as follows:

- **Preparation of food** such as sandwiches, rolls and the like for distribution.
- **Heating of pre-prepared food** such as pies, sausage rolls and the like for distribution, undertaken in equipment such as pie ovens and /or microwave ovens.
- **Cooking on a cooktop**, whether that be a cooktop built in or a cooking appliance.
- **Boiling water** for the preparation of hot beverages.
- **Washing up** is usually able to be undertaken within a double sink providing the sink dimensions are large enough to fit a large saucepan as well as chopping boards of various sizes.

9.2.3 Canteen Design and Construction

Based on the use of a Canteen in a Schools noted above, a Canteen in a School is defined as Food Premises in accordance with current regulation.

As such, **a Canteen in a School is required to be designed and constructed to meet or exceed the requirements of regulation for Food Premises**.

Requirements:

Unless a higher standard is required in the relevant food premises standards then the following are to be considered the **minimum** requirements for school canteen areas:

- **Finishes** – generally to be free of open joints, cracks, crevices or openings in which grease, vapours or vermin may collect. The junction between differing wall finishes are to be finished flush and sealed. Floor to wall junctions is to be coved to enable effective cleaning of the surfaces.
- **Floor Coverings** – sheet vinyl without defects and welded at joints, coved at the junction between all walls and floors.
- **Ceilings** – to be smooth faced, non-absorbent sealed from dust and vermin and painted (gloss latex acrylic, light colour) to enable cleaning.
- **Ceiling light fittings** – are to be installed flush with the ceiling or provided with a diffuser cover to prevent accumulation of dust.
- **Ceiling grilles** – are not suitable in schools for roof mounted turbo-ventilators. If a turbo-ventilator is installed on a canteen roof, they are to only ventilate the roof space.
- **Walls** – to be solid masonry construction. Framed walls are not suitable.
- **Splashbacks** – minimum 450mm high splashbacks to all sinks, basins and benches, in easy to clean and water resistant material.
- **Servery Counter Tops** – smooth impervious material with rolled edge and without defects, or surface imperfections.
- **Food Preparation Surfaces** – seamless stainless-steel surface on sealed HMR particleboard and aluminium zinc coated steel sheet to the underside to seal particle board from moisture.
- **Solid plinths or bases** – are required to all floor mounted bench and cupboard units and are required to be sealed against vermin.
- **Clearance** – between fixtures are to be installed to allow effective cleaning.
- **Vermin and Fly Proofing** – to be provided to all external openings.
- **Hot and Cold Water** – to common outlets for double bowl stainless steel sink and hand basin.
- As part of the **Whole of Life** framework the selection of materials, services and equipment is to be undertaken to provide a facility that is fit for purpose, value for money and requires minimal maintenance.

9.2.4 Canteen Servery Shutters

Requirement:

- The canteen servery shutters must be designed and specified to ensure they cannot be dislodged from their guides.
- The shutter design is to prevent flammable materials from being pushed underneath the shutters, options include:
  - A step-up to the counter behind the shutter
  - A solid roller shutter.

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9.3 Technology and Applied Studies

9.3.1 General

Preamble:

The planning and fit out of spaces for the education of Technology and Applied Studies (TAS) include the design and construction for Workshops as well as associated spaces in Schools.

When a Technology and Applied Studies space or spaces are to be included in a school, **an Acoustic Consultant is required to be engaged to assess acoustic requirements for the spaces** so that they can be implemented in the design and construction.

Requirements:

TAS spaces are to:

- Support safe delivery of NSW curriculum and VET qualifications.
- Enable clear teacher supervision and demonstration.
- Provide efficient material flow, storage and maintenance.
- Minimise whole-of-life costs and environmental impacts.
- Allow flexibility for future equipment changes.
- Comply with DoE_TAS_Equipment_Safety_Zones.
- Allow clear sightlines in Workshops for one teacher to be able to view benches, equipment and exits.
- Show equipment safety clearances in design layouts, including operator zones and traffic ways.
- Provide robust, quiet, low-maintenance dust and fume control with plant equipment located to minimise noise and floor-area impacts.
- Provide safe receipt, storage and handling of long materials and gas cylinders.
- Provide flexible power and bench layouts to support future equipment changes.
- Be assessed by a specialist consultant to determine the effects of vibration associated with equipment in order to establish solutions to minimise its vibration affects to the buildings construction integrity and the users of the space.
- Provide protective mesh to windows located in proximity to equipment that may generate projectiles.
- Control glare to the demonstration wall and equipment.
- Not incorporate mezzanine storage.

Definitions of Zones for TAS spaces in Schools:

- **Operator zone**: the designated floor area for the machine operator, treated as a three-dimensional volume to ceiling height
- **Traffic way**: the circulation route for students and staff between machines and benches.

Refer to:

Including but not limited to the following:

- Current regulation associated with work health and safety requirements
- DoE Equipment Safety in Schools (ESIS) guidance.
- Applicable sections within this document.

9.3.2 Location of Spaces

Preamble:

There are functional relationships between Technology and Applied Studies (TAS) spaces that are required and subsequently determine the location of those spaces within Schools.

Requirements:

WORKSHOP LOCATION

- Locate Workshops at ground level with direct external access for deliveries and emergency egress.

ADJACENT SPACES AND FUNCTIONAL RELATIONSHIPS

- Provide a **Materials Store** and a separate **Project Store** located adjacent to each other and connected directly to a Workshop.
- Provide external vehicular access for loading of stores to each Materials Store with an industrial grade roller door opening between the Material Store and Workshop, that has a clear opening width of 1.5 metres or greater.
- Provide a dedicated **Materials Breakdown** area that may include a guillotine, cold saw/horizontal bandsaw or similar, along a wall adjacent the Materials Store, with feed-in/feed-out capacity for up to 6 metre length pieces of material.
- Provide an enclosed laser/3D **Printer Space** within the TAS hub adjacent to a GLS, accessible from Workshops, with independent ventilation/extraction.
- Provide a **Covered Outdoor Work Area** (COWA) or **WandM Ancillary Workspace**. This may be co-located to serve multiple Workshops where supervision, noise and dust can be managed.
- **Welding Bays** are to be 2 metres wide × 2 metres deep baseline modules configured as double bays.
- Locate gas storage outside.

9.3.3 Layout of Spaces

Preamble:

It is important to ensure that Technology and Applied Studies (TAS) spaces including the location of equipment and work areas are laid out in a safe and usable manner to minimise the risk of injury.

Requirements:

The criteria to be assessed when spatial planning TAS Learning Spaces, in order of priority, are:

1. Enough workbench space to cater for 24 students
2. Benches are to be 1200mm apart
3. Space to enter the various doorways
4. Operating zones and traffic-ways
5. Instruction by teachers
6. Equipment maintenance
7. Sufficient wall space for wall mounted tool storage
8. Occasional larger projects
9. Workshop spaces containing equipment must be configured to provide a clear line of sight for one teacher over the whole class including visibility over the machines.
10. Space Geometry:

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  - Workshops are to be proportioned to allow a 2 metre × 3 metre grid of student benches with a defined teacher demonstration wall (whiteboard/AV) and clear sightlines from all benches.
  - Avoid long, narrow spaces.

WORKSHOP EGRESS

- Each exit/entry door opening to a Workshop are to have a clear opening greater than or equal to 1.5 metres. Ensure to meet the requirements for minimum egress width in accordance with regulation.
- Each exit/entry door opening to a Workshop is to be kept free of obstruction.
- Each Workshop is to have more than one egress route.
- Locate equipment adjacent to exits only where they will not impede egress.
- Align main circulation paths with exit/entry door openings.

9.3.4 Fitout of Spaces

Preamble:

The furniture, fixtures, and equipment (FFE) for metal and woodwork workshops must be carefully selected to enhance functionality, safety, and efficiency, ensuring that the space effectively supports a diverse range of creative and technical projects.

Requirements:

WORKSHOPS

- Provide a teacher demonstration bench with whiteboard/AV and secure storage for hand/power tools.
- Provide minimum 6 benches accommodating 4 student each with bench vices for each student to allow for a class of 24 students.
- Cap student workstations at a maximum of 24 per workshop.
- Student benches are to maintain ≥1200 mm clearance between benches and to traffic ways.
- Benches are to generally be unfixed to allow reconfiguration; fix only where required for safety.
- Provide a cleaner's sink and adjacent finishing area in each wood workshop for projects.
- Provide a cleaners sink in each metalwork workshop.
- Provide wall-secured PPE storage near the entry.
- Provide a first aid kit in an accessible, visible location.
- Provide bag storage outside the workshop or in an entry alcove.
- Wood workshops are to have access to a least one circular saw, thicknesser and core hand/power tools consistent with syllabus delivery.
- Procure fixed machinery via the DoE SINSW TAS Machine and Plant Contract Alternative suppliers or non-approved models are to not be used.

WELDING BAY

- Provide 2.1m high fixed back wall. Side boundaries of welding bays are to be sheet curtains; provide 100 mm floor clearance to curtained edges; the front are to provide entry/exit and visual screening to the rest of the workshop.
- Provide an insulated welding mat to each welding bay.

STORAGE

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- Materials Store: provide proprietary cantilever or equivalent floor-supported racking for 6–8 m long timber and metal. Design the floor capacity, clearances and turning circles for deliveries of long timber and metal items.
- Project Store: Provide adjustable shelving for ≥18 major projects per workshop.
- Shelf Depth: 600 – 900mm
- Timber Workspace racking for sheets Wood / metal refer to EFSG1.0 SG 410/3
- Metal Workspace: Racking for Metal Workspace refer to EFSG1.0 SG 410/5
- Load signage: Each bay must display its certified load rating
- Racking design and specification must comply with FEM 10.2.09 – Design of Cantilever Racking and be reviewed by the project Structural Engineer.

9.3.5 Workshop Finishes

Requirements:

- Floor finishes must be durable and have a non-slip finish compliant with HB 197 and HB 198.
- Floor finish must be designed for machine weight and to withstand damage from dropped tools.
- Provide stainless-steel splashbacks to wet areas and drinking troughs.
- Provide stainless steel mesh to windows within 2 m of machinery.

9.3.6 Equipment

Requirements:

- All equipment is to be identified and tagged.
- All existing and new machines are to have lockable isolation. Install wall mounted lockable isolators to lock machines when not in use, (keyed switches/padlocks).
- Heavy machinery designed for fixed operation are to be bolted to a stable support to prevent movement or instability; portable machines are to be used only where designed for mobility.
- TAS workspace equipment must be purchased from the DoE SINSW TAS Machine and Plant Contract.
- Ensure an earthing control panel and associated elements are provided to each welding bay where a welder will be used.

This is a list of the minimum TAS equipment required for new build for Stages 4 and 5 curriculum:

Table 9.3.1 TAS Wood Workspace Equipment Requirements

Code	Qty	Item	Power requirement	Dust extraction required (Y/N)	Comment
M-D	1	Drilling machine, floor mounted	240V single phase or 415V 3 Phase (recommended)	N	
M-G	1	Machine Grinder	240V single phase	N	
S-BW	1	Bandsaw (wood)	240V single phase or 415V 3 Phase (recommended)	Y	

L-WL	2	Lathe, Wood - long bed	240V single phase or 415V 3 Phase (recommended)	Y	
DS-300	2	Disc Sander	240V single phase or 415V 3 Phase (recommended)	Y	
S-CW	1	Saw, Circular, tilting arbor	240V single phase or 415V 3 Phase (recommended)	Y	
TH-W	1	Thicknesser	415V 3 Phase (recommended)	Y	
M-HC	1	Mortising Machine	240V single phase	N	Optional - only for stage 5 and stage 6
RT-ST	1	Router Table	240V single phase	Y	Optional - only for stage 5 and stage 6
DR-SAW	1	Drop Saw on bench	240V single phase	N	Optional - only for stage 5 and stage 6
T-WB	6	Timber Work bench			For 24 Students: Dim W1200 x D1200 x H860

Table 9.3.2 TAS Metal Workspaces Equipment Requirements:

Code	Qty	Item	Power Requirement	Comment
M-D	2	Drilling machine, floor mounted	240V single phase or 415V 3 Phase (recommended)	
M-G	1	Machine Grinder	240V single phase	
M-GB	1	Combination Grinder / Buffing Machine	240V single phase	
M-DM	1	Drilling/Milling Machine	415V 3 Phase	
M-F	1	Magnetic Folder	240V single phase	
G-SM	1	Guillotine, Sheet Metal	N/A	
L-M	2	Lathe Metal	240V single phase or 415V 3 Phase (either)	
S-CM	1	Saw, Cold Metal	415V 3 Phase	
S-BMV	1	Bandsaw, Metal Vertical	240V single phase or 415V 3 Phase (recommended)	Optional - only for stage 5 and stage 6

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M-WB	6	Metal Work bench	For 24 Students: W1200 x D1200 x H860

Table 9.3.3 TAS Welding Bay Area:

Code	Qty	Description	Power requirement	Comment
B-HT	2	Bench Heat Treatment /Welding		W1095 x D645 x H855
W-EA	2	Welder, electric arc 200amp	240V single phase	
P-WISO	2	Welding Bay Isolator Panel	415V 3 Phase	
G-MIG	2	Gas metal arc welder 200amp		
W-MAT	2	Welding Matt	NA	
W-CUR	5	Welding Curtains	NA	
W-FWXT	2	Welding Bay Fume Extraction Flexible Arms with inline fans	240V single phase	
M-WFB	2	Mobile Welding Fume Bench	240V single phase	Optional Equipment

9.3.7 Equipment Layout

Requirements:

- Arrange machines to maintain teacher sightlines. One long machine run is preferred; place lathes at ends; locate drills/grinders to walls; position optical devices away from dust sources.
- Provide greater clearance on out-feed than in-feed for thicknessers, bandsaws and table saws to enable safe handling of long workpieces.
- Where machines are back-to-back, provide impact-resistant transparent screens from 0.1 m to 1.5 m above floor without reducing required clearances.
- Operator zones and Traffic ways are to be shown to scale on plans and marked on the floor; treat as three-dimensional volumes to ceiling height.
- Operator zones are to be in accordance with DoE TAS equipment Safety Zones and are to not overlap other operator zones.
- Traffic ways are to be ≥600 mm and are not to overlap operator zones.
- Must comply with DoE_TAS_Equipment_Safety_Zones.
- Each machine and traffic-way must have its own designated safe operating area that is clearly marked on the floor with safety line which provides 30% luminance contrast against the floor finish.
- The line is to be 50 mm wide.

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9.3.8 Power, Data and Controls

Requirements:

- Provide outlets for power tools above workbenches.
- Provide outlets for power tools with shelves where tools are stored so they can re-charge.

9.3.9 Dust, Fume and Ventilation

Requirements:

- Locate central dust extraction plant outside the workshop footprint to reduce noise and save internal floor area. Coordinate slab-to-slab height with ductwork and equipment.
- Do not connect laser/3D printer exhaust to wood dust systems.
- Laser cutters/engravers are to connect to a dedicated extraction system (ducted to atmosphere above roof with rigid duct and weather cap). The system is to operate whenever equipment is in use.
- Provide local exhaust at finishing areas.
- Welding bays are to have source extraction (e.g. articulated arms) and isolation where required
- 3D printing: select low-emission materials where practical and provide sealed storage for resins/filaments; provide local extraction to manage fumes.
- Where multiple 3D printers are installed, extraction is to be designed to accommodate all of them.

9.3.10 Gas Storage

Requirements:

- Gas cylinders: provide an external, covered, ventilated, segregated and secure store with restraints and signage.
- Separate incompatible gases per AS 4332.
- Locate near a safe drop-off/exchange point.
- Maintain greater than or equal to 3 metre separation between oxidising/inert and flammable cylinders or provide a compliant non-combustible fire-rated barrier.
- Provide a dry-chemical extinguisher within 5 m of and vehicle access for cylinder exchange.

9.4 Waste Collection

9.4.1 General

Requirements:

All new buildings and refurbishment projects are to meet the below requirements:

- **Collection of Waste Streams:** Provide bins to allow separation of General waste, Recycling streams (including paper and cardboard, glass, and plastic), Food organic (FO) and food organic and garden organic (FOGO), One additional waste stream (e-waste, batteries, etc.), and Any other stream with more than 5% of total annual operation waste and resources (by volume).
- **Mobile Waste Containers:** Designers are to refer to AS4123.7 Mobile waste containers - Colours, markings, and designation requirements for further guidance on bin colour, waste stream and waste type.

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- **Dedicated Waste Storage Area:** Provide dedicated area(s) for storage and collection of applicable waste streams. Storage area is to be sized by the Waste Consultant for each project to accommodate all applicable waste streams for at least one collection cycle. Calculations to be done based on third-party best practice guidelines. Ensure safe access by collection vehicles. The waste streams are to include provision for batteries, pesticides, lamps that may contain mercury, other mercury-containing equipment (including thermostats and thermometers), and electrical and electronic equipment present or expected to be present within the project during the building operations.
- **Sign-off by Waste Specialist and/or Contractor:** Storage areas design are to be signed off by a waste specialist and/or contractor to confirm the appropriateness of size, location and separation.

Refer to:

Including but not limited to the following:

- Green Star Buildings Credit 4 – Responsible Resource Management for detailed requirements
- NSW Department of Education's Waste Handbook: A practical guide to introducing waste separation into schools (October 2023) for current waste separation guidance for schools.
- Applicable sections within this document.

9.5 End of Trip Facilities

9.5.1 General

Requirements:

No requirement for small projects.

All large projects (new buildings and refurbishments) are to meet the below requirements:

- End of Trip Facilities must be accessible, inclusive, safe and protected from the elements.
- End of Trip facility users are to have access to lockers, showers and building entry.
- Clear signage is to be provided to End of Trip facilities.
- Changing space facilities must be provided with showers.
- Showers: Provide the appropriate number of showers for regular occupants or staff. Statutory accessibility showers and Bath Rooms do not count towards the below End of Trip minimum showers requirement:
  - 0-49 FTE staff: 1 Unisex shower
  - 55-99 FTE staff: 2 showers
  - 100-200 FTE staff: 4 showers
  - 200+ FTE staff: additional 1 per 200 occupants above 200
- Lockers: Provide a minimum of one locker for every eight regular occupants or staff. These are to be in the changing spaces.

Refer to:

Including but not limited to the following:

- Green Star Buildings Credit 27 – Movement and Place – Minimum Expectation for detailed requirements

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- GNCC Technical Question R-14416 for the GNCC approved approach for School Infrastructure projects.
- Applicable sections within this document.

9.6 Laboratories

Note: **This Section is being created.**

Until this section is created, please refer to other Parts of the EFSG, and seek direction from the Senior Project Director or equivalent Project Lead for requirements.

9.7 Stages in Halls

Note: **This Section is being created.**

Until this section is created, please refer to other Parts of the EFSG, and seek direction from the Senior Project Director or equivalent Project Lead for requirements.

10 Appendices

10.1 Warranties

10.1 Warranties

Requirements:

SOLAR PANELS

There are specific requirements for Photo-Voltaic Solar Panels including submissions required to be made to the Senior Project Director or equivalent Project Lead.

PV modules are to have a minimum warranties as follow:

- 15 year product warranty.
- 25 year performance warranty (>85% performance)
- 10-year inverter warranty
- 10-year workmanship warranty
- manufacturer warranty contact info
- The System Provider are to provide an installation workmanship warranty for a minimum of 10 years. This includes a full onsite replacement of a faulty inverter if required. The system provider are to also provide a 12 and 24 months operations and maintenance service. This may entail remote monitoring, review of generation data against design capacity, module cleaning and general inspections.
- A report is to be submitted on the findings of the 12 and 24 month maintenance service, and any rectification work that was done or needs to be addressed

The following warranty period applies to each particular item listed in the following Tables.

Table 10.1.1: Major Services Warranties

Item	Warranty Period
All electrical trades and equipment (unless listed below)	2 years
All mechanical trades and equipment (unless listed below)	2 years
BMCS	10 years
Fire services	2 years
Hydraulic services installations	2 years
Switchboards	10 years
Light Fittings	5 years
Lifts	5 years
Electronic security system	7 years
Active communications equipment	7 years
Structured cabling system	20 years
Solar PV and energy storage systems	

• PV Module product	15 years
• Optimiser	25 years
• Inverter	10 years
• Inverter Enclosure	5 years
• Framing System (PV mounting Structure)	15 years
• Batteries (for energy storage systems)	5 years

Table 10.1.2 External (General Elements) Warranties

Item	Warranty Period
Bicycle racks	7 years
Structural steelwork corrosion protection	15 years
Bollards	7 years
Metal fencing	10 years
Handrails and balustrades	10 years
Stair Nosing	7 years
Street furniture	7 years

Table 10.1.3 Door Assembly Warranties

Items	Warranty Period
Aluminium and Glass Doors	10 years
Aluminium door frames	10 years
Auto doors	3 years
Door closers	2 years
Door hardware Electrical and electronic components	2 years
Door hardware Finish	25 Years
Door hardware General	25 years
Door hardware Keys	2 years
Fire rated steel door frames	7 years
Fire shutters	7 years
Hold open devices	2 years
Metal Louvred doors	7 years

Operable Walls	7 years
Roller shutters (external)	7 years
Roller shutters (internal)	7 years
S/S Kick plates	7 years
Steel door frames	7 years
Timber doors	7 years

Table 10.1.4 Membranes Warranties

Item	Warranty Period
Balcony slabs	20 years
External and Tanking	20 years
Planter boxes	20 years
Wet Areas	20 years

Table 10.1.5 Roofing Warranties

Item	Warranty period
Colorbond Gutter / Down pipe systems	15 years
Metal Roofing (e.g. Colorbond)	15 years
Other types: Tiled Roofing – 30 years, Slate roofing 80 years,	
Roof Insulation and sarking materials	15 years
Roof membrane (concrete roof systems)	20 years
Stainless Steel gutter and downpipe systems	15 years
Underslab Insulation	15 years

Table 10.1.6 Ceiling Systems Warranties

Item	Warranty period
Ceiling systems	7 years

Table 10.1.7 Roof Access Safety Systems Warranties

Item	Warranty Period
Coating stability and colour retention of components	15 years

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Faults in supplying and installing components	25 years
Integrity of components	25 years

Table 10.1.8 Joinery Warranties

Item	Warranty Period
Bath Room cubicle partitions	7 years
Carcass and doors	7 years
CORIAN Benchtop	7 years
Joinery in wet areas	7 years
Reception Joinery	7 years
Servery joinery	7 years

Table 10.1.9 Façade, Windows, Roof Lights, Screens, Louvres Warranties

Item	Warranty Period
External façade (General)	15 years
Glazing and coatings	15 years
Framing system	15 years
External metal louvres, grilles and screens	15 years
Sunshading devices (aluminium)	15 years
Paint finishes	10 years
Brick / blockwork	25 years
Metal Finishes (ALPOLIC)	15 years
FC sheeting cladding systems and eaves systems	25 years
VITRA PANEL	15 years
Steel Galvanising	15 years
Applied finishes to steel	15 years
Metal wall cladding	15 years
External window systems	15 years
Internal glazed screen / partition systems	15 years
Roof lights	10 years

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Canopies	10 years

Table 10.1.10 Floor Finishes (internal) Warranties

Item	Warranty Period
Resilient Finishes	7 years
Vinyl skirting	7 years
Ceramic tiles	7 years
Carpet tiles	7 years
Carpet Broadloom	7 years
Floor Expansion joints	25 years
Timber flooring	7 years
Entry Mats	7 years

Table 10.1.11 Wall Finishes Warranties

Item	Warranty Period
Paint (internal)	7 years
Paint (external)	7 years
Resilient Finishes	7 years
Render/plaster	7 years
Acrovyn Products (door and wall protection, corner guards, handrails etc)	15 years
Wall Tiles	7 years
Timber lining	7 years

Table 10.1.12 Bath Rooms / Toilets Warranties

Item	Warranty Period
Sanitary ware	7 years

Mirrors/glass splashbacks	7 years
Fittings, fixtures and accessories	7 years

Table 10.1.13 Other Items Warranties

Item	Warranty Period
Fire stopping systems and compounds	10 years
Food service equipment	2 years
Furniture	7 years
Monitor brackets	7 years
Signage	7 years
Blinds	7 years
Termite Management	1 year
Light Fittings	5 Years

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