Technical note:
Special school evacuation guideline

Review of evacuation considerations and design

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Fire Engineering Special School Evacuation		
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Contents

Executive summary

The intent of this document is to generate design recommendations for the safe egress of occupants during an evacuation from special schools, with particular consideration for occupants with a mobility impairment. These recommendations take into consideration specific functions and uses, building height, generalised layouts, and readily available operational plans, as well as the higher proportion of occupants with a mobility impairment typically seen in special schools. The intent is to provide a framework to homogenise the evacuation design process and approach implemented across special schools.

The Department of Education recognises effective Safety in Design is essential for successful and safe project delivery. For the delivery of new special school facilities, it is considered that the use of stairs is not a suitable means of evacuation for occupants with a mobility impairment. The design team must identify and establish appropriate safety requirements for the design and operation of a building with regard to the evacuation of all occupants. It is recommended that the evacuation strategy for the building is reviewed by a suitably qualified fire engineer for the explicit purpose of reviewing evacuation of mobility impaired occupants.

This document is designed to assist in making information regarding evacuation of all occupants easily available. However, the Department of Education does not accept any responsibility for the use of the information contained in this document and makes no warranty or representation whatsoever that the information is an exhaustive treatment of evacuation potential for all special school buildings. Users are required to exercise their own skill and care with respect to its use. In any important matter, users should carefully evaluate the scope of the treatment of the particular subject matter, its completeness, accuracy, currency and relevance for their purposes, and should obtain appropriate professional advice relevant to their particular circumstances. In particular, and to avoid doubt, the use of this document does not:

- guarantee acceptance of a design or building solution by any entity authorised to do so under any law;
- guarantee fire safety within a building; or
- absolve the user from complying with any legal requirements.

1.0 Introduction

1.1 General

The aim of this document is to provide generalised design considerations for the evacuation of occupants with a mobility impairment from special schools, taking into consideration specific functions and uses, building height, generalised layouts, and readily available operational plans. The intent is to provide a framework to homogenise the evacuation design process and approach across special schools.

The focus of this document is to review and provide guidance on the evacuation considerations for mobility impaired occupants in an emergency. General day-to-day access to and egress from the buildings is under non-emergency conditions and hence is outside the context of this document.

1.2 Scope

The scope is to provide, through a fire engineering lens, a generalised design consideration pathway for the evacuation of mobility impaired occupants from special schools.

This document provides:

- A review of the potential evacuation modes, including horizontal exits (i.e., on floor compartmentation and egress to adjacent buildings), ramps, refuge areas, lifts (including stretcher lifts), and stairs.
- A flow chart to inform the design of evacuation for new special school facilities with recommendations for appropriate fire engineering provisions.

1.3 Objectives

The objective of this document is to provide design guidance on the safe evacuation of occupants with a mobility impairment and to help de-risk the design process as much as possible during the earliest stages of design.

It is acknowledged that there will frequently be more than one acceptable solution to a design problem and that individual designs may differ in their approach to providing suitable evacuation principles for occupants with a mobility impairment.

1.4 Applicable legislation and regulatory framework

The following Regulatory Framework is applicable:

- *Professional Engineers Act 2002* and subsequent amendments.
- *Queensland Building Act 1975* and subsequent amendments.
- *Queensland Building Fire Safety Regulation 2008* and subsequent amendments.
- *Queensland Fire and Emergency Services Act 1990* and subsequent amendments.
- *Queensland Work Health and Safety Act 2011* and subsequent amendments.
- *Queensland Building Regulations 2021* and subsequent amendments.
- *National Construction Code (NCC) 2022 Volume One, Building Code of Australia (BCA) Class 2 to Class 9 Buildings.*

1.4.1 *Queensland Work Health and Safety Act 2011*

The *Queensland Work Health and Safety Act 2011* needs to be compiled with in its entirety, as a general theme it is required that, so far as reasonably practicable, the health and safety of occupants (e.g., staff and students) must be ensured and/or the risks minimised where there are unable to be eliminated. This legislation contains relevant information for the Person Conducting a Business or Undertaking (PCBU) in Queensland and describes the overarching Legislative Lawful obligations for Work Health and Safety in Queensland.

2.0 Available evacuation modes

2.1 Mobility impaired evacuation

It is noted that, as representative of the general population of special schools, there is expected to be a higher proportion of occupants with a mobility impairment. While the NCC does not explicitly cater, or have any specific provisions, for egress of persons with a mobility impairment, Performance Requirements D1P4 and D1P6, evacuation should be appropriate to "the number, mobility and other characteristics of occupants". Therefore, it is expected that occupants with a mobility impairment should be provided with similar or at least suitable provision to enable their safe evacuation from the building.

Having a mobility impairment refers to a condition or limitation that affects an individual's ability to move around and perform everyday activities independently. This impairment can result from various causes, including physical disabilities, medical conditions, or injuries, and it may manifest as difficulty walking, standing, or using one's limbs effectively. Mobility impairments can vary in severity, ranging from minor limitations to more profound challenges that necessitate the use of mobility aids like wheelchairs, crutches, or walkers.

Evacuating individuals with mobility impairments presents a host of complex challenges that demand special attention and tailored strategies. Individuals with a mobility impairment, including those who use wheelchairs, walkers, or have limited mobility, face obstacles during emergencies that require careful consideration.

Firstly, the physical barriers of stairs and uneven terrain can hinder their quick and safe evacuation. Traditional evacuation routes may be inaccessible, necessitating the identification of alternative paths or the utilisation of evacuation aids such as evacuation mattresses, stair chairs, or other devices.

Secondly, communication can pose a challenge, as some individuals with mobility impairments may have difficulty alerting others about their need for assistance during emergencies. Ensuring clear communication methods and accessible alert systems is crucial.

Thirdly, the time-sensitive nature of evacuations requires coordinated planning and training. School staff, emergency responders, and individuals must be well-prepared to execute evacuation plans efficiently.

Lastly, the emotional and psychological impact of emergencies can be intensified for individuals within a special school environment. Feelings of vulnerability, isolation, and uncertainty may arise, underscoring the need for supportive and empathetic response strategies.

Addressing these challenges involves integrating accessibility into building design, providing evacuation devices, fostering a culture of awareness and inclusivity, and conducting regular drills that include individuals with a mobility impairment. An all-encompassing approach, grounded in collaboration, empathy, and strategic planning, is essential to ensure the safety and well-being of those with mobility impairments during evacuations.

The effective management of emergency situations and ensuring the safe evacuation of occupants is a critical aspect of building design and planning. Furthermore, evacuating persons with a mobility

impairment during emergencies presents additional unique challenges that must be addressed with careful consideration of their specific needs. This section examines various evacuation modes, including horizontal exits, ramps, refuge areas, lifts (including stretcher and emergency lifts), and stairs, evaluating their strengths and limitations in facilitating the safe evacuation of people during emergencies.

2.2 Stairs

Stairs are a fundamental and widely used means of egress in buildings, providing a reliable path of evacuation during emergencies.

2.2.1 Strength

Familiarity: Stairs are universally understood and require minimal training or instruction. Furthermore, dual purpose stairs (i.e., those used for circulation and evacuation) are considered to be very familiar for occupants that frequent the building.

Reliability: Stairs are less likely to be affected by power loss or mechanical failures, ensuring a dependable means of evacuation. However, depending on whether these stairs are fire-isolated, are open and used for circulation, or have a degree of separation will define the reliability of the stair.

2.2.2 Limitations

Mobility constraints: Stairs may be inaccessible or extremely challenging for individuals with mobility impairments or those who use wheelchairs. In this instance, staff assistance is required through the use of evacuation mattresses or Stair Chairs. While the use of the mattresses or Stair Chairs requires minimal training, their use has the potential to delay evacuation as they are being deployed, and indeed hinder the evacuation of others using the stair. Furthermore, storing and maintaining evacuation mattresses or Stair Chairs requires space and regular upkeep and a knowledge of where they are stored.

Congestion: Stairs, particularly in the context of using evacuation mattresses or Stair Chairs, can become congested during the evacuation process, potentially slowing down and extending the total time for occupants to safely evacuate from the building.

It should be is noted that for the delivery of new special school facilities in Queensland, the use of stairs is considered not to be a suitable as the only means of evacuation for occupants with a mobility impairment. While this is the case, it may be recommended that the provision of emergency evacuation equipment such as mattresses or Stair Chairs be retained as a degree of robustness to the evacuation strategy. Whether emergency evacuation equipment is provided is dependent on whether the evacuation strategy relies on lifts and the adequacy of refuge and lift provisions. This will need to be determined on a case-by- case basis by a qualified fire engineer when assessing evacuation.

For example, if evacuation is achieved via ramps and elevated walkways only, there would be no need for emergency evacuation equipment.

2.3 Ramps and elevated walkways

Ramps and elevated walkways, provide an accessible means of egress for individuals with mobility impairments, and can serve as an evacuation route for all occupants, depending on the building design and configuration.

2.3.1 Strength

Familiarity: Similar to stairs, ramps and elevated walkways are universally understood and require minimal training or instruction.

Inclusivity: Ramps and elevated walkways offer an accessible route for individuals with mobility impairments, ensuring equitable evacuation, without the explicit need for assistance.

Congestion mitigation: Ramps and elevated walkways can accommodate a larger flow of people compared to stairs, reducing congestion.

2.3.2 Limitations

Space and length: Ramps and elevated walkways can require significant space and, with regard to ramps, may need to be quite long to accommodate compliant slopes, which can be challenging to accommodate in dense urban environments. The length of ramps is also limited by the NCC D2D14 such that the distance from any point of the floor, to the road or open space, by way of the ramp, does not exceed 80m. Refer NCC Snip in Figure 2.1.

Limited locations: Not all sites include multiple buildings with the opportunity to provide elevated walkways.

Physical exertion: Evacuating via ramps may be slower and more physically demanding for some individuals, compared to other evacuation modes such as on-grade elevated walkways.

Figure 2.1. Excerpt of NCC D2D14

D2D14 Travel by non-fire-isolated stairways or ramps

[2019: D1.9]

(1) A non-*fire-isolated stairway* or non-*fire-isolated ramp* serving as a *required exit* must provide a continuous means of travel by its own *flights* and landings from every *storey* served to the level at which egress to a road or *open space* is provided.

(2) In a Class 2, 3 or 4 building, the distance between the doorway of a room or *sole-occupancy unit* and the point of egress to a road or *open space* by way of a stairway or ramp that is not fire-isolated and is *required* to serve that room or *sole-occupancy unit* must not exceed—

(a) 30 m in a building of Type C construction; or

(b) 60 m in all other cases.

(3) In a Class 5, 6, 7, 8 or 9 building, the distance from any point on a floor to a point of egress to a road or *open space* by way of a *required* non-*fire-isolated stairway* or non-*fire-isolated ramp* must not exceed 80 m.

2.4 Lifts

The use of lifts for evacuation during an emergency is a concept that typically goes against the 'norm', as illustrated by the deemed-to-satisfy requirement for signage warning against the use of lifts in the event of fire. However, with careful consideration to address the associated hazards, lifts can provide a safe and efficient means of evacuation, particularly for occupants with a mobility impairment.

2.4.1 Strength

Accessibility: Lifts provide a means of evacuation for wheelchair users and individuals with mobility impairments.

Rapid evacuation: When designed for emergency use, lifts can quickly expedite evacuation for those who cannot use stairs.

2.4.2 Limitations

Technical requirements: Depending on the other features of the building, emergency lifts may be required to be built with fire-resistant materials, independent power sources, and smoke-sealing mechanisms. This makes them more costly to install and maintain. Furthermore, continuity of pre-defined logic may become a maintenance aspect to assure that the lifts operate in a manner that is required for emergency and not be impacted by software and firmware updates.

Risk of malfunction: Lifts could become inoperable during emergencies or malfunction due to fire or power loss, hence introducing the risk of occupants becoming trapped.

Limited capacity: Lifts have a limited capacity and may only be able to evacuate one student at a time with potential for staff members to have to return to assist other students multiple times.

2.4.3 Consideration of lift types

Whether lifts are required as part of the design for evacuation depends on the characteristics of the occupants that are likely to be using the lifts. Able bodied occupants are considered to be able to evacuate via the stairs, leaving those that have a mobility impairment to utilise the lift as part of the evacuation route. While, as discussed previously, a range of mobility impairments may be present, for the purpose of lift evacuation, it is considered that those who use a wheelchair, require the largest space in comparison to those that may use other mobility aids such as crutches, or walkers.

AS 1428.1-2009 provides guidance on the design footprint of wheelchairs (refer Figure 2.2). This illustrates that for design purposes, a representative wheelchair footprint may be 800 mm wide by 1300 mm long. Furthermore, taking into consideration the dimension of an accompanying staff member standing behind the wheelchair, it is reasonable to assume that the total dimension required is 800 mm wide by 2000 mm long, leaving room for some maneuvering.

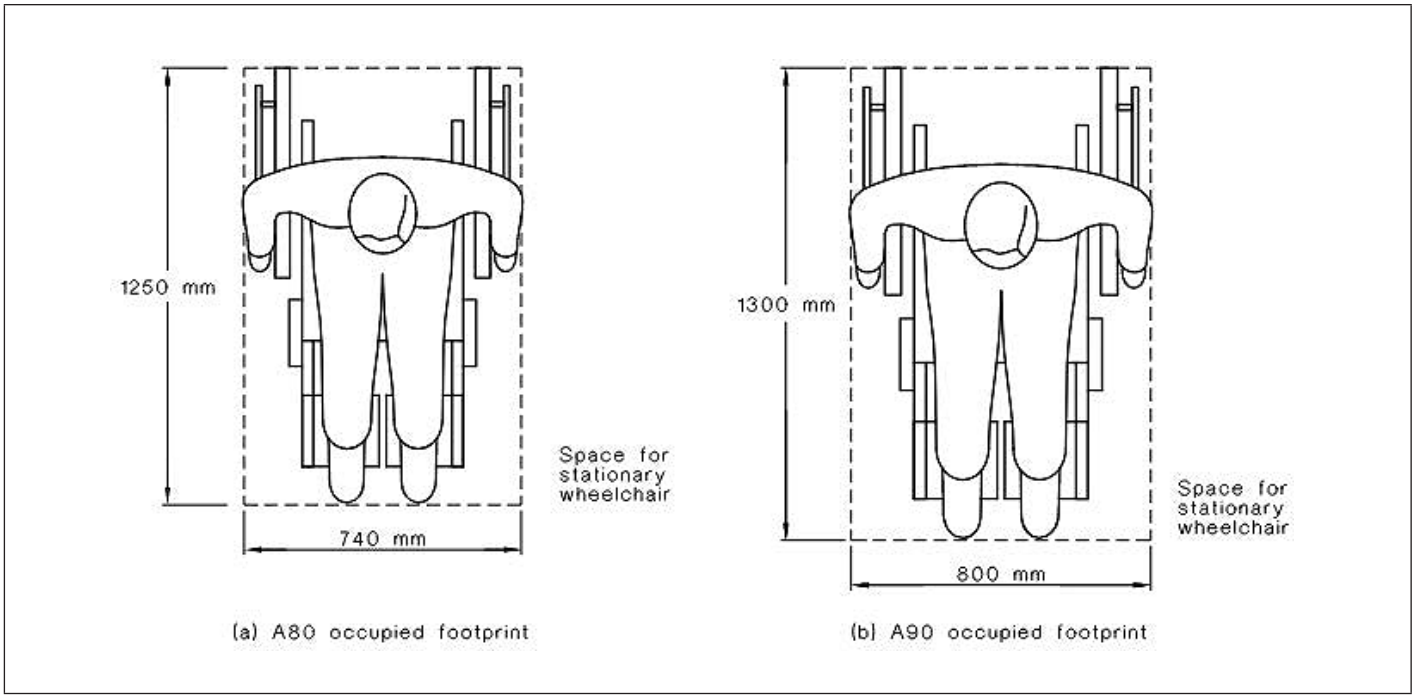
There are various types of lifts which are designed for different purposes and applications. For the purpose of this document, stretcher lifts and emergency lifts have been reviewed.

Stretcher lifts and emergency lifts serve distinct purposes in various settings, particularly in buildings and facilities where safety needs are paramount. Stretcher lifts are primarily designed to safely transport occupants who are lying down on a stretcher or gurney, or where occupants require additional space for the effective and safe use of the lift. In accordance with NCC 2022 Clause E3D3 a stretcher lift must accommodate a raised stretcher with a patient lying on it horizontally by providing a clear space not less

than 600 mm wide × 2000 mm long × 1400 mm high above the floor level. These dimensions would also be considered suitable to accommodate a single wheelchair bound occupant along with an accompanying staff member.

While the NCC does not require stretcher lifts to include fire safety design aspects, such as fire-safe power requirements, and fire bridge controls, these can be provided upon request.

Figure 2.2. Footprint for an occupied wheelchair (AS 1428.1-2009 excerpt)



Emergency lifts are a specialised lift specifically intended for use during emergencies, particularly in situations such as fires or power outages. These lifts are designed to facilitate the swift evacuation of occupants from buildings, especially those with mobility impairments or other disabilities. Emergency lifts typically have features that prioritise safety and reliability under adverse conditions, such as fire-resistant materials, backup or reliable power systems, and robust communication capabilities to assist first responders and occupants during emergencies. In accordance with NCC 2022 Clause E3D5, emergency lift dimensions (refer Figure 2.3) a car dimension of 1600 mm by 2280 mm is required. This car size would also allow for up to two wheelchairs as well as an accompanying staff member at any one time.

Figure 2.3. Emergency lift dimensions (NCC Table E3D5 excerpt)

Lift component	Minimum dimension (mm)
Minimum depth of car	2280
Minimum width of car	1600
Minimum floor to ceiling height	2300
Minimum door height	2100
Minimum door width	1300

In all new special schools' facilities, the lifts are to be dimensioned in line with stretcher lifts at a minimum. Whether an evacuation lift is required, will depend on the evacuation requirements defined through a fire engineering performance solution.

2.5 Refuge areas

Refuge areas are designated safe zones within a building, usually equipped with fire and/or smoke-resistant features. They are intended for occupants to shelter in place until assistance arrives or to provide additional time for occupants to use stairs or lifts. Adjacent fire compartments may be considered a refuge area for the temporary housing of occupants in an emergency.

2.5.1 Strength

Temporary safe haven: Refuge areas provide a place for occupants to await rescue or further instructions, particularly for those who cannot evacuate easily such as those with a mobility impairment.

2.5.2 Limitations

Reliance on external aid: Occupants in refuge areas are dependent on timely rescue or availability of continued evacuation, which might not always be possible in rapidly evolving emergencies. This may also cause undue distress to occupants who can begin to feel trapped.

Limited duration: Refuge areas are designed for short-term use only, until continued evacuation is available or rescue arrives.

Continuation of evacuation: Continued evacuation out of the building is still a requirement. Therefore, provision for continuation of evacuation needs to be considered and compartmentation by itself does not achieve safe building evacuation.

2.5.3 Refuge considerations

When planning for evacuations that rely on the use of lifts or stairs, it is essential to incorporate separation/ refuge areas at the access point of lift or stairs. For the design of these areas, it is important to consider the occupant characteristics and load to ensure the design is fit for purpose. Such design parameters may include the following:

- **Bounding construction:** Refuge areas must be appropriately separated from the remainder of the building with a rating suitable and associated with the likely wait times for the lift or mounting on an appropriate evacuation device.
- **Capacity and space:** Refuge locations should have adequate space to accommodate a reasonable number of people, including those with mobility devices and additional space for associated staff.
- **Emergency communication:** Installation of communication systems or emergency call buttons in refuge areas to allow staff to communicate as required.

2.6 Horizontal exits

Horizontal exits, often achieved through compartmentalisation, allow occupants to move horizontally from one part of a building to another, thereby avoiding the hazards of fire, smoke, or other emergencies. This is different to the use of elevated walkways, in that horizontal exits retain occupants within the subject building. This approach can be highly effective when combined with proper fire-rated materials and separation to prevent the spread of fire and enable phased evacuation.

2.6.1 Strength

Enhanced safety: Horizontal exits provide an alternative path for occupants, reducing congestion and minimizing exposure to hazards. Furthermore, horizontal exits can provide a more accessible route for individuals with mobility impairments.

Simplicity: Occupants can easily navigate through familiar spaces, making it an intuitive evacuation method.

2.6.2 Limitations

Limited scope: The effectiveness of horizontal exits heavily relies on proper compartmentation, which may not be feasible in all building types or designs, particularly open and naturally ventilated buildings that have large open spaces.

Maintenance: Regular maintenance is crucial to ensure fire doors and barriers remain functional and effective.

Continuation of evacuation: Continued evacuation out of the building is still a requirement. Therefore, provision for continuation of evacuation needs to be considered and compartmentation by itself does not achieve safe building evacuation.

2.6.3 Horizontal considerations

Horizontal exits are used only to provide occupants with additional time to access another evacuation method to continue the evacuation from the building. It is noted that the current NCC Deemed-to-Satisfy provisions do not permit the use of horizontal exits in school buildings (refer Figure 2.4). Therefore, while this approach can be highly effective from an evacuation perspective, by reducing effective travel distances to a place of relative safety (i.e., refuge), it is noted that this strategy can only be utilised through a fire engineered performance solution.

Figure 2.4. NCC D2D16 excerpt

D2D16 Horizontal exits

[2019: D1.11]

(1) *Horizontal exits* must not be counted as *required exits*—

(a) between *sole-occupancy units*; or

(b) in a Class 9b building used as an *early childhood centre*, primary or secondary *school*.

2.7 Conclusion

Each evacuation mode has its own strengths and limitations, making a combination of strategies the most effective approach. When considering the evacuation of mobility impaired occupants within a special school environment, a comprehensive approach that combines various strategies may be necessary to address their diverse needs. Integrating accessible features into evacuation routes, providing assistive devices, and ensuring communication and training for both occupants with a mobility impairment and emergency responders, are all crucial considerations. Designing buildings with features such as accessible ramps, emergency lifts, and clearly marked refuge areas can contribute to the safety and well-being of occupants during emergencies.

Building designers, architects, and emergency planners should consider the specific needs of the building's occupants, its design and layout, and the types of emergencies that might occur, when determining the most suitable evacuation modes and strategies. Integrating a comprehensive approach that addresses various scenarios will contribute to a safer built environment and more effective emergency management.

3.0 Discussion and conclusions

This review was undertaken to support a more consistent approach to evacuation planning for new facilities in Queensland special schools, where there are typically a higher proportion of building occupants with a mobility impairment. It is recognised that occupants with a mobility impairment are less able to use vertical evacuation routes where the gradient is steeper than 1:14 (i.e., stairs). For the delivery of new facilities in Queensland special schools, the use of stairs via an evacuation mattress or stair chair, should not be considered the primary evacuation strategy for occupants with a mobility impairment and an alternative solution is required.

The potential evacuation modes have been reviewed and their strengths and limitations outlined. The subsequent Fire Engineering Recommendations detailed for the evacuation of occupants with a mobility impairment, are considered to increase the safety for all occupants by enhancing the security, reliability, and availability of egress routes.

Within this context, the following summarises the hierarchy of preferred evacuation modes (i.e. accessible exits) for occupants with a mobility impairment. ***(Noting that compliant travel distances associated with these accessible exits are to be achieved in accordance with NCC clause D2D5 and D2D6, or addressed through Performance Solution):***

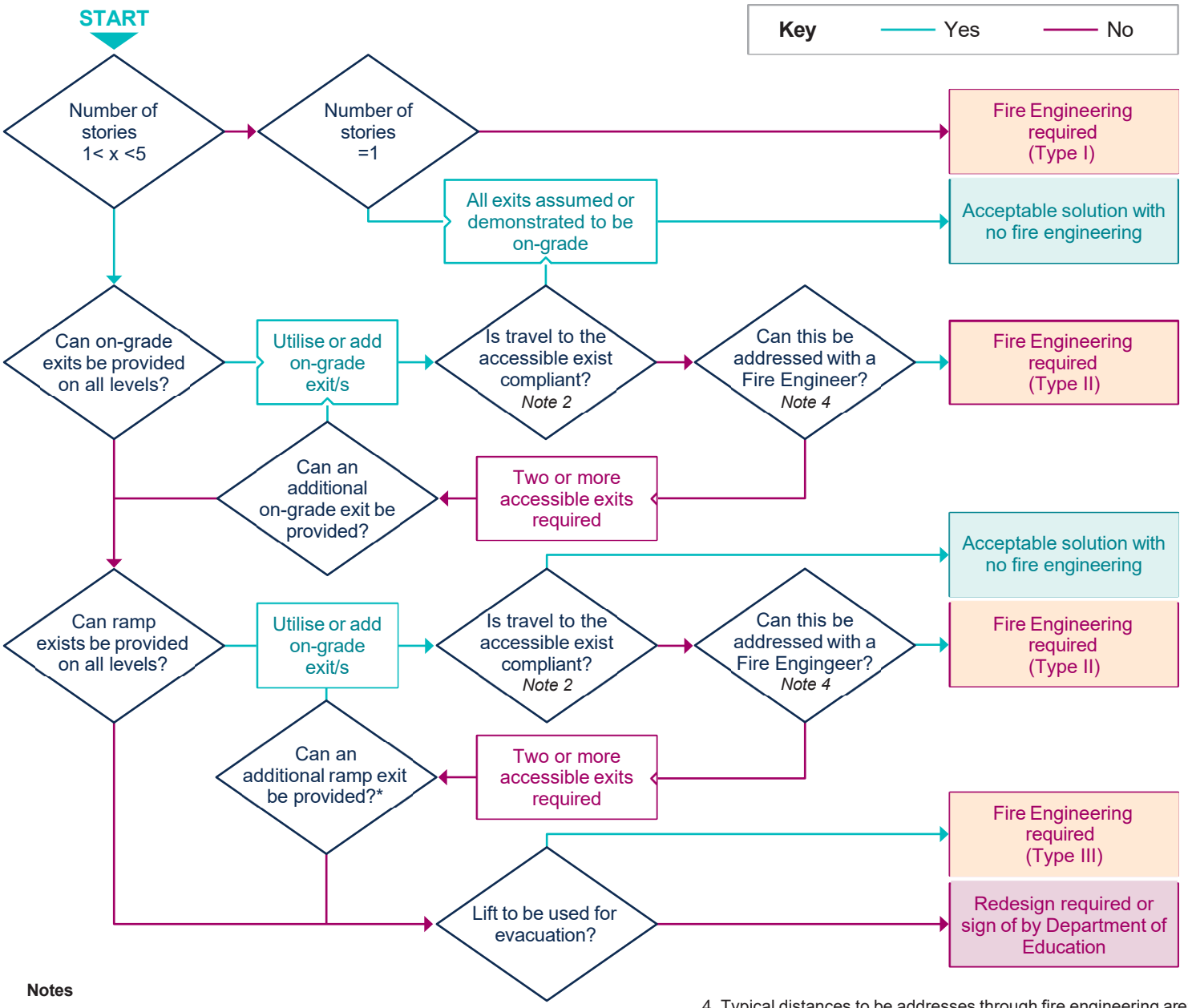
- Provision of on-grade (i.e., flat) exits to road or open space, or to an adjacent building via an elevated walkway, if available.
  - This mode of evacuation allows for occupants with a mobility impairment to freely evacuate with minimal assistance. Furthermore, the pathways would likely be familiar to occupants as they are anticipated to be commonly used under normal operational conditions.
- Provision of an externally located ramp complying with accessibility requirements.
  - Again, this mode of evacuation allows for occupants with a mobility impairment to freely evacuate with minimal assistance using pathways that are likely to be familiar.
  - However, in assessing the route of the ramp as an evacuation strategy, a review of potential exposure hazards from the building it serves needs to be considered.
- Use of lifts
  - With appropriate treatment, lifts may serve as the evacuation strategy for occupants with a mobility impairment
  - It is recommended that the access lobbies to the lift be separated from the main building, given potential waiting times for the lift to arrive.
    - Separation and refuge space must be provided in terms of physical fire and/or smoke separation, or physical distance with suitable ventilation.
    - The expected time of evacuation must be reviewed as to define the rating of the refuge space (i.e., fire or smoke rated) if required.
    - The geometry and available area of the refuge space must be reviewed against the potential occupant load and mobility.
    - Provision of fire compartments and horizontal exits may be utilised as forming part of the separation and refuge space.
  - Lifts should be treated in the same manner as fire-isolated stairs in that they need to be fire separated from the building and discharge to a point that this suitably separated from the remainder of the building as to allow continued safe egress. It is recommended that the lifts are designed as evacuation lifts in accordance with NCC.
  - Lifts must be provided with an adequate power supply to ensure reliable operation in the case of an event requiring evacuation, this may be a power supply direct from the national power grid through a

dedicated fire separated switchboard, a stand by power supply system or localised battery backup.

- Use of stairs
  - As noted, the use of stairs as a mode of evacuation is not desired for occupants with a mobility impairment as it is in contradiction to the WHS legislation for staff and students. However, stairs should still be installed for able bodied occupants and must achieve compliance with the NCC or be addressed through a performance solution.

The following flow diagram (refer Figure 3.1) provides guidance on the required fire engineering provisions and considerations when designing evacuation strategies for new special school facilities.

Figure 3.1. Design for mobility impaired evacuation



Notes

1. 'x' relates to the number of stories.
2. Compliant travel relates to the definition provided in NCC Clause D2D5
3. '*' Denotes the potential use of a ramp in addition to an on-grade exit, if provided.
4. Typical distances to be addresses through fire engineering are:
   a. 25 m to a point of choice or single exit
   b. 50 m to the nearest exit where two are available.
   c. 70 m between alternative exits.

3.1 Typical fire engineering provisions and considerations

These Fire Engineering Provisions are included as typical examples only, with the aim to address departures from the NCC DtS Provisions and are intended to achieve a level of fire and life safety satisfying the Performance Requirements of the NCC and the Department of Education's objectives.

3.1.1 Type I

Description

This is a building that is 5 stories or more. As noted in NCC D2D23 (refer Figure 3.2), these buildings are explicitly not covered by NCC Deemed-to-Satisfy provisions, and it is highlighted that the reason for this is due to the difficulties associated with evacuation.

Figure 3.2. NCC D2D23 excerpt

D2D23 Egress from primary schools

[2019: D1.18]

(1) Every part of a Class 9b primary *school* must be wholly within a *storey* that provides direct egress to a road or *open space*.

(2) The requirements of (1) do not apply to a building with a *rise in storeys* of 4 or less, where the primary *school* is the only use in that building.

Applications

(1) For D2D23(1), a primary *school* includes classrooms, offices, staffrooms, halls, canteens and the like within the primary *school*.

(2) For D2D23(2), a primary *school* incluces classrooms, offices, staffrooms, halls, canteens, carparks, end of trip facilities and the like provided solely for the primary *school*, or *school* which incorporates the primary *school*.

Explanatory Information

D2D23(1) recognises the difficulties associated with evacuation of primary *schools*. Should a primary *school* be proposed within a *storey* that does not meet the requirements of D2D23, a *Performance Solution* is to be used to demonstrate compliance with the relevant *Performance Requirements*.

Typical fire engineering provisions

- A fire sprinkler system must be provided throughout the building in accordance with AS 2118.1-2017 and the fire sprinkler system must be zoned to provide independent monitoring and isolation to each level.
- The building must be provided with a smoke detection and alarm system throughout in accordance with NCC Clause E2D9(2)(c).

Other fire related considerations

Depending on the requirements of the building and operator, the following fire rated aspects may also need to be considered.

- Additional egress routes and egress capacity to the minimum required may need to be provided to enable a more free-flowing evacuation.
- On-floor compartmentation may be required to provide a degree of separation and refuge for occupants.
- Given the height of the building and the expressed difficultly in evacuation, the use of lifts as part of the evacuation strategy may be a requirement, irrespective of the mobility of the building occupants (refer Section 3.1.3).

3.1.2 Type II

Description

A building where the egress routes and capacities are suitable for the occupant load and characteristics, however, the travel distances to those exits may exceed those allowable.

Typical fire engineering provisions

- A smoke detection and alarm system must be provided throughout the buildings in accordance with NCC DtS, except that smoke detectors must not have a spacing greater than 7.0 m × 7.0 m throughout the internal spaces of the building.

  Note: The spacing of detectors will be driven by the degree of extended travel distance.

Other fire related considerations

- Additional egress routes and egress capacity to the minimum required may need to be provided to enable a more free-flowing evacuation.
- On-floor compartmentation may be required to provide a degree of separation and refuge for occupants. Compartmentation may reduce effective travel distances to a place of relative safety (i.e., refuge) and can be used through a fire engineering performance solution. However, the current NCC Deemed-to-Satisfy provisions do not permit the use of horizontal exits in school buildings (refer Figure 2.4) as an evacuation strategy.

3.1.3 Type III

Description

This applies to a building where it is intended to use the lifts as part of the evacuation strategy. Given that there are currently no NCC Deemed-to-Satisfy provisions that permit the use of lifts as an evacuation mode, their explicit use is inherently a fire engineered performance solution that needs to comply directly with the performance requirements of the NCC, namely D1P7 (refer Figure 3.3).

Figure 3.3. NCC D1P7 excerpt

D1P7 Evacuation lifts

[2019: DP7]

Where a lift is intended to be used in addition to the *required exits* to assist occupants to evacuate a building safely, the type, number, location and fire-isolation must be appropriate to—

(a) the travel distance to the lift; and
(b) the number, mobility and other characteristics of occupants; and
(c) the function or use of the building; and
(d) the number of *storeys* connected by the lift; and
(e) the *fire safety system* installed in the building; and
(f) the waiting time, travel time and capacity of the lift; and
(g) the reliability and availability of the lift; and
(h) the emergency procedures for the building.

Typical fire engineering provisions

- Compartmentation and separation must be in accordance with the NCC DtS provisions, and as follows.
  - Access to and discharge from the evacuation lifts must be separated from the remainder of the building by fire-rated and smoke-proof construction, meeting the following requirements:
    - Fire-rated walls must achieve an FRL of not less than (60)/60/60 minutes.
- Doorsets must achieve an FRL of not less than -/60/30 minutes, be provided with medium temperature smoke seals to the top and sides, and are permitted to be provided with magnetic hold-open devices that release upon local smoke detection (i.e., smoke detectors located 1.5 m from the doors).

  Note: The separation of the lifts as typically outlined above may be achieved by physical separation and natural ventilation, rather than new construction.

- Lift Installations must be provided in accordance with the NCC DtS provisions, as modified by the following:
  - The lift shaft and lift machinery room (if provided) must be separated from the remainder of the building via FRL 120/120/120 (if loadbearing) or FRL -/120/120 (if non-loadbearing).
  - The lift car shall be of non-combustible construction (no timber lining etc.). The term non-combustible means a material not deemed combustible as determined by AS 1530.1-2014.
  - The lift must have minimum dimensions, measured clear of all obstructions, including handrails, etc. complying with NCC Table E3D5.

    Note: The above sub-clause may need to be modified on a case-by-case basis depending on the particular fire engineering outcomes to account for factors such as occupant load, ventilation conditions, and surrounding building function and use. It may be demonstrated that the dimension of a stretcher lift in accordance with NCC Clause E3D3 may be sufficient. This will need to be determined on a case-by-case basis by a qualified fire engineer when assessing evacuation.

  - Points of access and discharge from the lift must be suitably fire and/or smoke separated from the remainder of the building to enable safe waiting for the lift and safe continued egress to road or open space.

    Note: The above sub-clause will need to be modified on a case-by-case basis to account for factors such as occupant load, ventilation conditions, and surrounding building function and use.

  - The lift must be connected to one of the following power supplies.
    - Direct from the national power grid through a dedicated fire separated switchboard and via fire-rated cabling in accordance with AS 3000 Clause 7.2.9.

      Note: This power supply does not require to have an additional standby power, generators, or battery backup to maintain its on-going operation.

    - A standby power supply system, where installed.
    - Localised battery backup.

      Note: Where localised battery backup is provided, the capacity of the battery must take into account the number/distance of travel required by the lift to evacuate all of the designed occupant load and must implement a suitable degree of safety to account for the degradation of the battery.

  - Facilities must be provided to allow emergency services personnel to take-over operation of the lift in accordance with NCC Clause E3D9.

  - The lift must be accompanied by appropriate signage.
    - Signage must be positioned in clear view of a person seeking egress, and be located between 1.5 m and 1.8 m Above Finished Floor Level (AFFL).
    - Signage must be incised, inlaid or embossed letters on a metal, wood, plastic or similar plate, and securely and mechanically affixed to the wall.
    - Signage must have text with lettering not less than 20 mm in height on a contrasting background reading “IN CASE OF FIRE OCCUPANTS MAY USE LIFT FOR EVACUATION”.

      Note: This signage is to replace the signage requirement of NCC Clause E3D4

- A red WIP phone must be installed adjacent to the lifts at all levels.
- A Management in Use Plan (MIUP) must be developed for the building, incorporating the following:
  - A fire safety evacuation plan must be developed by the building management to facilitate the evacuation of students from the building.
  - Instruction and training must be provided to staff members on the evacuation procedures.
  - Nominated staff members using the lift to transport students are to be provided with a lift key override to assure that operation for evacuation is available at any time.

Other fire related considerations

- Pending the design of the building, and given that staff and students may require additional time to evacuate (i.e., due to wait times for the lift), consideration of a smoke detection system throughout may be required.
- On-floor compartmentation may be required to provide a degree of separation and refuge for occupants. While this may reduce effective travel distances to a place of relative safety (i.e., refuge) and can be used through a fire engineering performance solution, the current NCC Deemed-to-Satisfy provisions do not permit the use of horizontal exits in school buildings (refer Figure 2.4).

Typical emergency evacuation equipment such as mattresses or stair chairs may still be a consideration depending on the number of occupants expected to need to use the lift, the degree of refuge space provided (including the ventilation provided), the robustness of the lift power supply, and whether there is a stair co located with the lift.