

# Part D

## Construction and Detailing – System Elements

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This section steps through the key systems in a dwelling where access features may need integration, answering these key questions:

- What standard systems may be suitable for accessible housing?
- How might these need to differ to standard industry set up?
- What system components may be useful in accessible housing?
- Is any specific detailing needed?





# 1. Mechanical

## 1.1 Heating and Cooling

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	1.1.1	Heating/cooling ... appropriate for the needs of residents  Note: This requirement does not detail possible needs of residents or what heating/cooling may be appropriate to provide in response. Provisions are suggested below to provide guidance in meeting this requirement.		SDA High Support
<input type="checkbox"/>	1.1.2	Heating/cooling system that ensures quick response and accurate temperature control e.g. refrigerated reverse cycle heating and cooling system (split system, single or multi-zoned) – needed by occupants with reduced capacity to naturally regulate their internal body temperature. <b>[Physical experience]</b>		Supports SDA
<input type="checkbox"/>	1.1.3	In 2+ bedroom dwellings – allow for separate temperature control in the accessible bedroom – to allow occupants to share with others (without thermoregulatory impairment). Where multi-zoning through one heating system is not possible – provide capacity in the Accessible Bedroom for a separate additional heating/cooling source, with quick and accurate temperature control		Supports SDA
<input type="checkbox"/>	1.1.4	Acoustic separation between rooms – in 2+ bedroom dwellings – to support occupants with increased sensitivity to noise, and to provide acoustic privacy during personal routines. <b>[Physical experience]</b>		Supports SDA

See also Part C Construction and Detailing, Section 8: Service Fixtures and Fittings.

### KEY



Social Inclusion



Affordability



Physical Independence



Amenity



Homelike

Value Colour Code: **Highly Desirable** | Desirable

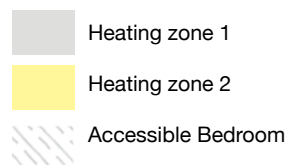
 Brief Development

## Heating/Cooling System Selection

Evaporative cooling will generally not be suitable for an occupant who cannot independently regulate their internal body temperature, particularly in humid climates. **[Physical experience]**

"As the cooling effect of evaporative systems relies on evaporating moisture from the wet filter pad, (such systems) work best in hot, dry conditions, and aren't well suited to humid conditions. If the outside air is humid then the cooling effect of the unit is limited..."

<http://www.sustainability.vic.gov.au/>



A multi-zoned heating and cooling system allows for a person with increased sensitivity to more easily share their home with others.

**Indicative Heating and Cooling Zones**

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	1.1.5	Locate or detail heating units to allow for faults or leakage, without causing harm to occupants who may be in bed (e.g. wall-units ideally not directly above a bedhead for this reason)		<input checked="" type="checkbox"/> Supports SDA
<input type="checkbox"/>	1.1.6	System that requires user control (rather than auto-controlled) to control heating/cooling, to support independence (through autonomous control over the internal environment)		<input checked="" type="checkbox"/> Supports SDA
<input type="checkbox"/>	1.1.7	Simple and intuitive standard method of control e.g. wall panel or remote – to support use by a person with cognitive or memory impairment		<input checked="" type="checkbox"/> Supports SDA
<input type="checkbox"/>	1.1.8	Capacity to link in with assistive technology – needed by occupants who cannot use standard manual control buttons		<input checked="" type="checkbox"/> Supports SDA
<input type="checkbox"/>	1.1.9	Mount any wall control panel between 900–1100mm AFFL and offset min. 600mm from an internal corner – to allow use by an occupant who must side approach from either the left or right-hand side. <b>[Multi-sided approach]</b>		<input checked="" type="checkbox"/> Supports SDA

⊙ Detailed Design

### Additional Heating

- Ceiling heat lamps warm areas directly below and are more effective under lower ceilings (e.g. 2.4m or less).
- A split system unit or wall-mounted heater (either convection or fan-assisted) can provide more general additional heat. Consider:
  - Mounting at a suitable height, so the heat source can benefit a seated user
  - Suitable surfaces, that won't burn or scald if accidentally brushed against



**Additional accessible bathroom heat sources:**

Ceiling heat lamp, Hunter Housing Project.  
Wall-mounted electric heater.

## 1.2 Exhaust System (Accessible Bathroom and Laundry)

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	1.2.1	Commercial-grade mechanical exhaust system	Prevents possible build-up of steam / odour, particularly where natural ventilation is not possible; supports healthy environment for occupants and property maintenance. <b>[Extended routines]</b>	
<input type="checkbox"/>	1.2.2	Silent operation	Enhances acoustic privacy within the dwelling and avoids causing agitation. <b>[Increased sensitivity]</b>	
<input type="checkbox"/>	1.2.3	One switch to control light and exhaust fan	Supports a person with memory/ cognitive impairment in removing steam/odours	

⊙ Detailed Design

### Laundry Exhaust System

For a home-like look and feel, provision should be made to screen off dryers visually and acoustically, where these are located within living spaces. **[Increased sensitivity] [Physical experience]**

Hence, where located within living spaces, dryers are best provided with mechanical ventilation or are a condenser type dryer, which does not require venting.

Locating a washing machine and dryer within a bathroom saves the cost of screening as well as any additional mechanical ventilation.

⊙ Detailed Design

### General Exhaust Systems

'In-line' ducted exhaust fans can draw damp air from one room and transfer it to another room. These fans can provide ventilation for example, to bathrooms without windows or ceiling cavities.

Positioning should be confirmed with the manufacturer to prevent excess draught. (This may occur if the exhaust is located directly above the shower space.)










## 2. Secure Access

### 2.1 Video or Intercom Systems

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	2.1.1	Household communication technology (e.g. video or intercom systems) appropriate for the needs of residents		SDA High Support
		Note: This requirement does not specifically detail possible needs of residents or what video/intercom systems may be appropriate in response. Provisions are suggested below to provide guidance in meeting this requirement.		
<input type="checkbox"/>	2.1.2	Intercom (2-way voice communication) and secure access control in one integrated unit (internally and externally) – streamlines quantity of fixtures and reduces effort (supports residents with cognitive or memory impairment, or reduced mobility)		■ Supports SDA
<input type="checkbox"/>	2.1.3	IP-type – able to be integrated into assistive technology – allows use by person who cannot access or use standard controls (such as a wall-mounted fixture, or pushbuttons)		■ Supports SDA
<input type="checkbox"/>	2.1.4	Visual display – aids identification of visitors for a person with hearing impairment and who cannot rely fully on voice communication		■ Supports SDA
<input type="checkbox"/>	2.1.5	Handsfree audio and access control (push-button to speak) – eliminates the need to lift a handset, which better enables use by a person with reduced strength or dexterity		■ Supports SDA
<input type="checkbox"/>	2.1.6	Minimal number of steps to operate intercom required – supports use by a person with cognitive or memory impairment		■ Supports SDA
<input type="checkbox"/>	2.1.7	Wall-mount at 1250mm AFFL and offset 600mm from any internal corner – allows ease of access for both a person who is seated (approaching from either side) or is standing		■ Supports SDA
<input type="checkbox"/>	2.1.8	Provide level landing of 1.5m x 1.5m to the external unit – supports ease of access for a seated user using a range of mobility aids		■ Supports SDA



## 2.2 Secure Access Control

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	2.2.1	Multi-residential context – one standard access control method across all dwellings	Supports social inclusion through providing the same look/feel as other dwellings	
<input type="checkbox"/>	2.2.2	Swipe and/or remote push-button fob control as standard access control method to unlock secure entrances	Avoids key unlocking – suits those with reduced dexterity. Remote unlocking suits those who cannot reach controls	
<input type="checkbox"/>	2.2.3	Capacity to remotely locate, activate or de-activate access fobs.	Supports security of a person with cognitive or memory impairment	
<input type="checkbox"/>	2.2.4	Push-to-exit button or movement sensor for exiting secure areas	Simplified exit for person with reduced mobility	
<input type="checkbox"/>	2.2.5	All wall fixtures (prox. Readers / push to exit buttons) installed at 1250mm AFFL, offset 600mm from an internal corner	Supports approach and reach of controls from either side. <b>[Multi-sided approach]</b>	

See also Part C Construction and Detailing, Section 8: Service Fixtures and Fittings.



Push-button radio-frequency (RF) access fobs, Hunter Housing Project. RF fobs can be programmed to control automation hardware with a radio-frequency receiver – in the project this includes dwelling main entry doors, private entry gates and basement carpark roller door. These fobs also can be used to “swipe” readers for access.

### KEY



Social Inclusion



Affordability



Physical Independence



Amenity



Homelike

Value Colour Code: **Highly Desirable** | Desirable





## 3. General Electrical

### 3.1 General Provisions

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	3.1.1	Light and powerpoint switches should be rocker action, toggle or push pad in design with a recommended width of 35mm		LHA Platinum
<input type="checkbox"/>	3.1.2	Centre low-level GPO's at 600mm AFFL consistently	Improves reach for a seated person	
<input type="checkbox"/>	3.1.3	Centre mid-height GPO's at 1050mm AFFL consistently	Allows for kitchen benchtops to be raised to 1000mm AFFL, without impacting powerpoints	\$
<input type="checkbox"/>	3.1.4	Locate GPO's max. 300mm behind an obstruction	Minimises reach range required to access GPO. <b>[Reach]</b>	
<input type="checkbox"/>	3.1.5	Provision for personal Wi-Fi access	Enables independent internet and communication control	

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## 3.2 Common Areas

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	3.2.1	One DGPO to each outdoor BBQ/ recreation area	Allows for re-charging of electric wheeled mobility devices	

## 3.3 Accessible Bedroom

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	3.3.1	Two DGPO's to both sides of bedhead, mounted 700-1000mm AFFL	For powering of equipment/ bedside lamps on tables either side of the bed	
<input type="checkbox"/>	3.3.2	One phone point and one USB charging point to bedhead on side with greatest circulation space	For convenient access to telephone/other equipment	
<input type="checkbox"/>	3.3.3	Two DGPO's and one TV point	Allows for viewing of TV while located in bed	
<input type="checkbox"/>	3.3.4	DGPO for ceiling hoist	Located in ceiling cavity/ceiling mounted/wall-mounted at high level, to manufacturer's advice	
<input type="checkbox"/>	3.3.5	DGPO within built-in-robe/ room niche	Allows for charging of mobile equipment (where adequate spatial provisions made)	
<input type="checkbox"/>	3.3.6	DGPO near room entry at min. 600 mm AFFL	Allows for plug-in of cleaning devices	



### 🕒 Detailed Design

#### Power to Basin/Vanity

The Australian Electrical Standard AS 3018-2001 requires minimum distance offsets between exposed GPO's and any water source.

Concealment of a GPO within cabinetry allows for closer positioning to the basin, and more convenient use of appliances.

### 3.4 Accessible Bathroom

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	3.4.1	GPO mounted at 1050mm AFFL, in close proximity to vanity and basin	For convenient use of shaver or hairdryer	
<input type="checkbox"/>	3.4.2	GPO readily accessible near the toilet, to allow for addition of a sensor-operated automatic flush	Supports the independence of a person who cannot twist or reach the flush button	
<input type="checkbox"/>	3.4.3	GPO to allow for sensor-operated tapware or 'smart' toilets	Remote operation of flush, sound and lighting may support acoustic privacy and improve ambience where interaction with the outside environment is limited. <b>[Outdoor connection] [Extended routines]</b>	

### 3.5 Living and Meals Area

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	3.5.1	Two DGPO's and one TV point	Allows for TV	
<input type="checkbox"/>	3.5.2	Two DGPO's elsewhere	For general use	



### 3.6 Kitchen – General

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	3.6.1	Locate all wall-mounted GPO's at 1050mm throughout	Allows for benchtop to be raised to 1000mm AFFL without impacting powerpoints	
<input type="checkbox"/>	3.6.2	All appliance GPO's located in accessible position. visible positions E.g. behind door or easily removable drawer	Allows for occupant to safely and independently turn off appliances (e.g. for maintenance or if going away)	












### 3.7 Kitchen – Specific Provisions

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	3.7.1	One GPO behind pantry	Enables plug-in motor for auto-opening if needed	
<input type="checkbox"/>	3.7.2	Rangehood switch mounted, between 700-1200mm AFFL, within 300mm reach range	Enables control of the rangehood by a seated person with limited reach	
<input type="checkbox"/>	3.7.3	DGPO for mobile island bench (in-floor or on wall, as needed)	Allows for use of appliances (such as microwave) in a more accessible position	
<input type="checkbox"/>	3.7.4	Provide two side-mounted DGPO's within 300mm of the benchtop edge	Enables use by seated users with limited reach, for general appliances	
<input type="checkbox"/>	3.7.5	Where side-mounted benchtop GPO's are not possible, provide one pull-down GPO from an overhead cupboard	Enhances use by seated users with limited reach	
<input type="checkbox"/>	3.7.6	Power provision for sensor-operated tapware	Enables addition of low-effort tap control if required	

### 3.8 Laundry

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	3.8.1	One GPO to washing machine door (if provided)	Enable install of motorised roller door if needed	
<input type="checkbox"/>	3.8.2	One GPO to mixer tap location	Supports future addition of sensor tapware if needed	

### 3.9 Secondary Bedroom(s)

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	3.9.1	Two DGPO's and phone point to possible desk position	For plug-in task lighting and office setup	  
<input type="checkbox"/>	3.9.2	Two DGPO's to either side of likely bed position	For plug-in of bedside lamps or charging of mobile devices	  
<input type="checkbox"/>	3.9.3	Two DGPO's and one TV point	Allows for use as a second living space	  
<input type="checkbox"/>	3.9.4	DGPO near room entry at min. 600 mm AFFL	Allows for plug-in of cleaning devices	 

See also Part C Construction and Detailing, Section 8: Service Fixtures and Fittings.

#### 🕒 Detailed Design

##### Appliance GPO's

- Avoid locating GPO's where fitted cabinetry may be located in front (obstructing access)
- Fridges do not generally pose safety risks and do not require turning off of power before cleaning (as other appliances do) – hence easy access to the fridge GPO is less critical








LEFT: In-floor GPO to possible island bench locations, Hunter Housing Project.

RIGHT: Rangehood wall switch mounted to front face of kitchen benchtop. Photo supplied by Royal Rehab.



## 4. Lighting

### 4.1 General

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	4.1.1	Flush-mounted ceiling light fittings	Supports free movement of any future ceiling hoist	 \$
<input type="checkbox"/>	4.1.2	Compatible with assistive technology (e.g. LEDs)	Provides options to control lights remotely e.g. via a Wi-Fi device, for a person with reduced mobility or strength	
<input type="checkbox"/>	4.1.3	Dimmable lighting	Enhances comfort for people with increased visual sensitivity. <b>[Physical experience]</b>	  

#### KEY



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Homelike

Value Colour Code: **Highly Desirable** | Desirable



## 4.2 Light Switches

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	4.2.1	Light switches should be positioned in a consistent location: between 900-1100mm above the finished floor level		LHA Platinum
<input type="checkbox"/>	4.2.2	Light switches should be positioned in a consistent location: horizontally aligned with the door handle at the entrance to a room		LHA Platinum
<input type="checkbox"/>	4.2.3	Light and powerpoint switches should be rocker action, toggle or push pad in design with a recommended width of 35mm		LHA Platinum
<input type="checkbox"/>	4.2.4	Light switches installed at 1050mm AFFL	Allows for consistent positioning with door handles (as per LHA Platinum requirement) and for height adjustment of any benches to 1000mm AFFL, without impacting any light switches located below	



Wireless switches in the Hunter Project: Switches lightly illuminate confirming that power is available.

### ⦿ Detailed Design

#### Wireless wall switches

Wireless switches offer a number of advantages:










- No hardwiring required – hence can be located anywhere and can be more easily retrofitted in a convenient location
- Allow ready reprogramming, to control various home features integrated into assistive technology, such as emergency call alerting, or control of automated doors, windows or blind control
- Switches can be programmed to control one or multiple home features simultaneously

### ⦿ Detailed Design




#### Lighting Levels

- Generally 160-300 lux levels within kitchen areas and 240-600 lux for task lighting will be suitable
- LED lighting offers the benefit of energy-efficiency and longevity, as well as being available in warmer tones, suitable for a private dwelling

## 4.3 Entry, Car Space and Transfer Area

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	4.3.1	Sensor lighting with override switch to car space	Supports safe movement at night and prevents possible pedestrian/vehicle conflict	 
<input type="checkbox"/>	4.3.2	Lighting on the CAPT between car space and dwelling entry	Improves safety and security for people with reduced mobility	  
<input type="checkbox"/>	4.3.3	Sensor lighting with override switch to all entry doors	Supports safety at night	 
<input type="checkbox"/>	4.3.4	Sensor lighting to external waste disposal areas	Supports safety at night	 



## 4.4 Common Area Amenities

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	4.4.1	Lighting to external seating	To support safe use for people with visual impairment	  









External entry lighting.

## 4.5 Accessible Bedroom

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	4.5.1	Two-way dimmable lighting (control at door and bedhead with capacity for integration into assistive technology)	Enhances comfort and relaxation, expected in a private dwelling	 

## 4.6 Accessible Bathroom


<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	4.6.1	Task lighting above basin/vanity	To support safe use of grooming devices	  
<input type="checkbox"/>	4.6.2	Waterproof light over shower space	Supports safety for a person with vision impairment	  



## 4.7 Kitchen

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	4.7.1	Task lighting installed above workspaces		LHA Platinum

## 4.8 Laundry

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	4.8.1	Task lighting above tub and workspaces	Supports safety around hot water source and assists cleaning	

See also Part C Construction and Detailing, Section 8: Service Fixtures and Fittings.



Kitchen task lighting, Mission Australia (Victoria) housing, MSN Architects.

### ⦿ Detailed Design

#### **Task Lighting and Customisations**

Future customisations of overhead kitchen joinery may impact on task lighting above workspaces.

Ensure sufficient length of strip lighting below overhead adjustable storage is provided, to cater for any future alterations.



## 5. Hot Water

### 5.1 General

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	5.1.1	Provision to temper (control) maximum temperature, in accessible bathroom, kitchen and/or laundry	Improves safety for people with increased sensitivity to heat or challenges in independently controlling water temperature. <b>[Increased sensitivity]</b>	
<input type="checkbox"/>	5.1.2	Conceal any tempering device (e.g. within cabinetry)	To minimise visual clutter and prevent accidental damage	

See also Part C Construction and Detailing, Section 8: Service Fixtures and Fittings.

#### KEY



Social Inclusion



Affordability



Physical Independence



Amenity



Homelike

Value Colour Code: **Highly Desirable** | Desirable

## Brief Development

### **Tempered Hot Water**

Tempered water may be inconvenient at times for occupants, as a kettle will be needed to produce hot water. Particularly in a shared household, it may be desirable to still have access to hot water from at least one source. Hence where possible, provision only to retrofit tempered water is ideal.

Waste outlets where water is tempered will require more maintenance, by way of regular flushing with boiled water, for adequate cleaning of pipes. Maintenance to waste pipes can be minimized by inserting drainers, to catch debris (food scraps in the kitchen sink and hair in bathrooms).

## Detailed Design

### **Integration of Tempered Hot Water**

Depending on the hot water system to a dwelling, hot water tempering can be achieved several ways – commonly via a tempering valve, and with even more precision, via a thermostatic mixing valve.

Bathroom joinery can be used to provide an easily accessible and concealed location for TMV's.



Access panel for thermostatic mixing valve, Mission Australia (Victoria) housing, MSN Architects.



## 6. Automation and Assistive Technology

Automation and Assistive Technology can greatly enhance a person's ability to live more independently, enhancing safety and reducing reliance on support workers within a home. Technology can provide alternative methods of control over the home environment, to suit a wide range of varying needs. For example, user-friendly advancements such as touch control or remote push-button control allow for operation of home features by a person with limited reach or dexterity. The capacity to program, re-program functions and 'add-on' various technologies without significantly altering building infrastructure (and without associated cost) means that a home can be highly customised to suit a particular person's needs, enhancing optimal use at the outset, as well as enabling highly specific modifications at a later date, if and when their needs change.

Essential considerations for technology in accessible housing are reliability, adaptability and usability. No single product on the market yet provides an integrated solution that suitably responds to these design drivers, while catering for a wide range of impairments. In demonstration projects to date, a range of technologies have been drawn on; e.g. reliable emergency communication systems have been drawn from traditional nursecall systems used in hospitals; user-friendly home automation systems from mainstream lifestyle products, and intelligent remote security and monitoring products from commercial security systems. There is a significant cost associated with using a number of different systems. More work is needed to integrate the functionality of these systems into one affordable, holistic package.

Technology is rapidly evolving – what today seems like a good idea may tomorrow become an outdated method. (A notable example is the move from fully hard-wiring dwellings to relying more upon wireless technology.) More work is also needed to understand how reliability may be achieved within this shifting context.

Whatever technology is provided within a project, it must have the capacity to meet the individual needs of an occupant and support them to live more independently. In some circumstances, unnecessary technology may actually de-skill a person, so it is important to consult with an occupant's Occupational Therapist to understand the needs and limitations of an individual, ensuring that technology solutions are suitably tailored.

In some projects, technology may also extend beyond the dwelling. For example, where there is 'On-site Overnight Assistance' (OOA), a quality assistive technology communication solution will enable a tenant to call on a support worker if and when assistance is needed. Such systems ideally provide capacity to use the technology via a range of user interfaces, specific to the needs of an occupant.

Technology of any kind requires careful consideration during early planning, particularly in the context of apartment developments, where a greater level of integration with building systems is needed. Appropriate budgeting is also needed to ensure the development of appropriate solutions for a specific project.

## 6.1 Power Pre-wiring for Automation of Key Dwelling Features

### Brief Development

#### Pre-wiring for Automation/Motorisation

The table below highlights:

- ① Key dwelling features that may require automated (or motorised) control
- ② Power provisions (pre-wiring or GPO) – to enable this in the future
- ③ Typical standard manual method of control for each key dwelling feature
- ④ Automated (or motorised) control method for each key dwelling feature, if an upgrade is required by an occupant

**Noted: Highlighted items require hardware to upgrade to automated/motorised control.**

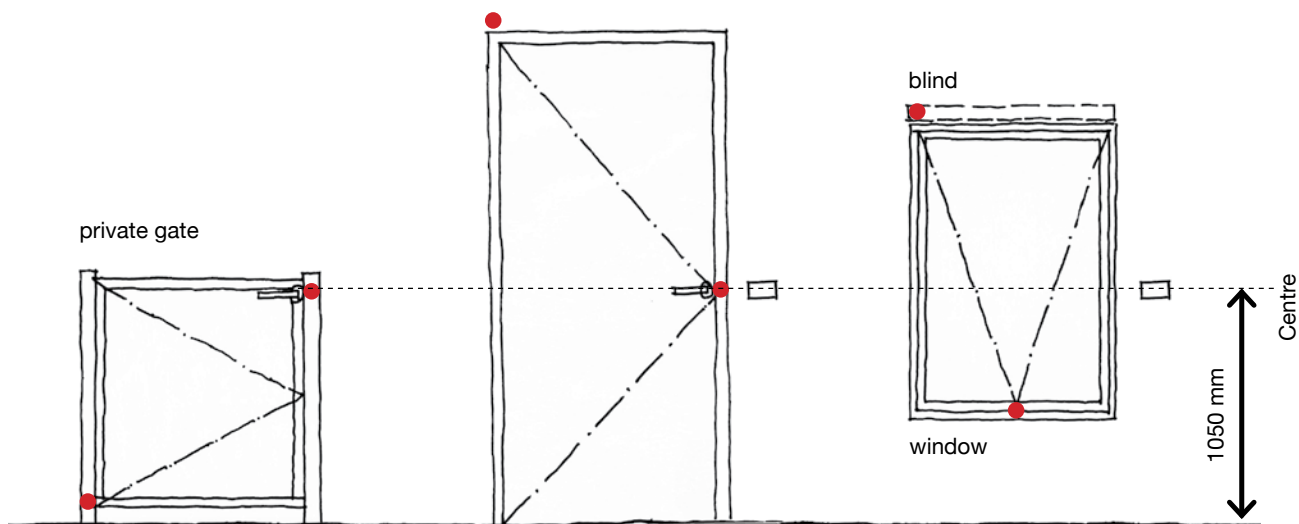
	Supports SDA
	Desirable

①	②	③	④
Dwelling Feature	Power Pre-wiring / GPO	Manual Control (Standard Provision)	Automated / Motorised Control (Upgrade)
<b>CONTROLS PROVIDED INTERNALLY</b>		<b>CONTROLS PROVIDED INTERNALLY</b>	
Emergency communication and alerting	n/a – already automatic	Wall switch and pendant (automatic control)	n/a – provided as standard
POS private gate	Power pre-wiring	Handle	Wall switch and/or electric fob
All entry doors	Power pre-wiring	Handle	Wall switch and/or electric fob
Internal doors	Power pre-wiring	Handle	n/a – see assistive technology instead
All opening windows	Power pre-wiring	Winder	Wall switch
Internal blinds (x2 sets)	Power pre-wiring	Chain/remote	Wall switch
Lighting	n/a – already automatic	Wall switch	n/a – provided as standard
Heating and cooling	n/a – already automatic	Wall panel/remote	n/a – provided as standard
Intercom	n/a – already automatic	Wall panel	n/a – provided as standard
Laundry screening door	GPO	Handle	Remote control
Pull-out pantry	GPO	Handle	'Knock-control'
Toilet flush	GPO	Flush-button	Sensor flush
<b>CONTROLS PROVIDED EXTERNALLY</b>		<b>CONTROLS PROVIDED EXTERNALLY</b>	
POS private gate	Power pre-wiring	Handle	Electric fob
All entry doors	Power pre-wiring	Handle	Electric fob

**Provide pre-wiring:**

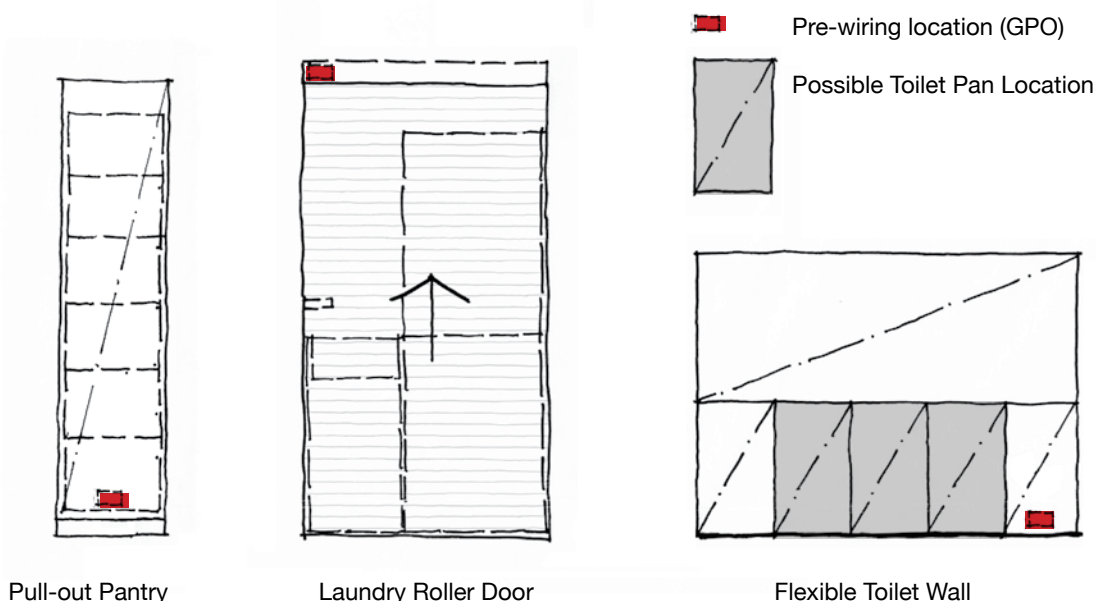
- ① To the future automation hardware/motor location (capped with discrete but legible grommet plug)
- ② To any future wall switch locations (capped with blank wall plate for legibility)

Note: It is not essential to have high quality power backup to some home features that are unlikely to impact on the safety of occupants (e.g. blinds and windows). Such home features may be automated via use of wireless automation hardware. Where such wireless automation hardware is available in the market, pre-wiring is not needed – eliminating some pre-wiring costs.



**Typical Pre-wiring Locations**

● Typical Pre-wiring Location



Pull-out Pantry

Laundry Roller Door

Flexible Toilet Wall

⊙ Detailed Design

**Data pre-wiring for Assistive Technology**

Note: This wiring is in addition to 6.1 Wiring for Automation.

**This table highlights:**

- ① Key dwelling features that may require integration into the dwelling’s smart hub, as well as control via a Wi-Fi device.
- ② Power provisions to enable this.

Note: It is not essential to have high quality power backup to some home features that are unlikely to impact on the safety of occupants (e.g. blinds and windows). Such home features may be automated via use of wireless automation hardware. Where such wireless automation hardware is available in the market, pre-wiring is not needed – eliminating some pre-wiring costs.

**Provide data pre-wiring:**

- To the automation hardware/motor location (Capped with discrete but legible grommet plug)
- To any wall switch locations (Capped with blank wall plate)
- See 6.1 Power Provisions for Automation Motorisation for standard locations

Noted: Highlighted items require data pre-wiring.

Supports SDA

①	②
Dwelling Feature	Data Pre-wiring
<b>CONTROLS PROVIDED INTERNALLY</b>	
Emergency communication and alerting	Data pre-wiring
POS private gate	Data pre-wiring
All entry doors	Data pre-wiring
Internal doors	Data pre-wiring
All opening windows	Data pre-wiring
Internal blinds (x2 sets)	Data pre-wiring
Lightings	Data pre-wiring
Heating and cooling	Data pre-wiring
Intercom	Data pre-wiring
Laundry screening door	n/a – none needed
Pull-out pantry	n/a – none needed
Toilet flush	n/a – none needed

<b>CONTROLS PROVIDED EXTERNALLY</b>	
POS private gate	Data pre-wiring
All entry doors	Data pre-wiring



Examples of automated home features. CLOCKWISE FROM LEFT: Automated private entry gate and internal dwelling entry door auto-door opener and internal wall switch, Hunter Housing Project.



## ⦿ Detailed Design

### **Door Pre-wiring**

Pre-wiring provided at the top left hand side will most readily suit the location of future door automation hardware.

Capping off pre-wiring with a small rubber grommet (colour-matched to wall surfaces) will allow legible installation, which helps future contractors locate pre-wiring, while being visually discrete.

## **6.2 Provisions for Assistive Technology**

### Brief Development

#### **Provisions for Assistive Technology**

A person living with disability, living independently in their own home, is likely to benefit from some form of communication with people offering support, which will help in the event of an emergency or unplanned need for assistance. For some people, this will be an essential service in supporting them to live on their own.

Particularly in apartment developments, essential services require increased integration into building services and building fabric, to ensure performance and a streamlined aesthetic. Hence, particularly in apartments, it is recommended to install a basic level of assistive technology into an accessible dwelling upfront during construction (i.e. even if dwelling occupants are not yet known).

## ⦿ Detailed Design

### **Phone Lines for Assistive Technology**

Useful provisions may include:

- Capacity for one hard-wired phone account in an anticipated support base location
- Capacity for 'priority calling' (i.e. to receive emergency communication calls before general phone calls)
- Capacity for additional phone extensions/phone lines as needed to achieve simultaneous calling to multiple emergency contacts

## ⦿ Detailed Design

### **Wi-Fi Capacity for Assistive Technology**

Useful provisions may include:

- Capacity for one dedicated Wi-Fi point per dwelling – for use of assistive technology only (separate to any private Wi-Fi)
- Capacity to restrict access to the dedicated Wi-Fi point, to ensure use is limited to operation of the dwelling only

## ⦿ Detailed Design

### **Manual control alongside Wi-Fi control**

In contexts where Wi-Fi control of a home feature is provided, an alternative manual control will ideally still be available:

- To allow use by family, friends, visitors and support persons
- To provide a backup option for control in the event of Wi-Fi instability

See 6.1 Pre-wiring for automation/motorisation for manual and automatic controls.





⦿ Detailed Design

### Capacity for Alternative Technologies

Useful provisions may include:

- Additional data point in each living area, accessible bedroom and bathroom, to allow for plug-in of alternative technologies such as an IR controlled device.
- Data points installed as an essential service, to facilitate plug-in of IR devices for emergency communication.

## 6.3 Emergency Communication – Provisions

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	6.3.1	Capacity for remote two-way communication between occupant and support person (i.e. via ceiling speakers and microphones)	Supports an occupant in resolving an issue independently	
<input type="checkbox"/>	6.3.2	Capacity for occupant to initiate communication via range of controls (e.g. wall switch, pendant, Wi-Fi device, other)	Allows for varied ability of occupants	
<input type="checkbox"/>	6.3.3	Capacity to install wall switches with auxiliary point, or inclusion of an additional data point next to a wall switch	Enables plug-in of alternative control (such as an infrared device)	
<input type="checkbox"/>	6.3.4	Capacity to install illuminated-type wall switches	Enhances identification in the dark	



Possible components of an Emergency Communication System:

TOP: iPad control, as used by this tenant.

BOTTOM, FROM LEFT: Wall switch call button and ceiling speakers for two-way communication.

## 6.4 Emergency Communication – Performance Outcomes

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	6.4.1	Capacity for occupant to cancel communication via tablet/smartphone	Supports privacy if accidentally triggered	🏠
<input type="checkbox"/>	6.4.2	Support persons cannot 'listen-in' to a dwelling without agreed protocols/occupant permission	Enhances privacy and independence of occupant	🏠
<input type="checkbox"/>	6.4.3	Visual and aural confirmation for occupant that communication is underway	Reduces possible concern for an occupant that a call may not have been registered	⚙️🏠
<input type="checkbox"/>	6.4.4	System resists failure if multiple requests for communication are made	Ensures system reliability	♿️
<input type="checkbox"/>	6.4.5	Communication requests escalate until received by a support person	Ensures communication requests cannot be missed	♿️
<input type="checkbox"/>	6.4.6	Capacity for communication between occupant and support persons located onsite or offsite	Provides flexibility for an occupant in their support provisions	♿️
<input type="checkbox"/>	6.4.7	Simple and intuitive response required to respond to communication requests	Enhances ease of response for support person and reduces chance error	♿️
<input type="checkbox"/>	6.4.8	Priority queuing to emergency communication, if general assistance calls could compete	Allows for a faster response to more important calls	♿️
<input type="checkbox"/>	6.4.9	Capacity for alert to divert to multiple phone lines – either same line in sequence (with appropriate relay time) or to various lines simultaneously	Allows for a faster response in an emergency situation	♿️
<input type="checkbox"/>	6.4.10	Flexible emergency call escalation process (adjustable function inputs)	Allows for customisation to suit individual and changing needs over time	♿️
<input type="checkbox"/>	6.4.11	Origin (dwelling address) and type (e.g. emergency or general) info available to support person prior to beginning communication	Allows for a more efficient response to more important calls	♿️
<input type="checkbox"/>	6.4.12	Emergency call type available to support person prior to beginning communication e.g. safety sensing, or emergency communication	Allows for a faster response to more important calls	♿️









LEFT: Support provider provisions, such as a desk phone and mobile phones.



RIGHT: Push-button pendant.

## 6.5 Safety Sensoring

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	6.5.1	Capacity to readily retrofit motion sensors in bedrooms, accessible bathroom and living	Alerts of possible emergency e.g. if no (expected) activity is sensed within a given timeframe	
<input type="checkbox"/>	6.5.2	Capacity to readily retrofit temperature sensor in accessible bedroom and living	Alerts of possible emergency e.g. if temperature outside of 'safe' range is sensed. <b>[Increased sensitivity]</b>	
<input type="checkbox"/>	6.5.3	Capacity to readily retrofit entry door and/or private gate sensor	Alerts of possible emergency e.g. if no (expected) door opening is sensed within a given timeframe (e.g. critical support visit)	
<input type="checkbox"/>	6.5.4	Capacity for sensors to be programmable for individual dwellings	Allows for customisation of sensor behaviour to suit individual needs	
<input type="checkbox"/>	6.5.5	Capacity for adjustment of alterable parameters or to be turned on/off	Allows for adjusting of sensor behaviour to suit changing needs	
<input type="checkbox"/>	6.5.6	Triggering of safety sensors to initiate emergency communication	Allows for a support person to remotely check on the wellbeing of an occupant	

### Brief Development

#### **Assistive Technology General Performance Features**

Recommended performance features, examples include:

##### **Reliability**

- Robust against interference from other systems in the building or vicinity
- Robust against network instability, hardware and software damage – to ensure essential services are always available and to support streamlined use for an occupant and support persons
- Capacity to communicate system failure/power outage – to prompt any necessary response

##### **Flexibility**

- Capacity to link in with future technologies and services
- Capacity to include additional inputs if required in future e.g. alerts from medical monitoring equipment such as epilepsy mats, fall detectors, etc.
- Capacity for future additional inputs to be an essential service

##### **Logging**

- Activity logging of all features operated through the assistive technology
- Activity logging of use of emergency communication system, including source and response time
- Password protection to activity logs

##### **Standalone**

- In a multi-residential context – allow for any accessible dwelling to be stand-alone, so that each dwelling can be individually customised without affecting other dwellings. Allow for deactivation of assistive technology, to enable removal of technology in future, if desired.

## Brief Development

### Wi-Fi Devices (Tablets/Smartphones)

#### Value to person living with disability

- Allows remote control of many functions on one device, and high degree of 'learnability' over time, which may assist a person with cognitive impairment; also allows for very low effort control over the home environment through touch control
- Utilises mainstream communications and lifestyle technologies **[Cost-efficient specification]**
- Variety of formats available e.g. smartphone, iPad, iPod play, iPad Mini, etc. **[Dexterity]**

#### Ideal Interface Features

- Customisable (e.g. customisable button logos and screen order)
- Capacity for friends or family of occupant to also have interface on a personal tablet/smartphone
- Capacity to add automated features one at a time over a period of time as features are learnt. **[Encouraging skill development]**
- Compatible with Apple IOS and Android tablet/smartphone
- Immediate feedback to confirm that a command has been executed
- Capacity to separate personal use and usage associated with provision of the dwelling

#### Accessories

- Fixed wall or loose desktop charger
- Protective cases (with reinforced edging) to protect device if dropped
- Screen cover to protect against screen damage



## Detailed Design

### Assistive Technology – Interface Configuration

Any standard setup will ideally be simple and intuitive, with a minimal number of steps to execute commands. Specific considerations include:

- Minimal buttons visible at one time
- No repeated buttons on one screen
- No institutional language (e.g. “nurse call”/“duress”, even if a “nurse-call” product is used)
- Most visually prominent commands: “Emergency Assistance” and “Cancel”
- Clearly visible time and battery life (larger symbols)
- Replace technical words with intuitive terms so that these are immediately apparent for people of varied abilities e.g. replace “climate” with “temperature” and “access” with “doors”
- No visual ‘clutter’ – e.g. inessential information, such as supplier details, widgets, etc.

## 6.6 Emergency Power Backup

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	6.6.1	Emergency power solutions to cater for a minimum two-hour outage where the welfare of participants is at risk  Note: NDIS Minimum Requirements do not specifically identify areas where the welfare of occupants may be at risk. Key services that are likely to highly impact the welfare of occupants are suggested below.		SDA High Support
<input type="checkbox"/>	6.6.2	Emergency communication system – ensures communication is available in the event of an emergency		■ Supports SDA
<input type="checkbox"/>	6.6.3	Safety sensing – ensures unsafe conditions for a particular individual are identified		■ Supports SDA
<input type="checkbox"/>	6.6.4	Fire safety systems – ensures fire hazards are identified		■ Supports SDA
<input type="checkbox"/>	6.6.5	Unlocking and opening of automated doors/gates (both Wi-Fi and wired controls) – ensures egress is available at all times, including for the person who relies on Wi-Fi or wired interfaces to control doors		■ Supports SDA
<input type="checkbox"/>	6.6.6	Continuous power backup (no warm-up or lag-time) – ensures there are no times where essential services are unavailable		■ Supports SDA

### ⦿ Detailed Design

#### Essential service cabling

Electrical considerations may include:

- Fire-rating of essential service cabling
- Termination of essential service cables in a location that allows for access and future alterations if required
- Combining of enhanced essential services (such as emergency call systems) with standard building essential services, such as a development lift, for increased efficiency

### ✎ Brief Development

#### Quality Control of Automation and Assistive Technology

To ensure ongoing performance of automation and assistive technology, it may be useful to request the below documents as part of building contract deliverables:

- Commissioning reports of all technology components
- On-site assessment of Wi-Fi coverage
- System maintenance to all technology components (e.g. batteries, updates, greasing of automated hardware, etc.)
- Product list of all technology system components, including serial numbers
- Warranty and commissioning information for all technology and fire safety components
- User manual/troubleshooting for technology and fire safety components
- Log retrieval instructions
- User-friendly testing protocol (test plan/checklist) of all technology to enable IT-trained Support staff to undertake this routinely
- Fixed call-out costs for maintenance during and after warranty
- Fixed unit cost for pre-identified individual tenant customisations



## 7. Fire Safety

Fire safety (detection and suppression) requirements associated with residential housing for people with a disability can be complex, and will be unique for every individual building type, use and construction method.

While the National Construction Code (NCC) fire protection requirements are very specific for NCC Class 2 (typical apartment) style buildings, 'deemed to satisfy' fire protection requirements for typical residential housing in Australia are less stringent. For example, fire sprinklers are not required in Australia for a typical 'Class 1' residential house.

As an industry benchmark, the NDIA SDA framework does offer an additional allowance for the inclusion of fire sprinklers for SDA enrolled dwellings, regardless of whether or not sprinklers are required by the NCC.

Consideration of individual occupant requirements is needed during project planning, along with any necessary fire safety measures, especially if the occupant requires assistance to evacuate in the event of an emergency. Specialist advice of this nature should be sought from a consultant fire engineer and building surveyor, in the very early stages of the concept design or project feasibility.

Information in this section is provided as a prompt to draw attention to various issues that impact on the design of accessible housing and to prompt further discussion within a project team in relation to a particular housing project. Many suggested provisions in this section are most relevant for a Class 2 (apartment) dwelling.

### KEY



Social Inclusion



Affordability



Physical Independence



Amenity



Homelike

Value Colour Code: **Highly Desirable** | Desirable



## 7.1 General Provisions

See also Part A, Section 5.4: Brief Development – Use of Lifts During Fire

☑	Ref.	Provision	Reason	Value
<input type="checkbox"/>		Emergency power solutions to cater for a minimum two-hour outage where the welfare of participants is at risk  *Note: NDIS Minimum Requirements do not specify which building features require emergency power solutions. The welfare of participants requires backup of emergency communication systems, safety sensing, automated secure-access doors (whether Wi-Fi or wired interfaces) and fire safety systems. Items 7.1.1 and 7.1.2 below support the intent of this requirement.		SDA High Support
<input type="checkbox"/>	7.1.1	Power backup of detectors by central fire system (i.e. rather than batteries, which an occupant may be required to physically access and replace periodically themselves)		Supports SDA
<input type="checkbox"/>	7.1.2	Continuous power backup (no warm-up or lag-time) – ensures there are no times where essential services are unavailable		Supports SDA
<input type="checkbox"/>	7.1.3	Multi-residential context – one system throughout all accessible and non-accessible dwellings	Ensures all stakeholders are familiar with protocols and are better equipped to act quickly	♿
<input type="checkbox"/>	7.1.4	Dual stage fire detectors (capable of differentiating between smoke and heat)	Allows faster response to fire, also avoiding false alarms due to smoke (costly if fire brigade required)	♿ \$
<input type="checkbox"/>	7.1.5	Detectors on a sounder base	Allows flexibility for augmentation of tone frequencies and outputs as needed	♿
<input type="checkbox"/>	7.1.6	Multi-residential – common area alarm speaker in dwelling entry – tone to NCC requirements, with additional warning, e.g. 'evacuate now'	Differentiates between fire alarms generated inside and out of dwelling, better informs whether to stay within dwelling or leave.	♿
<input type="checkbox"/>	7.1.7	Interlink all dwelling detectors	More quickly raises attention in other rooms, possibly alerting other household members	♿
<input type="checkbox"/>	7.1.8	Cabling between fire detectors and fire indicator panel (FIP)	Allows for fire brigade to be alerted immediately in the event detectors within the dwelling sense heat	♿
<input type="checkbox"/>	7.1.9	Cabling between FIP and emergency communication system	Allows for smoke detection to trigger emergency alert to support persons	♿



LEFT: Multi-sensor detectors provided within accessible dwellings, Hunter Housing Project.

RIGHT: A typical fire indicator panel, located with the apartment development entry, Abbotsford Housing Project.

<input checked="" type="checkbox"/>	Ref.	Provision	Reason	Value
<input type="checkbox"/>	7.1.10	Provide a sounder base within any onsite support space provided	Ensures support persons hear a smoke/heat alert, e.g. if sleeping at night	3i
<input type="checkbox"/>	7.1.11	Cabling between FIP and (any) dwelling entry automatic door closer location	Allows override of any hold-open command to automated door – ensuring self-closing in fire mode (where required by NCC)	3i
<input type="checkbox"/>	7.1.12	Cabling between FIP and dwelling assistive technology hub	Enables integration with assistive technology, if required e.g. if smoke detected – all lights turn on	3i
<input type="checkbox"/>	7.1.13	Capacity for future sprinklers e.g. cabling between FIP and local sprinkler flow switch within each dwelling	Allows for increased levels of safety, if required for an individual	3i
<input type="checkbox"/>	7.1.14	In contexts of fire-rated stairwells - landings of sufficient size to accommodate a fire refuge location	Provides refuge for a wheeled mobility user, especially where no egress via lift/stairlift is available	3i
<input type="checkbox"/>	7.1.15	Wi-Fi coverage in (any) stairwells suitable to be used for fire refuge	Supports communication with support persons during an emergency	3i
<input type="checkbox"/>	7.1.16	In contexts of fire-rated stairwells – stairwell doors min 950mm wide	Accommodates any stretcher equipment required for evacuation	3i

See also Part C Construction and Detailing, Section 8: Service Fixtures and Fittings.

## ⊙ Detailed Design

### Smoke Detectors

NCC regulations for fire safety vary from state to state throughout Australia.

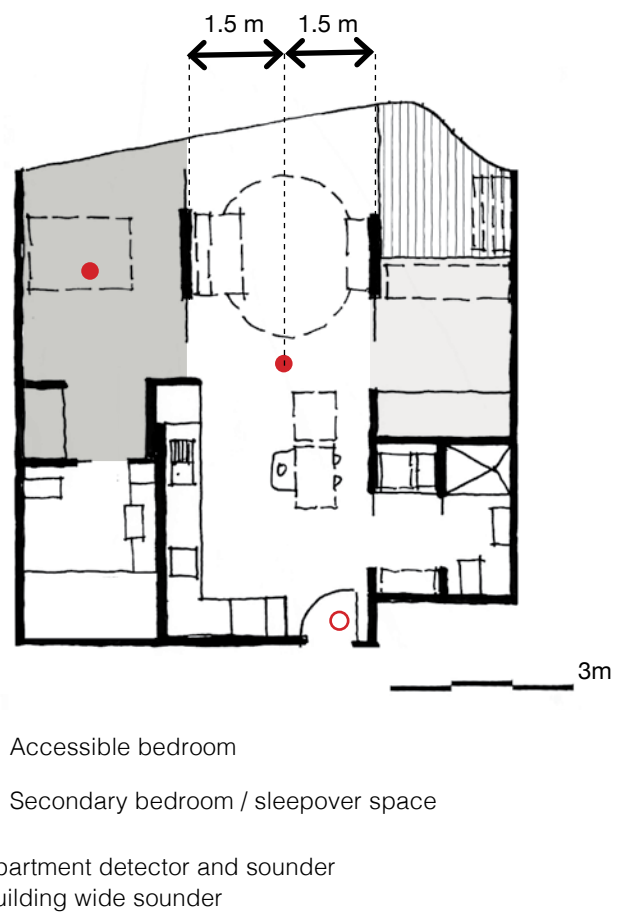
#### Standard allowances for detectors may include:

- One detector in each accessible bedroom
- One detector between each bedroom and the rest of dwelling (within 1.5m of any bedroom door without a detector)

#### Detailed considerations:

- Avoid placing detectors near bathrooms and cooking areas, to prevent steam falsely activating detectors.
- Consider switching bathroom fans to automatically turn on with light switches, to avoid a buildup of steam, which could trigger detectors
- Provide capacity for a bathroom fan to turn on automatically when the door opens – to support a person who may not remember to use the fan.

#### [Physical experience]



Typical Detector and Sounder Locations (Apartments)

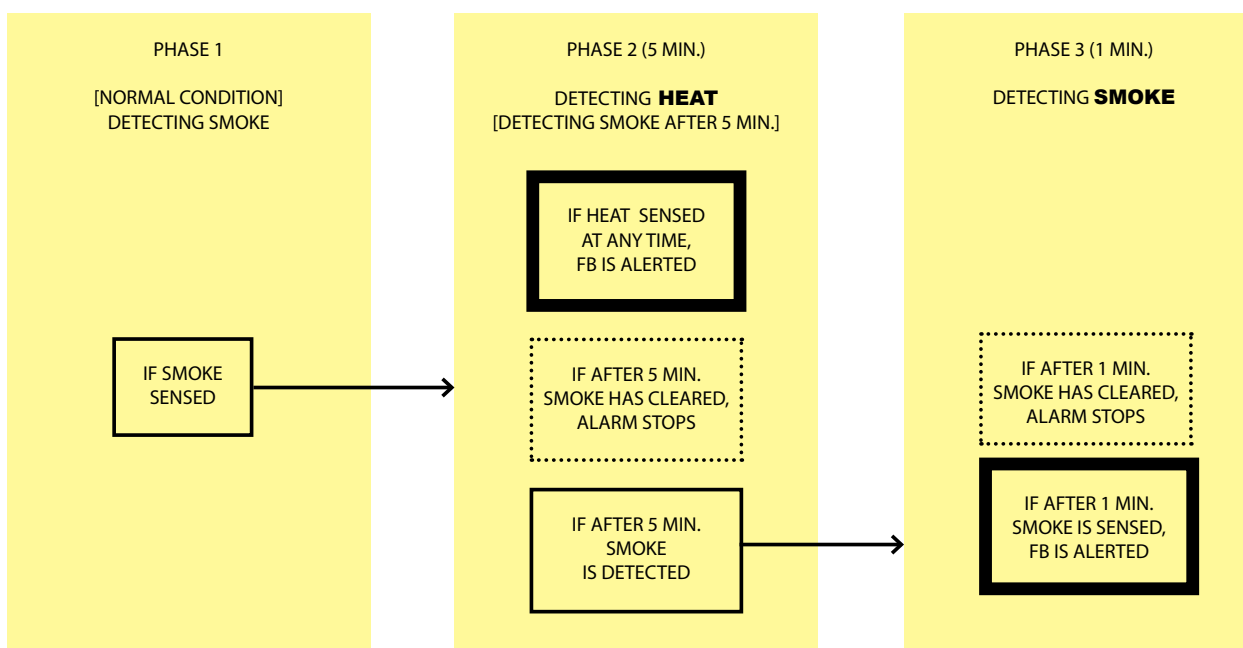
## Brief Development

### Dual Stage Smoke Detectors

Dual stage smoke detectors can enhance the safety of people living with disability, particularly in multi-level buildings where evacuation processes require detailed consideration. Detectors that can sense both smoke and heat can more quickly identify a genuine fire risk. In the event that heat is sensed, or smoke is sensed after a prolonged period (possibly indicating a shouldering fire) detectors can be programmed to immediately alert the fire brigade via the fire indicator panel (FIP). Automatic alerting to the fire brigade maximises the speed of response by emergency personnel adequately trained and equipped to assist the occupant.

In addition, false alarms (e.g. such as burnt toast) can more easily be filtered out through the use of dual stage fire detectors, saving the cost of false alarm call-out costs of the fire brigade, which will be incurred to the building owner.

The concept diagram below provides an example of how dual stage detectors may be programmed. Note: Appropriateness of detectors and specific programming requires input from a fire engineer and building surveyor.



## Detailed Design

### Fire Safety Customisations

Detectors that are integrated into assistive technology may be programmed to link in with automated home features, such as doors and lights. Some examples are provided below of possible programming functions for detectors, along with the adjustable parameters, that allow for adjustment to suit individual needs.

#### Functionality/Alterable Parameters

- Automatic close of any automated fire-rated entry door
- All lights turn on within dwelling if one detector senses smoke [ON/OFF]
- Automatic unlatching of any secured automatic accessible bedroom external door during fire [ON/OFF]



Universally-designed fire evacuation signage, photo supplied by Lee Wilson, Egress Group Pty Ltd.