DESIGN GUIDE

47359 461 Chapel Rd, Sustainable Development Group Ltd

461 Chapel Rd, Bankstown NSW 2200, Australia

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06/01/2025

WELCOME

This report has been produced for the proposed development at 461 Chapel Rd, Bankstown NSW 2200, Australia. The intent of this report is to outline the engineering spatial planning requirements for this development.

This report outlines typical planning provisions, general building on floor requirements, central building system requirements and authority connection considerations.

This report only contemplates mechanical, electrical, hydraulic, fire protection and vertical transportation engineering services. All of the design inputs, referenced industry standards and design assumptions can be found summarised at the end of this report.

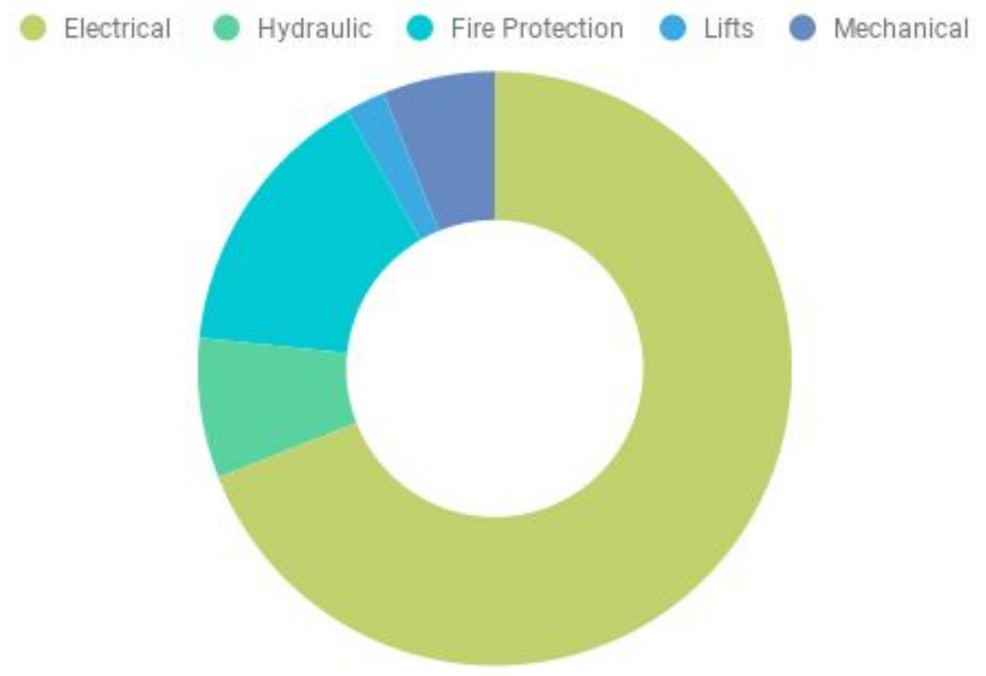
Steven Cassells NER. RPEQ. CEng. MSc. BEng. MCIBSE. MIEAust.
Engineering Lead

DESIGN
GUIDE

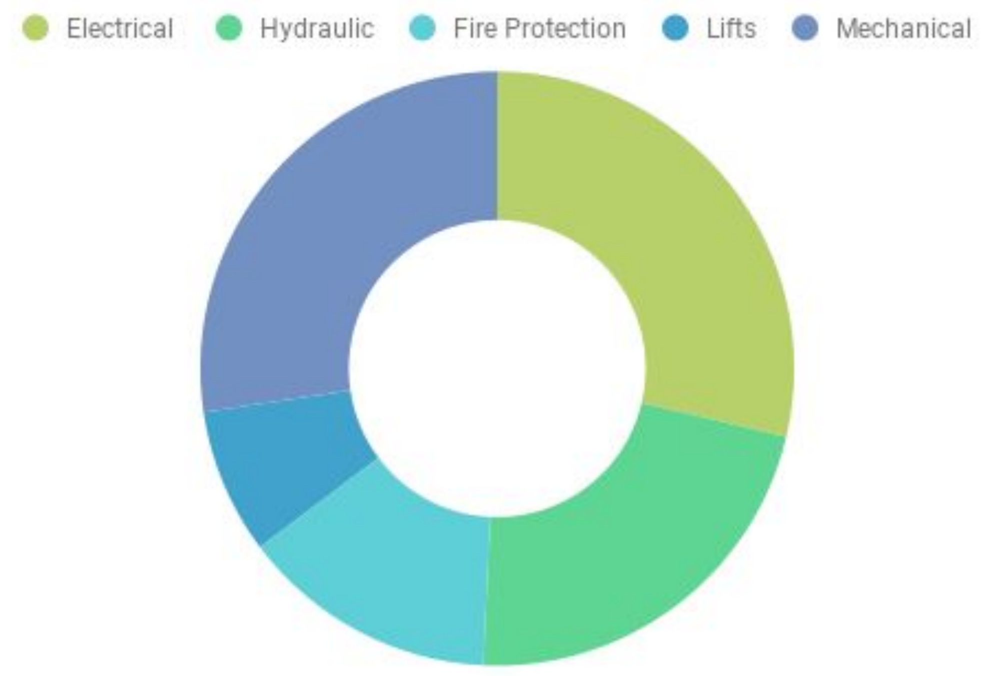
EXECUTIVE SUMMARY

615 m²	37.4 m²	340.4 m²
Roof plant area	Typical floor plant area	Ground level plant area

AREA BREAKDOWN (m²)



COST BREAKDOWN ($)



AREA AND COST OVERVIEW

DISCIPLINE	AREA (m²)	COST ($AUD)
Electrical	697.3	$4,615,900.00
Hydraulic	77.1	$3,549,941.00
Fire Protection	152	$2,248,836.00
Lifts	22.1	$1,275,000.00
Mechanical	61.8	$4,400,697.00

Note these costs exclude the utility connection associated costs. Refer to the Services Infrastructure Report for those cost.

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KEY ISSUES

615 m²	37.4 m²	340.4 m²
Roof plant area	Typical floor plant area	Ground level plant area

KEY ISSUES

- Request that the sustainability consultant confirms the solar array chosen complies with or exceeds the capacity required for the sustainability target for the development.
- Ensure a workshop has been conducted to understand the impact that the desired quantity of EV chargers simultaneously charging will have on the projects maximum demand calculation.
- Develop a retail matrix of engineering services provisions to understand tenancy offerings and requirements. Tip: prudent engineering provisions are recommended to cater for a range of potential retail tenants over time.
- Confirm the power connection strategy for your development and understand the likely works required to bring power to your building. This process includes a connection application to the supply authority to confirm their requirements.*
- Undertake a lift traffic analysis to ensure the proposed lift strategy meets the desired performance.
- Goods lift dimensions vary significantly between suppliers and goods lift requirements vary significantly via operators and users. Ensure you speak with both a supplier and future users to gain further details into their specific product and aligning it with the tasks required by that goods lift.
- Coordinate the stair pressurisation shafts including the associated locations of fans and air intakes.**
- Two options have been proposed for the lobby relief system. Confirm the preferred option and make provision for either the relief air shaft or the natural relief louvres.**
- Ensure the fire control room meets the specific code requirements outlined in the fire protection section of this report. Confirm and agree it's location with your BCA consultant and Fire Safety Engineer.
- Ensure that a slab to slab height review is completed to ensure there is sufficient head height to locate services within false ceilings of typical apartments. This review should be done on typical, most upper and transition levels with the structural engineers, building services engineers and architects. Typical pinch points include terrace roof gardens that have drainage, balcony set-downs that have exhaust discharging to the facade and transition levels that have either additional structure or insulation below the slab.
- Coordinate the car park intake and exhaust locations.**
- The services infrastructure report findings note there may be insufficient capacity in the existing sewer mains for this development. Refer to this report for suggested next steps to resolve this issue.
- Complete an invert level study of the buildings sewer discharge height against the invert level connection to the existing sewer main to confirm if a sewer pump station is required for the development
- Complete an invert level study of the buildings storm water discharge height against the invert level connection to the council storm water main to confirm if a storm water pump station is required for the development
- Confirm that a gas connection is definitely not required for this development
- The supply air required for the fire control room is quite large and must be fire-rated. Minimising the extent of this ductwork will save money for the project. Tip: A fire engineer may be able to help rationalise this requirement during detailed design.**
- Confirm the projects sustainability targets with a sustainability consultant to establish if a rainwater tank is required for this development.
- Investigate the size and location of available mains water near your development. This is required to establish the connection strategy, and any required augmentation works.*
- Verify the available mains water pressure and flow to confirm the water pumping requirements for the development.*

Note:

- * Complete a Services Infrastructure Report (SIR) to confirm this item
- ** Get your architectural plans reviewed by an Engineer to confirm this item

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SPATIAL MATRIX

615 m²	37.4 m²	340.4 m²
Roof plant area	Typical floor plant area	Ground level plant area

MECHANICAL

Items	Dimensions	No.	Watch Points
Commercial Kitchen Exhaust Shafts	0.8	3	Locate the vertically aligned fire-rated shafts close to the commercial kitchen exhaust hoods they serve. Note the shaft size is typical refer to the Engineering Options Report for the full itemised list of kitchen exhaust shaft sizes for each retail tenancy.
Commercial Kitchen Exhaust Roof Fans	2m (l) x 1m (w) x 1.2m (h)	2	Locate the rooftop exhaust fans in a safe location for access and maintenance, near the exhaust shafts and well away (6m minimum) from any air intakes.
Retail Air Conditioning Condensers	0.95m (l) x 0.8m (d) x 1.7m (h)	23	Locate outside (or in a well ventilated space like a car park) close to the retail tenancy it serves.Note fan coil units
Stair Pressurisation Shaft (sqm)	1.4	2	One required per fire stair. Locate the shaft directly adjoining each fire stair in a dedicated vertically aligned fire-rated enclosure. Note the requirements for top and bottom supply into the common shaft.
Stair Pressurisation Fan	3m (l) x 0.9m (w) x 1.2m (h)	6	Locate the fan on the roof, ideally above or directly adjacent the stair pressurisation shaft(s) below to which they physically connect.
Lobby Relief Shaft (sqm)	3.15	1	The lobby relief grille must connect directly to the communal corridor and have a clear path between it and the fire stair doors that it is relieving air from. The shaft must be vertically aligned.
Lobby Relief Fan	2.2m (l) x 1.2m (w) x 1.3m (h)	2	Locate the fan on the roof, ideally above or directly adjacent the lobby relief shaft below to which they physically connect.
Car Park Ventilation Fan Room	4m x 2.4m	2	Allow for a supply and exhaust fan room. For further requirements refer to the design guide.
Car Park Ventilation Exhaust Air Riser	1.0	1	Ensure the exhaust air shaft aligns vertically up through the building. Ideally, locate the shaft close to the car park exhaust air fan room, to which it connects.
Car Park Ventilation Supply Air Riser	0.9	1	Ensure the supply air shaft aligns vertically up through the building. Ideally, locate the shaft close to the car park supply fan room, to which it connects.
Air conditioning condenser area	900mm (l) x 400mm (d) x 900mm (h)	185	The air conditioner on balcony dimensions are per apartment. Locate on the balcony away from the handrail close to the external apartment wall.
Main switch room Ventilation (sqm)	0.2	2	Two of these noted shafts are required if the room is ventilated from the roof. Refer to the main switch room ventilation section for requirements if it is preferred and possible to ventilated this space to/ from a local facade.
Fire Control Room Ventilation (sqm)	0.52	2	The supply air required for the fire control room must be fire-rated.

Items	Dimensions	No.	Watch Points
Garbage Room Exhaust (sqm)	0.21	1	Refer to the garbage room ventilation section for requirements to assess if exhausting to a local facade is possible. If not, the noted shaft size will be required. We recommend including a hot water heater below the sink in each garbage room.
Storage Room Ventilation (sqm)	0.30	1	Intake via a local facade if possible to avoid this shaft.
Loading Dock Exhaust (sqm)	0.6	1	Refer to the loading dock ventilation section for requirements to assess if the supply and exhaust air can run from a local facade. If not, the supply or exhaust air must run-up to the roof, noting the required shaft size. Tip: separate air intakes and air discharge locations by 6m.
Retail Garbage Room Exhaust (sqm)	0.8	1	Refer to the retail garbage room exhaust section for requirements to assess if exhausting to a local facade is possible. If not, exhaust to the roof noting the required shaft size. A single shaft can serve multiple garbage rooms.
Grease Arrestor Room Exhaust (sqm)	0.09	1	Refer to the design guide for requirements to assess if the supply and exhaust air can run from a local facade. If not, the supply or exhaust air must run-up to the roof, noting the required shaft size. Tip: separate air intakes and air discharge locations by 6m.
Fire Pump Room Ventilation (sqm)	0.26	2	Note that general supply and exhaust is required. Refer to the fire pump section for additional requirements.

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LIFTS

Items	Dimensions	No.	Watch Points
Lift Shaft Dimensions	2500mm (w) x 2500mm (d)	3	This figure is the clear internal dimension per lift which excludes the structure. Refer to the lift section for lift numbers and further details.
Goods Lift Dimensions	1700mm (w) x 2000mm (d)	1	Refer to the lift section for full details

ELECTRICAL

Items	Dimensions	No.	Watch Points
Solar PV Array (sqm)	599	1	Locate away from roof edges and areas with overshadowing
On floor Electrical Cupboard	1.8m (l) x 0.6m (d) x 2.1m (h)	1	To be vertically aligned up through the building located in common areas such as corridors
On floor Communications Cupboard	1.2m (l) x 0.6m (d) x 2.1m (h)	1	To be vertically aligned up through the building located in common areas such as corridors
Car park Electrical Cupboard	1m (l) x 0.6m (d) x 2.1m (h)	1	One cupboard per level, and per 60 m radius i.e. max cable length out from each cupboard. Often located close to the building core and lifts.
Car park Communication Cupboard	1m (l) x 0.6m (d) x 2.1m (h)	1	One cupboard per level, and per 60 m radius i.e. max cable length out from each cupboard. Often located close to the building core and lifts.
EV Charger Distribution Board(s)	0.6m (l) x 0.3m (d) x 1.5m (h)	2	To be evenly distributed throughout the car park close to the EV charging points they serve
Distribution Board, Communications Board, Fire Hose Reel	0.8m (w) x 0.5m (d), 0.9m (w) x 0.5m (d), 1m (w) x 0.5m (d)	23	Required for each retail tenancy typically located towards the rear of the room.
Electrical Substation	5.3m (l) x3.3m (w) x 1.7m (h)	2	Refer to the substation section for the external padmount substation requirements
Main Electrical Switchrooms	9.7m (l) x 4.5m (w) x 3m (h)	2	Locate adjacent the substation. Allow for two means of egress via separate doors. Refer to the design guide for further details.
Communications Building Distributor Room	3.2m (l) x 3m (w) x 2.6m (h)	1	Where practical provide direct access for cabling from the street and near to the communications riser
MATV antennas	2m (l) x 2.5m (w) x 1.5m (h)	1	External zone located on the roof ideally close to the communication riser below.

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SPATIAL MATRIX

615 m²
Roof plant area

37.4 m²
Typical floor plant area

340.4 m²
Ground level plant area

FIRE PROTECTION

Items	Dimensions	No.	Watch Points
Fire Control Room	4m (l) x 2.5m (w) x 2.4m (h)	1	Note this room requires direct access from the building entrance or main lobby from within a fire corridor. Agreed the location with your BCA consultant and Fire Safety Engineer.
Fire brigade booster assembly	4m (w) x 0.7m (d) x 1.8m (h)	1	Locate near to the front entry and allow for fire truck hardstand
Fire extinguishers	0.4m (w) x 0.4m (d)	1	Located within 10m of each single occupancy unit. Mounted between 100mm and 1200mm above floor level
Hydrant and sprinkler zone valve assembly	1.5m (w) x 0.5m (d)	2	Note the required BCA clearances within the typical apartment section. Generally a 1,300mm stair landing will provide sufficient clearances.
Fire Pump Room	7m (l) x 5m (w) x 2.4m (h)	1	Provide direct access from an external facade or fire stair
Central Fire Protection Riser	0.8m (l) x 0.4m (w)	1	This riser is in addition to the wet fire risers within the fire stairs. Locate adjacent to the fire stair.
Fire Pump Flue Shaft	0.4m (l) x 0.4m (w)	1	Locate within a fire rated shaft discharging to atmosphere
Fire Water Storage Tank Room Size (sqm)	68	1	Area based on a 2.5m high fire tank. Must be located on the same level or above fire pump room. Refer to the design guide for specific requirements.

HYDRAULIC

Items	Dimensions	No.	Watch Points
Grease Arrestor(s)	5.6m (l) x 3.8m (w) 2.8m (h)	2	Locate below and close to the retail tenancy they serve. For multiple F&B tenants locate centrally to tenancies across the site
Sewer Pump Station (inground)	1.8m (l) x 1.8m (w) x 2m (h)	1	Inground only. TBD pending detailed invert level study to determine exact requirements (if any)
Stormwater Pump Station (inground)	1.8m (l) x 1.8m (w) x 2m (h)	1	Inground only. TBD pending detailed invert level study by Civil Engineer to determine exact requirements (if any)
Rainwater Reuse Tank	5m (l) x 5m (w) x 2.2m (h)	1	This allowance is an estimate only and is subject to sustainability targets. Confirm this requirement with a sustainability consultant.
Rainwater Tank Filtration and Pumps	3m (l) x 1.5m (w) x 2.3m (h)	1	Locate adjacent the rainwater tank
Water Meter Cupboard	0.9m (l) x 0.5m (d) x 2.3m (h)	1	Required on each level, ideally full height, centrally located and vertically aligned up through the building within the common corridor with clear access for maintenance.
Cold Water Pump Room	5.5m (l) x 3m (d) x 2.4m (h)	1	To be located close to the site boundary.
Authority Cold Water Meter	3.3m (l) x 0.5m (d) x 1m (h)	1	The space is currently allocated within the cold water pump room. No additional space required. Locate close to the site boundary. Refer to the hydraulic section of this report for details
Main Hydraulic Riser	2m (l) x 0.8m (w)	1	To be located off a common corridor, vertically aligned up through the building.
Electric Water Heater	500mmØ x 885mm (h)	1	A tank is required per apartment, and is sized to store 80L of hot water.

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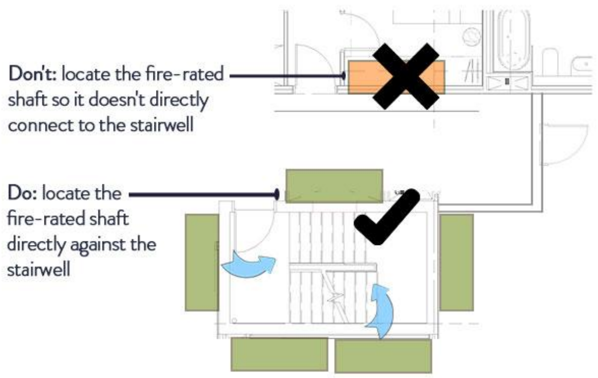
MECHANICAL SYSTEMS

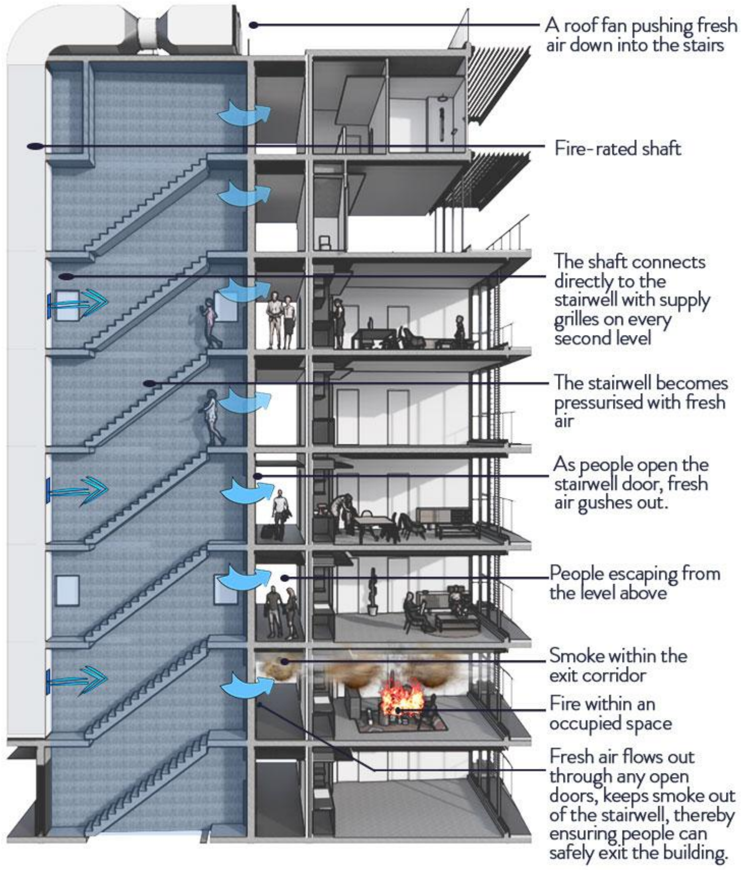
1.4 m2

Stair pressurisation shaft

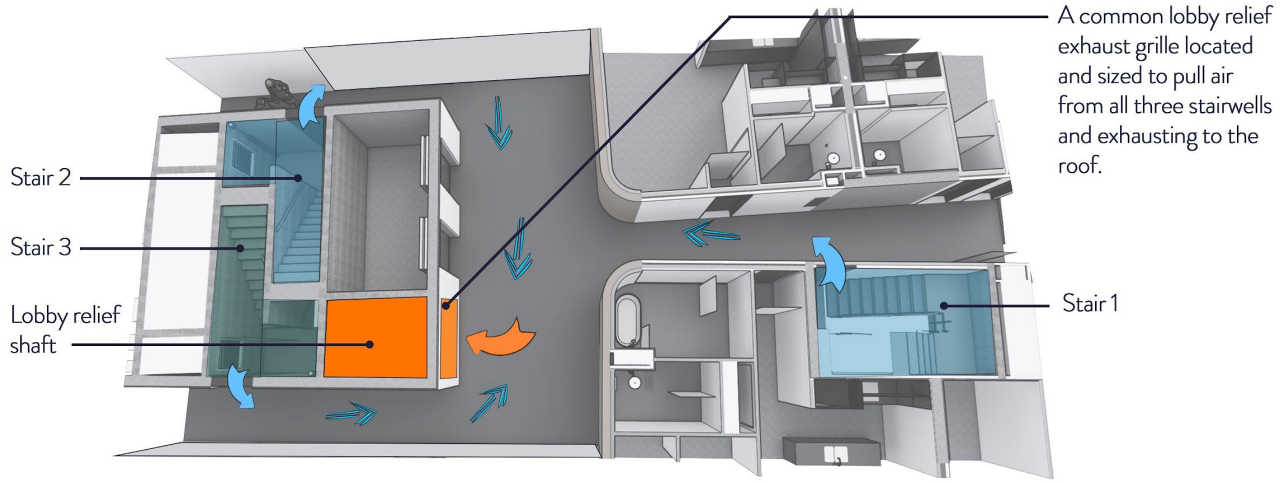
3.15 m2

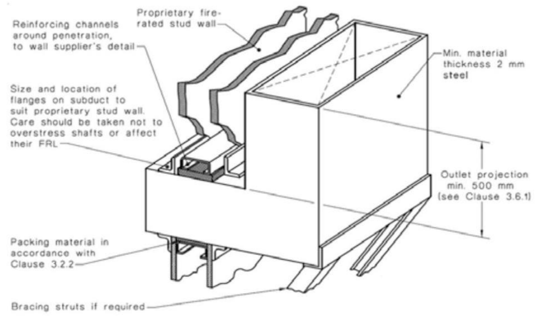
Lobby relief air shaft





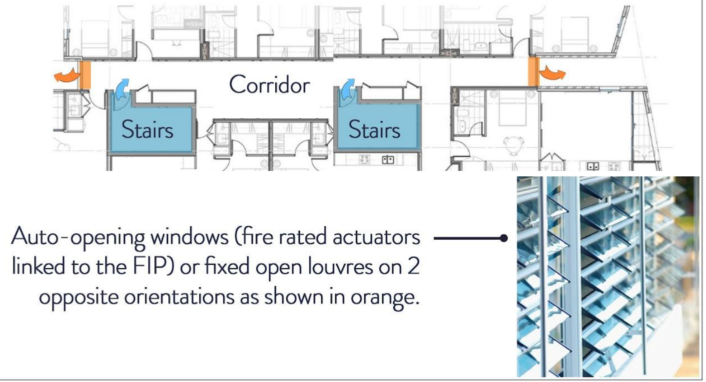
Example: a lobby relief system serving 3 stairs.





The required connection detail between the grille and the shaft

Example: a natural relief system serving 2 stairs.



Stair pressurisation

The purpose of this system is to pressurise the fire stair(s) with outside air in the event of a fire. This stops smoke from entering the fire stair while people are evacuating the building. This system enables occupants to evacuate the building safely. These systems are required for all buildings that have an "effective height" (as defined in the NCC) of greater than 25m. The BCA consultant should confirm if your building requires this system; however, based on the design inputs section, it appears this system is required.

The system operates by pressurising the stairwell with clean outside air so that when an occupant opens the door to a fire-affected floor sufficient clean air moves from within the stairs, out into the adjacent space thereby ensuring smoke does not enter the stairwell which is the main escape route. To ensure that sufficient air passes through an open door, supply air at every other level within the fire stairs. This shaft must be fire-rated and directly adjoin the fire stair. The above image illustrates a typical arrangement. The air intake must be 6m away from any other air discharges. Please note there are stringent performance requirements for this system during commissioning. Therefore, we strongly recommend not compromising these items in terms of size or location. The shaft size based on the project inputs is 1.4m2 and a minimum depth of 500mm. This is required for each fire stair.

Due to the height of this building, it is recommended that each of the stair pressurisation shafts is pressurised from both the top (roof) AND the bottom. The low-level supply can be via a suitable area where a supply fan can be located adjacent to the fire stair, and air can be pulled in from outside via an intake louvre. The fan can be located within a fire-rated ceiling enclosure connecting the stair pressurisation shaft to the intake louvre utilising fire rated ductwork. Allow for 1000mm diameter fan, 4.1m2 free area intake louvre and a clear path for 1500mm x 800mm for ductwork to pass from the louvre to the riser via the fan.

Lobby relief

When an occupant opens the fire stair door of a fire-affected floor to escape, the stair pressurisation system pushes outside air through that door into the corridor containing the smoke. To ensure that air continues to move from within the fire stair out into a fire affected corridor, a second system is required. This system is called a lobby relief system. This system operates by relieving air from the corridor of the fire affected floor ensuring smoke does not enter the fire stair. The code allows for two methods of lobby relief: the first being natural relief. This arrangement consists of either fixed open louvres on two opposing facades sized to relive the air from the fire stairs or operable louvres that are fire rated with actuators that open in the event of a fire achieving the same intent. The code requires each louvre to be sized for 100% of the relief air quantity. The intent being, should one of the facade orientations experience high wind pressures, then the air can relieve through the opposing facade. For planning purposes, allow for 2.6m2 free area louvre on each opposing facade.

The alternative option is to seal the corridors with no operable windows (at least in fire mode) and put in a dedicated shaft with a fan on top (at roof level). Relief air grilles are required on each level that relieve the air from the fire affected corridor. This grille must connect directly to the corridor and have a clear path between it and the fire stair doors that it is relieving air from.

The more fire stairs we have (connecting to a common corridor), the larger the lobby relief shaft will become. Alternatively, you can have more than one lobby relief shaft. However, this is expensive and has not been considered at this stage. Note the lobby relief grille is large and mounted on the corridor wall directly in front of the relief air shaft. The code has strict requirements for this detail.

For planning purposes, allow for a 3.15m2 shaft with a minimum depth of 1,000mm on every level, vertically aligned, stopping only on the level above the exit level. The wall-mounted lobby relief grille in the corridor is approx 1.88m2. Further details are shown in the above image.

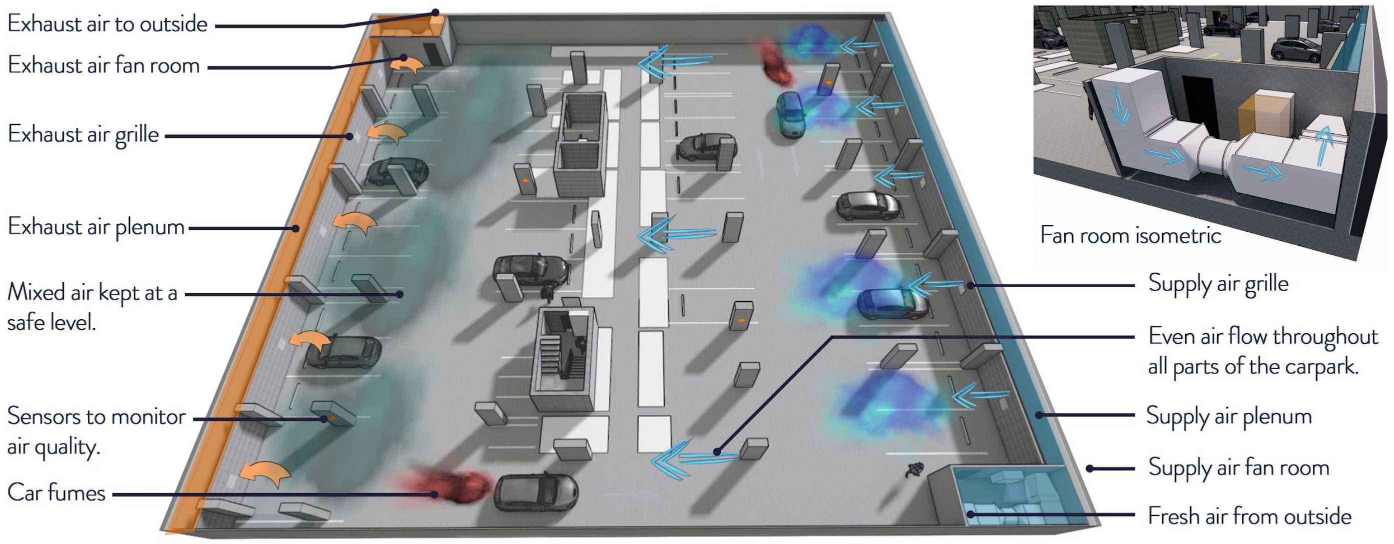
MECHANICAL SYSTEMS

1.0 m2

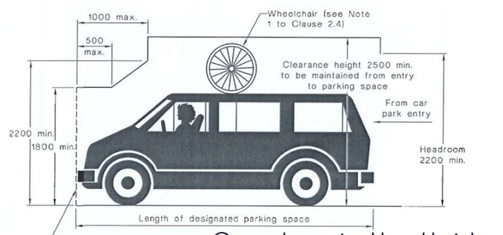
Carpark exhaust shaft

n/a

Basement Stair Pressurisation Shaft size

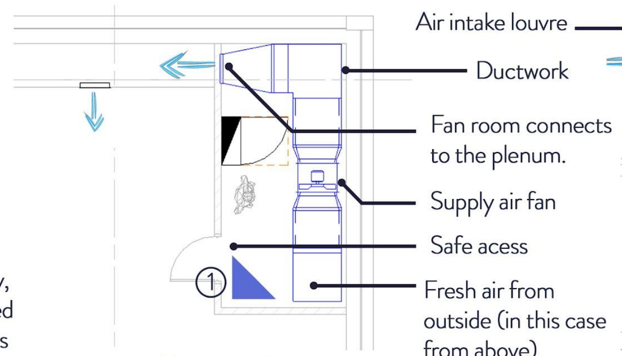


Car park ventilation design intent.

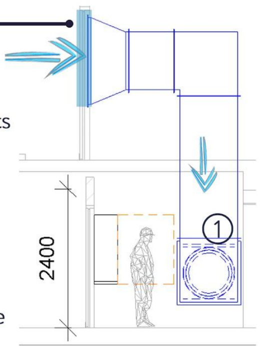


Car park required head heights

Tip: follow the intent of this image. The supply air should connect from outside to inside via the supply fan. Similarly, the exhaust air is removed from the carpark and discharged to outside via the exhaust fan. Ideally, locate the fan rooms on the opposite sides of the car park like shown.



Fan room plan



Fan room section

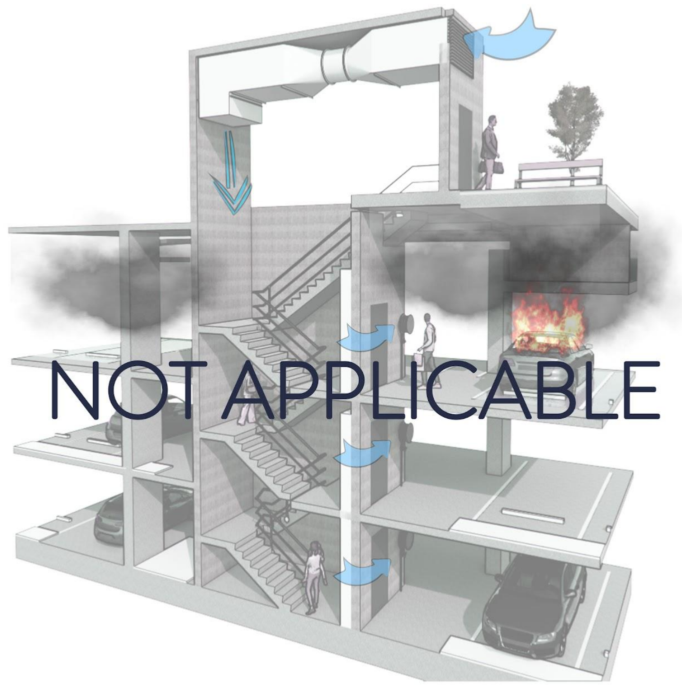
Car park ventilation

Based on the design inputs section, the enclosed car park will require a mechanical ventilation system. Enclosed car parks require ventilation to remove the carbon monoxide (CO) from the air that is emitted by cars. Typically, this involves a fan that supplies outside air into the car park, and an exhaust fan, removing the air from the car park. Sensors monitor the CO levels within the car park and tell the fans to speed up or down to maintain a safe level at all times. The building code stipulates that the ventilation air must be evenly distributed throughout the car park. The intent is shown in the image above. As shown, ideally one side of the car park has supply and the other side exhaust. This ductwork must physically connect to the fan rooms, which in turn connect to the air intakes and discharges. Typically, air intakes are located close to the supply air fan room on the level above with either an open shaft above (allow for a 0.9m2 supply air shaft) or a 5.1m2 free area weather louvre integrated into a facade. Air discharges are similar discharging vertically through an open shaft (1.0m2) or to a facade discharge louvre (3.4m2) that is 6m away from any other air intake or building opening including apartment windows and similar.

For preliminary planning purposes, allow for a 4m x 2.4m supply fan room and 4m x 2.4m exhaust fan room within the most upper car park level. These must be enclosed rooms with safe access for maintenance and fan replacement.

For preliminary planning purposes, it is recommended that a full-height, 600mm deep plenum on each level is provided meeting the intent shown in the above image. For clarity, the supply air plenum needs to physically connect back to the supply fan room, and the exhaust plenum connects back to the exhaust fan room.

Alternatively, if plenums are not desired, high-level ductwork throughout each level is possible. However, this will create coordination challenges with basement head height, structural beams and other services to fit in approximately 400mm (h) ductwork.



Basement stair pressurisation

Any fire stairs that serve more than two below ground storeys, not counted in the riser in storeys require pressurisation. Based on the number of underground car parking levels entered in the design inputs section, we believe basement stair pressurisation systems will not be required.

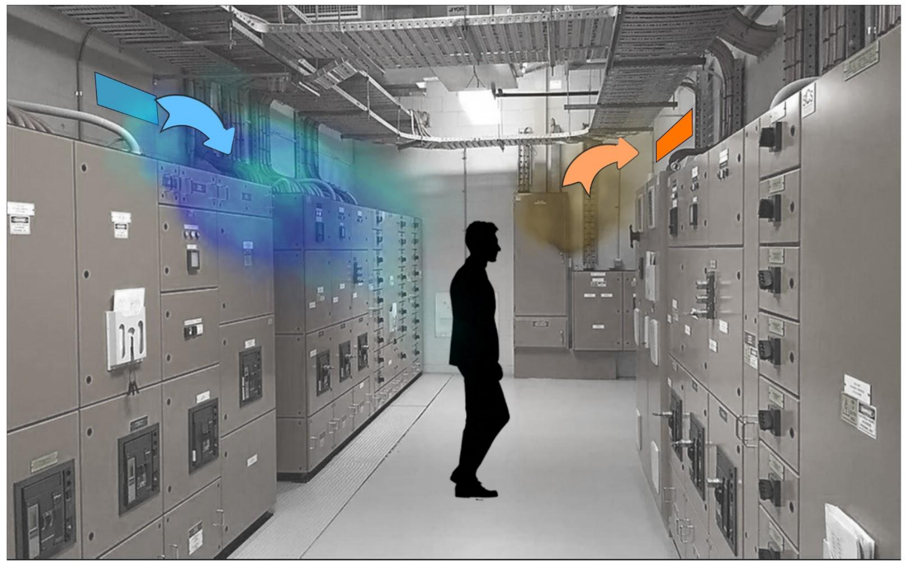
MECHANICAL SYSTEMS

0.2 m2

Main switchroom shafts

Tip: Kiosk substations are designed to be located outside so they can be naturally ventilated via louvres that are integrated into the kiosk.

Tip: Locate ductwork grilles at opposite sides of the switchroom to create good airflow through the rom.



Ventilation air required for operators within the switchroom.

Substation ventilation

External padmount substations are located outside. Padmount substations come with in-built louvre that enable the components within the external shell to be naturally ventilated. These details are illustrated in the above image. Refer to the substation section for specific requirements related to the location of padmount substations.

Main switch room ventilation

The main switch room will require mechanical ventilation. Typically the supply and exhaust air comes from a local facade. Allow for 2 x 0.2m2 for ductwork with a minimum height of 300mm. If this is not possible, allow for 2 x 0.2m2 shafts to connect the switch room ductwork to the roof. If louvres are required to intake and discharge air from the facade, allow for 0.34m2 free area intake louvre and 0.21m2 free area for the exhaust louvre. Note all air intakes should have a minimum separation clearance of 6m from any air exhaust discharge points.

MECHANICAL SYSTEMS

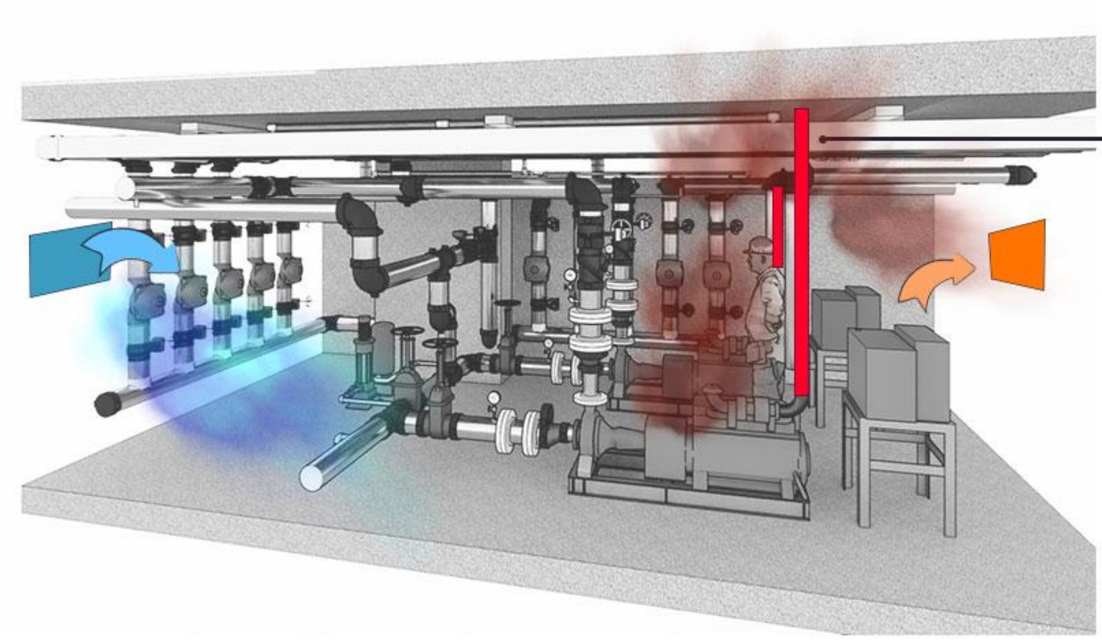
0.26 m2

Fire pump room shafts

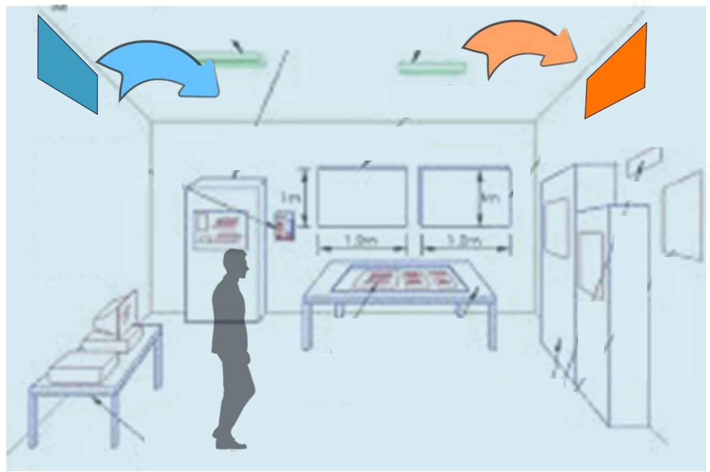
0.52 m2

Fire control room shafts

Tip: The diesel pumps have flues which remove the fumes however the engines get very hot when operating and this heat needs to be removed from the space. A large ventilation system is required to remove this heat. Locate ductwork grilles at opposite sides of the room to create good airflow through the room ideally past the pumps.



Tip: The ductwork serving this room is fire rated and therefore expensive. Try minimise the duct length connecting this room to ourside (local facade/roof).



Example fire control rool with large supply and exhaust grilles.

The fire control room is pressurised with outside air to ensure it remains smoke during a fire when the room is in use by the fire brigade to coordinate fire fighting activities for the building.

Fire pump room ventilation

The fire pump room will require supply and exhaust ventilation. Typically, the supply and exhaust air are via a local facade. Allow for 2 x 0.26m2 for ductwork with a minimum height of 300mm. If this is not possible, allow for 2 x 0.26m2 shafts to connect the ductwork from the roof level down to the fire pump room. Note: this ductwork must be fire-rated where it passes through other fire compartments. If louvres are required to intake and discharge air from the facade, allow for a 1.33m2 free area intake louvre and a 0.80m2 free area for the exhaust louvre. Note all air intakes should have a minimum separation clearance of 6m from any air exhaust discharge points.

Fire Control Room Ventilation

The National Construction Code (NCC) states that a fire control room requires a minimum of 30 air changes per hour when the system is operating, and any door to the room is open. The ductwork and associated fans must be fire-rated. The shaft size for the supply air to the fire control room will be 0.52m2, and if the air intake is via a local facade a 3.00m2 free area intake louvre and a 1.80m2 free area discharge louvre will be required. Note all air intakes should have a minimum separation clearance of 6m from any air exhaust discharge points.

DESIGN GUIDE

MECHANICAL SYSTEMS

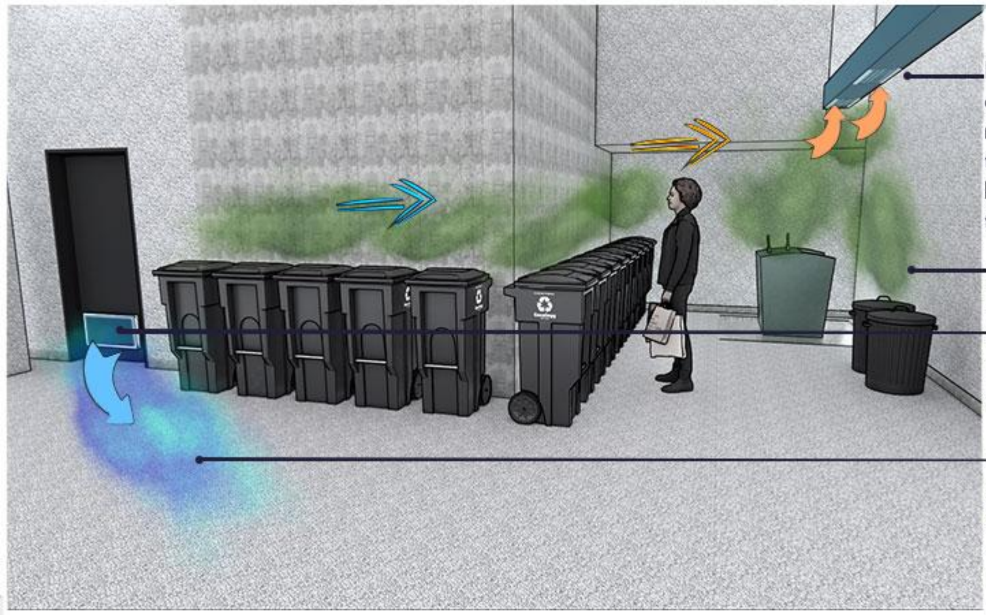
0.21 m2

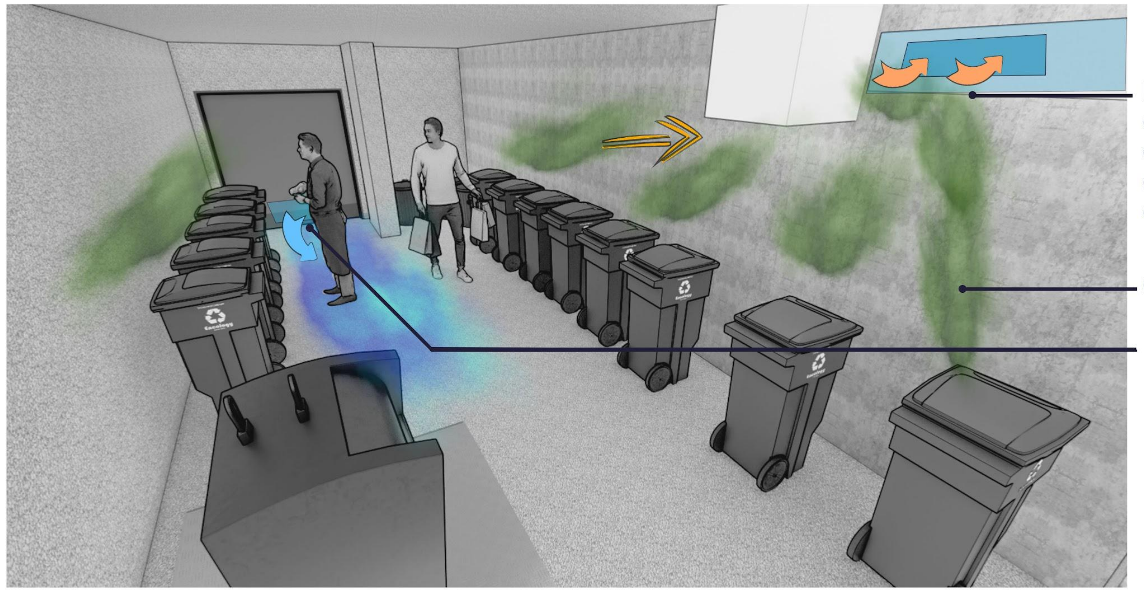
Garbage room exhaust shaft

0.8 m2

Retail garbage room exhaust shaft

'Elephant Foot' Waste chute system.





Garbage Room Exhaust

If enclosed within the building, the garbage room(s) will require mechanical ventilation. Typically via supply and exhaust ductwork. Where there are multiple garbage rooms, exhausts can be combined if needed. If the preference is to discharge exhaust air to the roof, which is typical, allow for a 0.21m2 shaft from the garbage room level to the roof.
Regarding garbage chutes, these can be ventilated via a fan located on top of the garbage chute shaft or for larger chutes via a small 300mm x 300mm shaft adjacent the garbage chute with a small exhaust grille located on each level. Consult the garbage chute supplier for further details.
Allow for a small instantaneous water heater below the sink within each garbage room.

Retail garbage room exhaust

Where you have an enclosed retail waste/bin room within your building, it will require mechanical ventilation. Typically exhaust ductwork will connect the bin rooms to the roof-mounted exhaust. Exhausts must be located 6m away from any building openings or air intakes. Bin room exhausts can be combined if needed. If discharging to the roof (which is typical) allow for a 0.8m2 shaft from the bin room level to the roof.
Allow for a small instantaneous water heater below the sink within each garbage room.

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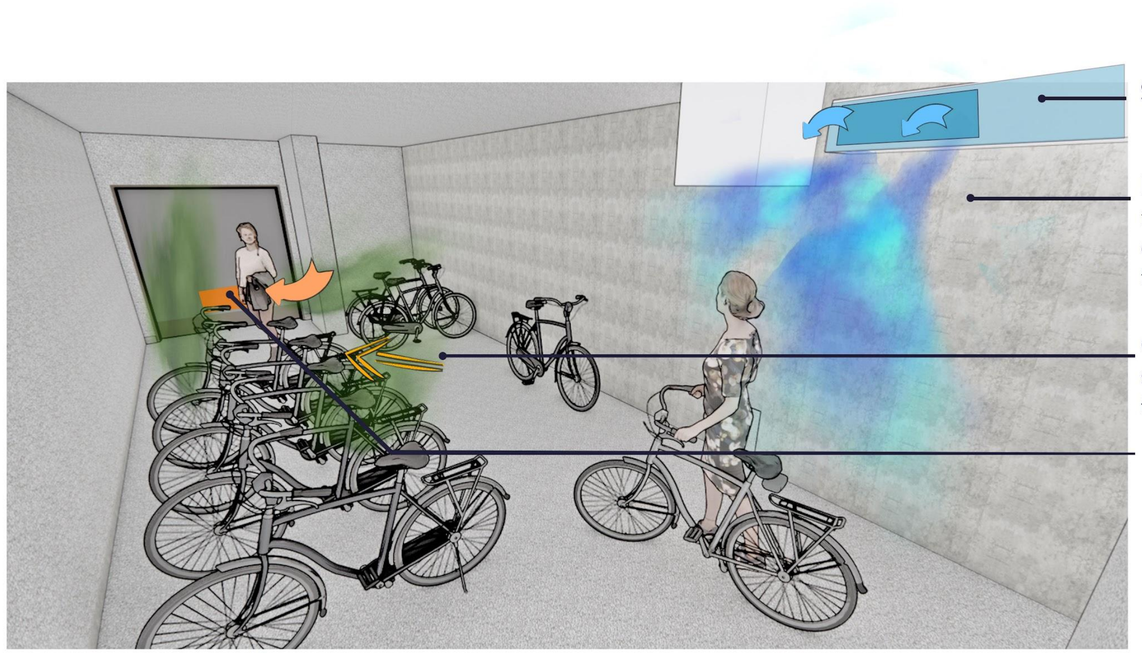
MECHANICAL SYSTEMS

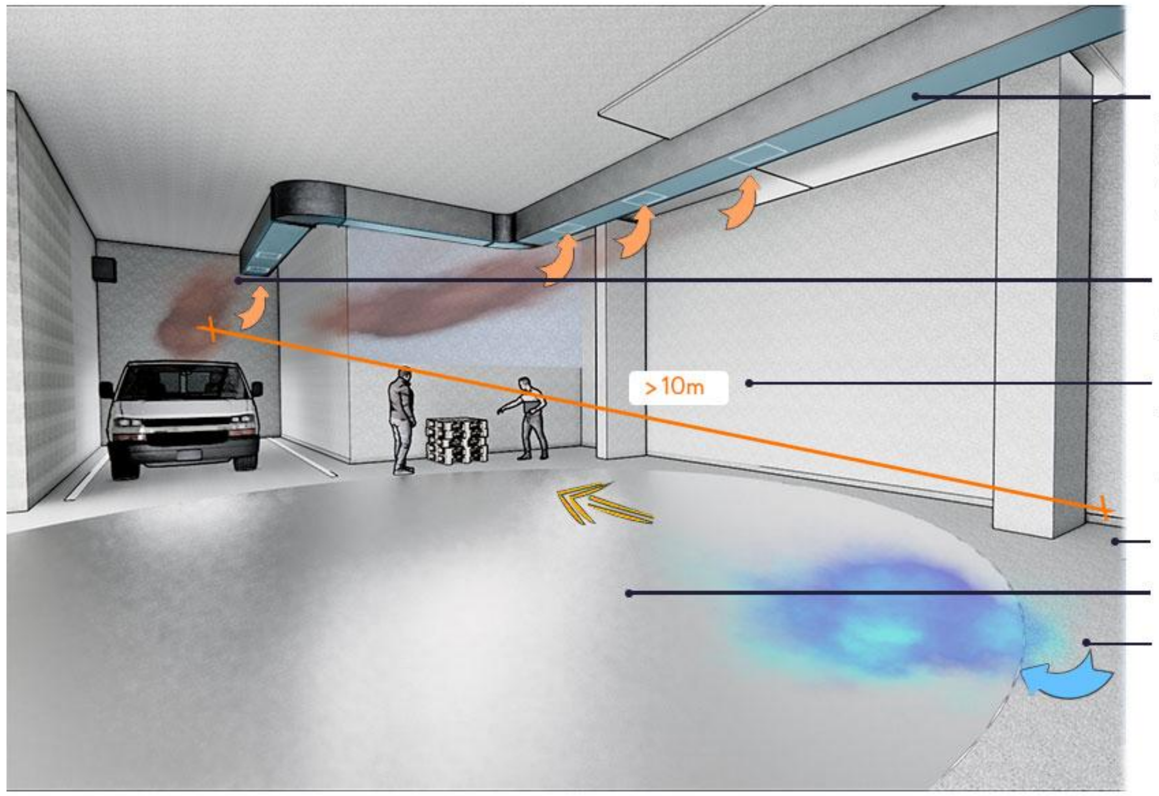
0.30 m2

Store room supply shaft

0.6 m2

Loading dock exhaust shaft





Storage room ventilation

The storeroom(s) will require ventilation if enclosed within the building. Typically, the supply air comes from a local facade. If this is not possible, allow for a 0.30m2 shaft to connect the ductwork from the roof level down to the storeroom. If louvres are required to intake air from the facade, allow for a 0.33m2 free area intake louvre. Note, all air intakes should have a minimum separation clearance of 6m from any air exhaust discharge points. Tip: Storage racks are often located within the car park areas and consist of wire mesh or heavily perforated storage racks. This enables the car park ventilation system to ventilate the storage racks. Ensure storage racks are not full height to avoid sprinkler heads.

Loading dock exhaust

Loading docks can be naturally ventilated if the rear of the vehicle is less than 10m from outside. This is often challenging to achieve. In cases where this is not possible, the loading dock requires supplementary mechanical exhaust ventilation. For planning purposes allow for 0.6m2 riser to the roof. If it is possible to connect the loading dock exhaust to the car park exhaust system, add this value to the car park exhaust riser size. If the loading dock air intake and air discharge are to a facade via a louvre allow for a 2.50m2 free area intake louvre and a 1.50m2 free area discharge louvre. Note air discharges must be 6m away from any air intakes, operable building components such as windows or from the site boundary.

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DESIGN GUIDE

MECHANICAL SYSTEMS

0.09 m2

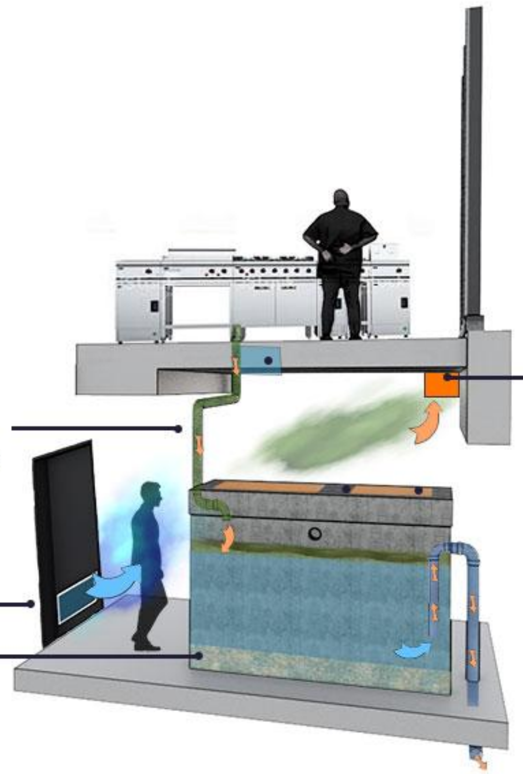
Grease arrestor exhaust shaft

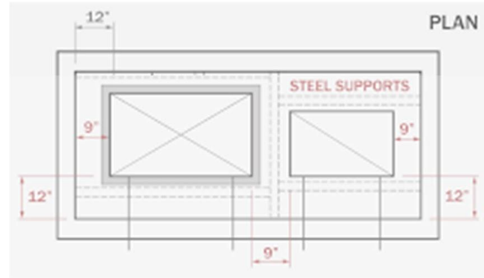
n/a

Apartment exhaust shaft

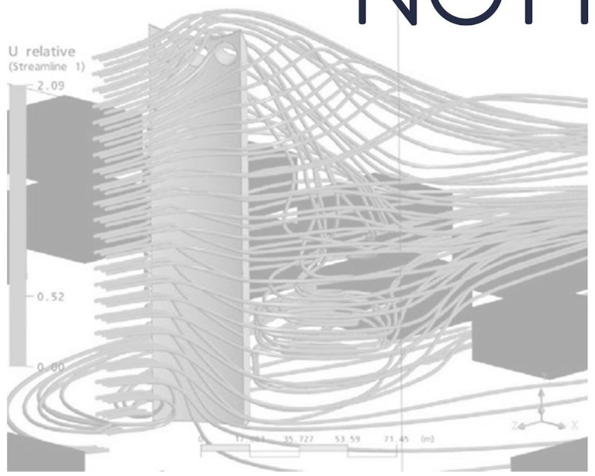
Tip: try to discharge the exhaust air to a local louvre to avoid an additional shaft running up through the building to the roof.

An image of an installed grease arrestor





NOT REQUIRED



Grease arrestor room exhaust

The grease arrestor room(s) will require mechanical exhaust if enclosed within the building. Typically exhaust ductwork will connect the grease arrestor room to the roof-mounted exhaust fan. Exhausts must be located 6m away from any building openings or air intakes. Where there are multiple rooms, exhausts can be combined if needed. If discharging to the roof (which is typical) allow for a 0.09m2 shaft from the grease arrestor room level to the roof. If discharging through the facade, allow for a 0.12m2 free area louvre.

Apartment Toilet Exhausts

In tall buildings, typically anything above 30 levels, discharging to the facade for apartment toilet and kitchen exhausts become difficult due to the wind pressures on the building at that height. In these scenarios, additional centralised exhaust systems are often required for these upper levels. Based on the design inputs section, this building is not tall enough to warrant these additional exhaust systems.

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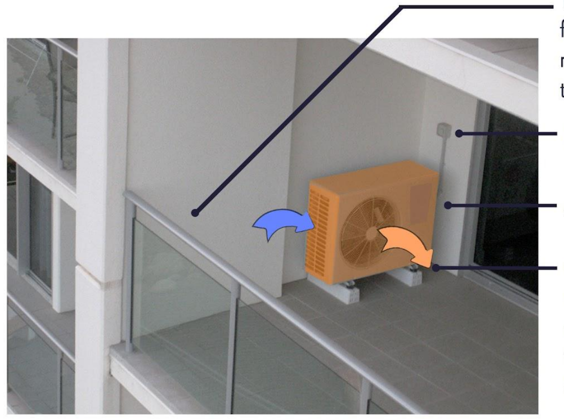
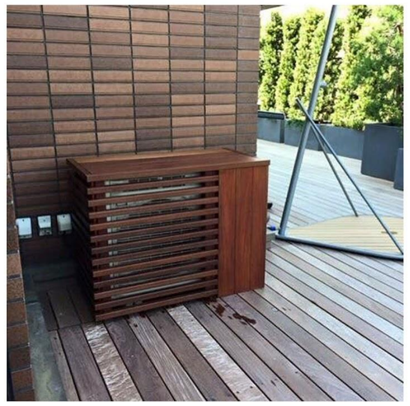
MECHANICAL SYSTEMS

900mm (l) x 400mm (d) x 900mm (h) m2
Air conditioning condenser area

n/a
Corridor ventilation louvre area (free area)



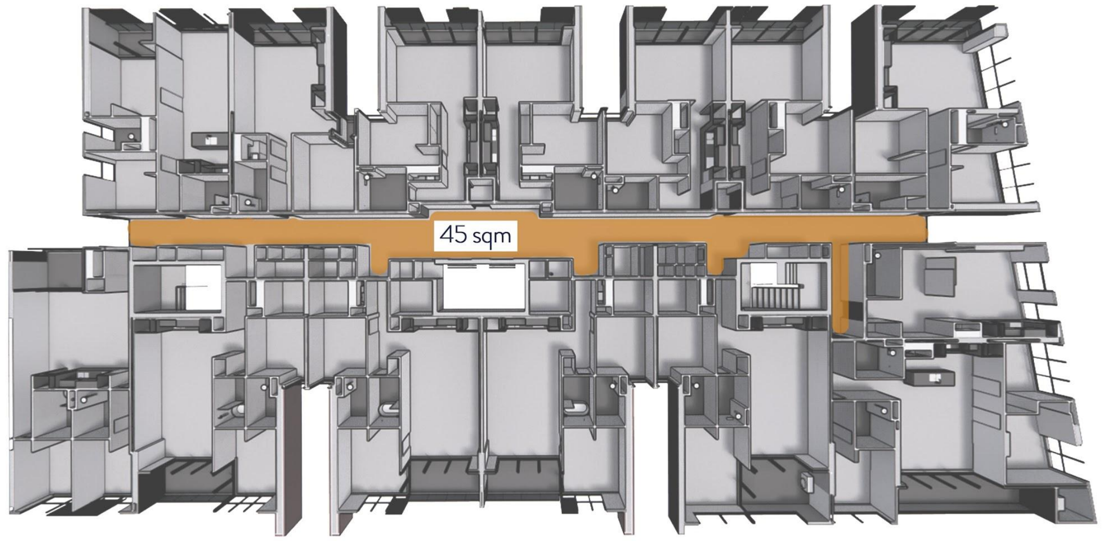

Example: Perforated condenser cover (min 80% open)

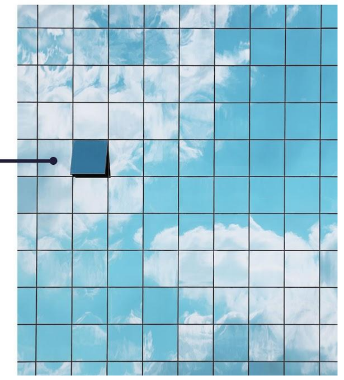
Example air conditioning schematic


Condenser size range (refer to blurb below for dimensions)

Air conditioning condensers

There are a number of areas within your development that will require Air Conditioning (AC), including apartment bedrooms, living rooms, and other base building areas. When it comes to AC, there is no single correct solution. The optimum AC solution must balance spatial constraints, budget allocation, desired internal and external appearances, and billing preferences by the owner. All of the above requirements must be understood to establish the appropriate AC solution for this project. The design inputs section indicates that it is understood that AC condensers on balconies are allowed. This is the simplest and most cost-effective AC condenser strategy. With condensers on balconies, screening can be constructed to conceal them. Note: Any screening should be significantly perforated (>70% open). Tip: to avoid potential fall hazards, locate away from balcony railings. For spatial planning, allow 900mm (l) x 400mm (d) x 900mm (h) on each balcony to house the apartment condenser. Note for large three bedroom apartments sometimes a taller condenser (1,400mm (h)) will be required. For further details, refer to the above image.





5% of the corridor served must be "openable windows" to enable a corridor to be naturally ventilated

Tip: In this example, the corridor is 45sqm therefore there must be a minimum of 2.25sqm of openable windows .

Corridor Ventilation

Based on our calculations, your building will require a stair pressurisation system. For this system to work, the corridor spaces must be either sealed or have openings which open or close in fire mode. Mechanical moveable glazing components linked to your fire mode operation can be expensive. For this reason, mechanically ventilating your corridors is recommended. Design tip: Reuse your lobby relief shaft, which exhausts air in fire mode, to supply air to your corridors in normal mode. Adding a supply air fan on the roof and incorporating the grille detail illustrated on the lobby relief section removes the need for an additional separate system. This supply air arrangement also acts as make-up air to the garbage chute exhaust system.

ELECTRICAL SYSTEMS

5.3m (l) x3.3m (w) x 1.7m (h)

Substation size

1,883 amps

Maximum demand

Electrical substation

The design inputs section indicates that the estimated maximum demand for this site will be approximately 1,883amps. This is a significant electrical load that will require a new power connection from the street.

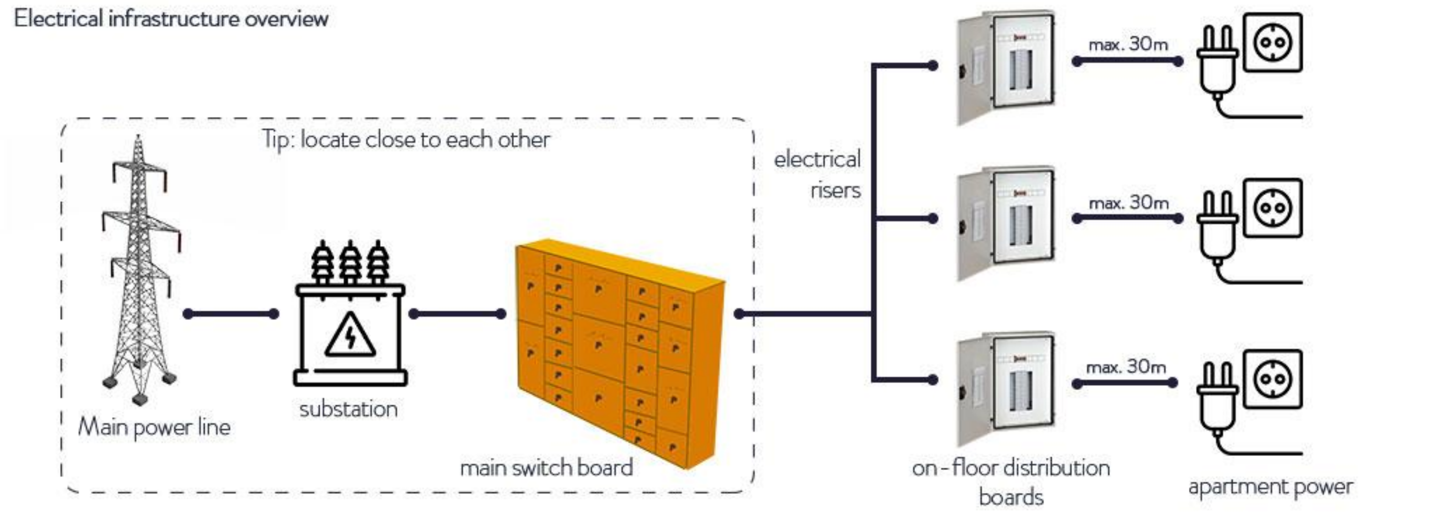
Design advice: A formal application will be required to confirm the exact padmount arrangement however based on the estimated maximum demand for this development, the following substation spatial allowance is recommended. Allow for a 5.3m (l) x3.3m (w) x 1.7m (h) external area to locate two 1,000kVA padmount substations. The specific layout and spatial requirements are illustrated in the adjacent image.

Design tips: A typical padmount substation requires a 3-meter blast radius from any building structure including to the site boundary. This is a string line measurement taken from the nearest corner of the padmount housing. Ideally, ensure your building and site boundary is outside of this radius. Anything within this blast zone must be sheltered by a non-ignitable blast-resisting barrier (i.e. an FRL of 120/120/120 & capable of withstanding a 2kPa live load). Where possible, designing out this scenario is strongly advised. Building ventilation openings must be located a minimum of 6m away from any padmount. Gas meters must be a minimum of 3m away from any padmount. padmount easements cannot be shared with items such as pathways or fire escape routes. Locate in well-drained areas clear of underground or overhead obstructions such as building overhangs at a level of no less than 120mm above street level. Do not locate within areas prone to flooding (i.e. locate above the 1 in a 100-year flood zone as advised by a civil engineer). The easement should sit above the overland flow path. Padmount substations cannot be installed within, on top of, or beneath buildings. The entire concrete pad, referred to as the easement, must be within the site boundary. A 1m trench is required below the substation to bring in high-voltage feeders from the street, which may affect any areas below. In addition padmounts require earthing rods into the ground below. Where located above a carpark a 0.9m x 0.6m riser is required to bring the earthing cables down from the padmount into the ground below the lowest carpark level. Note for transformer delivery and replacement, the supply authority will require a minimum of 5m clear to crane off the transformers from the back of the heavy delivery truck.

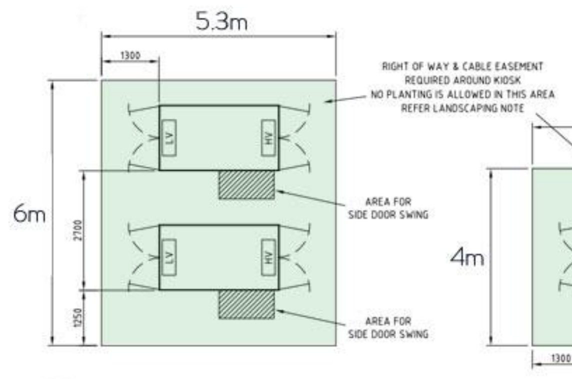
Ensure a heavy rigid truck with a vehicle-mounted crane can remove and replace the padmount(s) by locating in an accessible, level location (within 1.5m of street-level) free of obstructions, ideally close to the street. padmounts cannot be sunk into the ground. Where the padmount easement sits more than 240mm above the natural ground level, a balustrade will be required, and two means of access to the padmount will be needed. The slope of the area around the padmount should be no more than 1 in 20, and the road where the padmount will be delivered should slope no more than 1 in 8. padmounts must be located a minimum of 15m from the Communications Building Distributor Room and any swimming pools.

Power connection process: To connect to the street mains power, an application to the relevant power supply authority is required outlining the new developments electrical load. The power authority will assess your application and respond with a design information pack. From there each supply authority has its own specific design and approval workflow. This process can take a significant amount of time depending on the size of the connection and design constraints including any aspects of the design that do not align with their preferred arrangements and design standards.

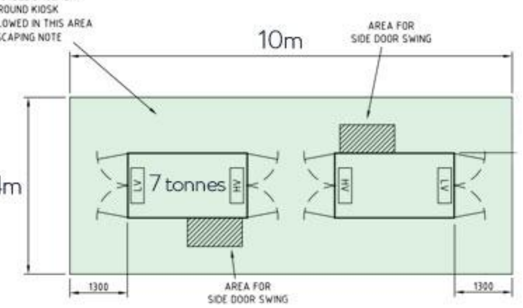
For this reason, substations are often a critical path design item for the project.



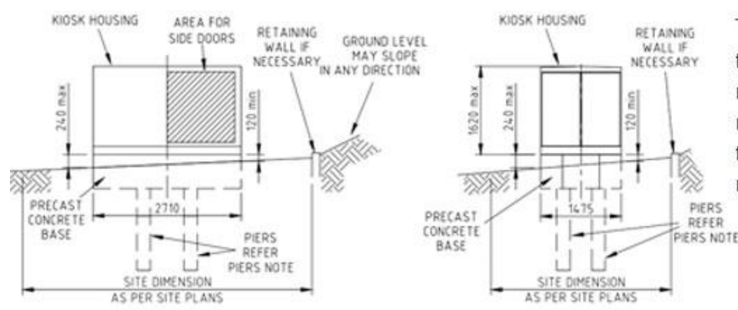
A padmount substation is delivered/replaced via heavy truck with 5m span vehicle mounted crane on all weather surface road.



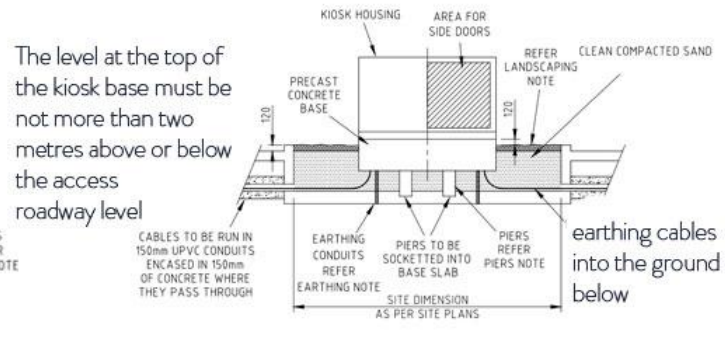
Multiple padmount arrangement options



Easement (green) to be within the lot boundary



Installing padmount substations on the ground



Installing padmount substations over a supporting structure

ELECTRICAL SYSTEMS

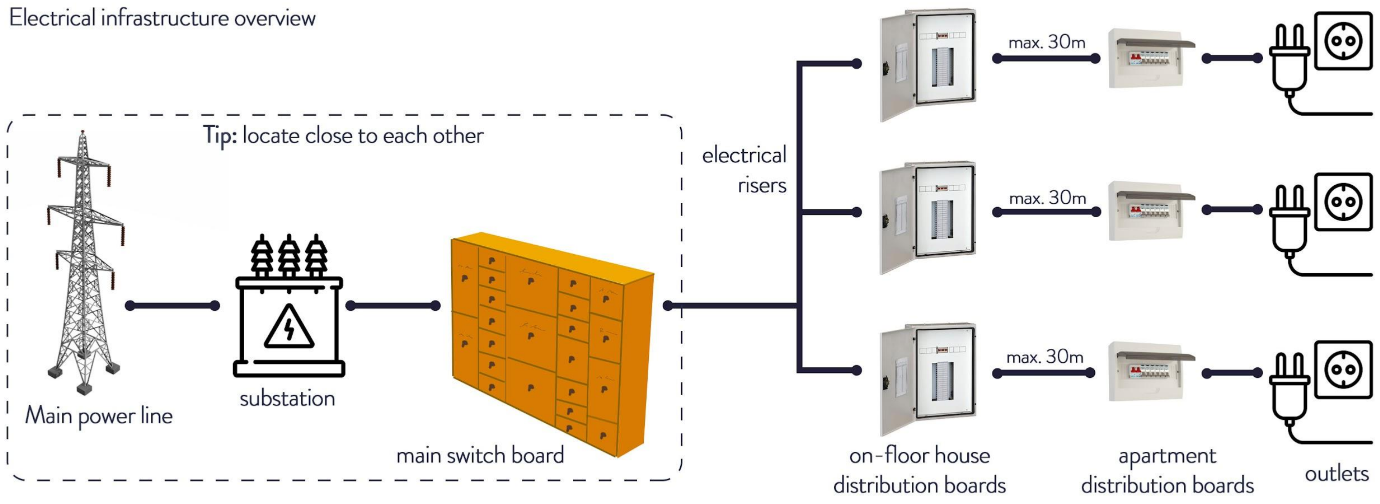
9.7m (l) x 4.5m (w) x 3m (h)

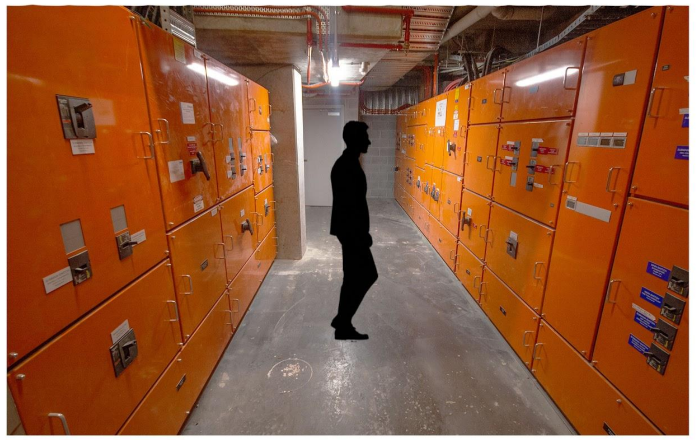
Main switchroom size

3.2m (l) x 3m (w) x 2.6m (h)

Main communications room size

Electrical infrastructure overview

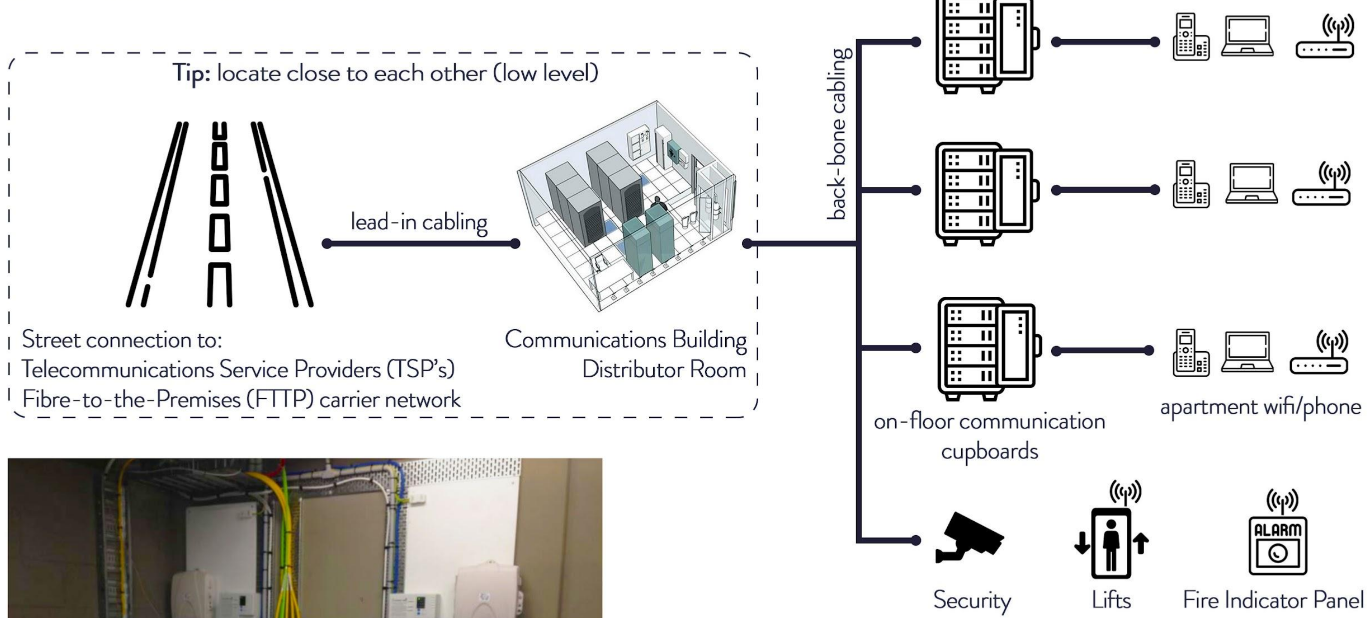




Main switch room image.

Tip: Locate the switchroom as close as possible to the substation. Allow for two outwardly opening doors at the opposite side of the switchroom.

Communications infrastructure overview



Communications Room Image.

Main Electrical Switchrooms

The main electrical switch rooms contain protection devices and meters which provide safe and billable power to the site. For preliminary planning purposes, allow for two main switch rooms, each sized at 9.7m (l) x 4.5m (w) x 3m (h). The switchrooms connect back to their associated substation via large and expensive copper cables, therefore, locate each main switch room adjacent their associated substation. Both rooms must be fire-rated (120/120/120). Provide two exits for each main switch room, spaced well apart, to enable a person to safely escape from any location within the room under emergency conditions. Further details illustrated in the above image.

Communications building distributor room

The building's communication network is illustrated in the image above. Typically a new fibre connection from the street will be established to serve the new development. The main fibre lines will enter a new building distributor room which should be ideally located within the basement of the building and/or close to street level. For DA planning purposes allow for a 3.2m (l) x 3m (w) x 2.6m (h) room.
This room will house the communications infrastructure for the apartments NBN, lift phone connections, security, metering connections along with the building's voice and data termination devices. Allow for a one and a half leaf door with a minimum of 1,300mm clear opening. Allow a 2m x 2.5m zone on the roof for MATV antennas.

DESIGN
GUIDE

ELECTRICAL SYSTEMS

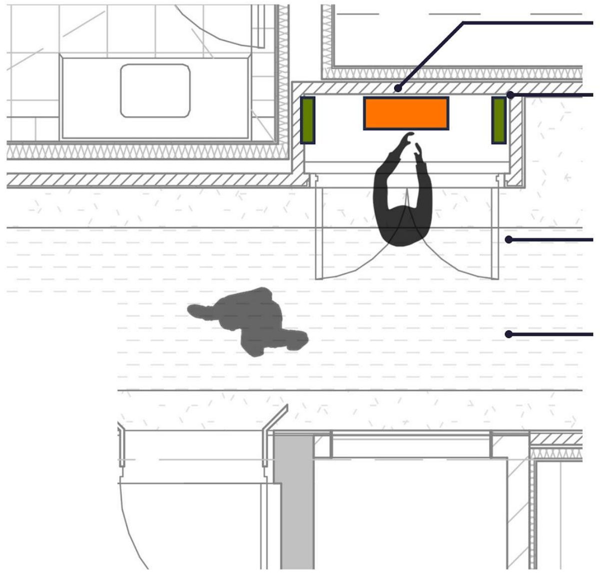
1.8m (l) x 0.6m (d) x 2.1m (h)

Electrical cupboard size

1.2m (l) x 0.6m (d) x 2.1m (h)

Communications cupboard size

Tip: Locate the electrical cupboard centrally and ideally next to the communications cubpoard to minimise cable lengths.

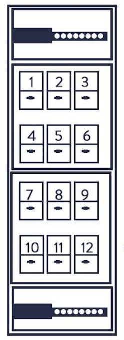


On - floor electrical distribution board.

Penetrations for cables to rise verticaly through the building bringing power from the main switchroom to the on floor distribution boards.

Double doors for maintenance access.

Locate the cupboard off a common corridor. Power cabling will run out from the top of the cupboard out to each apartment within a false ceiling . Ensure there is space to walk past the electrical cupborad when the doors are open as shown by allowing a minimum of 600mm in front of the open door swing.

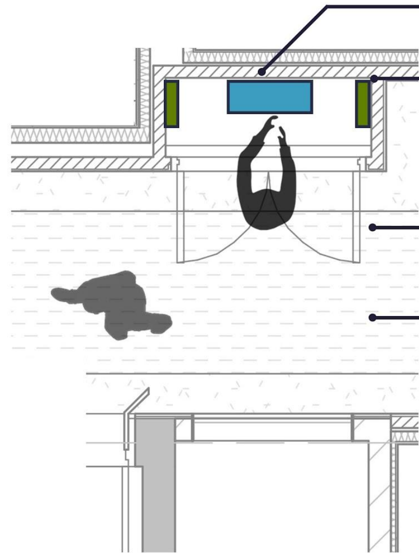


Electrical meter panels for each apartment.

A typical electrical cupboard layout

Tip: Locate the communication cupboard centrally and ideally next to the electrical cupboard to minimise cable lengths.

A typical on - floor communication cupboard



On - floor comunications distribution board.

Penetrations for cables to rise verticaly through the building bringing backbone cabling from the communications buildings distributer room to each on floor comunications cupboards.

Doors for maintenance access.

Locate the cupboard off a common corridor. Comunication cabling will run out from the top of the cupboard out to each apartment within a false ceiling . Ensure there is space to walk past the communication cupborad when the doors are open as shown.

Electrical cupboards

From the main switch room, cable trays carry power cabling out to each electrical riser and from there, bring power up and down through the building. These cables are typically mounted onto cable trays running up along the back or side of the on-floor electrical cupboards. These electrical cupboards house circuit breakers and electrical meters for the apartments on each level. Allow for a 1.8m (l) x 0.6m (d) x 2.1m (h) full-height electrical cupboard on each level vertically aligned. Offsets are to be avoided. Details illustrated in the above image and include the required clearances.

Communication cupboards

From the main communications room, cable trays carry communications cabling out to each communications riser and from there, travel up and down through the building. These cables are typically mounted onto cable trays running up along the back or side of the on-floor communications cupboards. These on floor communications cupboards house NBN, voice and data termination devices for the apartments on each level. Allow for a 1.2m (l) x 0.6m (d) x 2.1m (h) full-height communications cupboard on each level vertically aligned. Offsets are to be avoided. Details illustrated in the above image and include required clearances.

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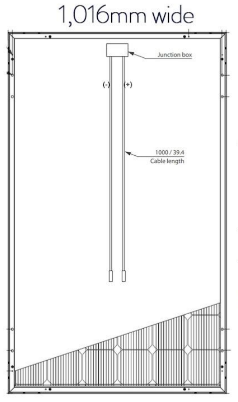
ELECTRICAL SYSTEMS

599 m2

Solar PV Array

Tip: Mount the solar panels at a minimum of 10 degrees off the horizontal to enable self cleaning (ideally at 30 degrees). Locate away from the edge of rooftops and consider roof anchors and parapet walls to enable a safe working environment.



A typical 350 w solar panel dimension

Roof anchors for safe access near the edge of roof tops

Solar panels should ideally be north facing mounted at 30 degrees and located in an area with no over shadowing from structures or other buildings

Ensure sufficient access is provided between rows of solar panels for maintenance

Solar panel invertor equipment is typically mounted on a wall within the main switchroom therefore locating the solar panels near or on the roof above the main switch room will minimise cabling costs.

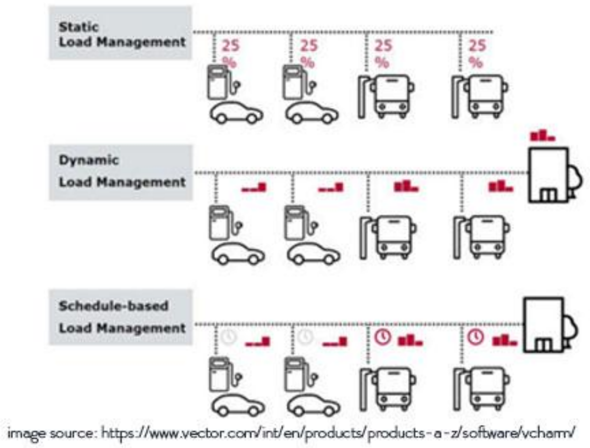
A typical solar panel arrangement
(image source https://www.sika.com/)

	Power	Range added per hour	Charging time	Typical application
Level 1 - single phase (domestic)	2.4-3.7kW	10-20km range / hour	5-16 hours	Home
Level 2 slow - single phase (domestic or public)	7 kW	30-45km range / hour	2-5 hours	Home,work, shopping centres, car parks
Level 2 fast - three-phase (public)	11-22kW	50-130km range / hour	30mins - 2 hours	Urban roadside
Level 3 - fast charge (public)	50kW	250-300km range / hour	20-60 mins	Regional near highways, motorways and key routes
Level 4 - super-fast charge (public)	120kW	400-500km range / hour	20-40 mins	Regional near highways, motorways and key routes
Ultra-fast charge (public)	350kW	1000+ km range / hour	10-15 mins	Highways and motorways

Example classification of EV charger performance

Example EV charger layout

Examples of types of EV charger billing systems



Examples of types of power management systems

Solar Photovoltaic (PV) Panels

Solar photovoltaic (PV) systems generate electricity from sunlight. Solar PV panels are typically mounted on the roof and capture sunlight to deliver solar power to the building. The optimum solar panel array needs to consider the actual use of solar energy, the available roof space to locate the panels, and the system's cost.

Based on the design inputs, the common property electrical use for solar energy is 30kW. The inputs noted that only 599sqm of roof space is for solar. If so, it is likely that circa 260 solar panels could be installed within that space, providing 86kW of solar power. Solar inverter equipment is situated in the main switch room.

Locate solar panels facing north, ideally tilted at 30 degrees in an area that is not overshadowed. Refer to the image for additional tips. Note: your sustainability consultant will specify the minimum solar array required to comply with the sustainability targets for the development..

Maximising solar: With the cost of solar panels coming down, and a need to reduce carbon footprints on developments, there is a solid case for maximising solar power on buildings beyond the minimum required. Excess solar power can be used to heat and store domestic hot water and power electric car batteries that can be used at night when no solar is available. A significant power reduction can be achieved when used in conjunction with demand-side power management systems.

As an aspirational goal, the project could investigate connecting solar to serve common property loads and apartment power loads. This would require additional systems to facilitate billing complexities of managing two power sources to an apartment, refer to the engineering options report for details. In this arrangement, the solar array could be extended to a 45kW array which would require 315 sqm and cost circa $736,667.

Electric Vehicle Chargers

NCC 2022 outlines specific requirements to facilitate the future installation of EV chargers in parking spaces associated with various classifications of buildings, such as the percentage of spaces requiring the EV charger provision, the number of EV distribution boards required per level, a charging rate, and whether that occurs during the day or overnight.
Under NCC 2022, the following arrangement is required. The main power connection to the building will feed the Main Switch Board (MSB) via a consumer main power feed. Dedicated circuit breakers will be provided within the MSB for the EV charging circuit. The EV charging circuit(s) will include several EV distribution boards that will bring power from the MSB out to the physical chargers within the car park. For spatial planning purposes, allow 0.6m (l) x 0.3m (d) x 1.5m (h) for each EV charger distribution board. Power cables will be mounted on dedicated cable trays that run through all car park levels to house these power cables. A power management system will be incorporated into the system downstream of the MSB that will manage and modulate the power consummated by the EV network. This component will ensure, amongst other things, that the simultaneous power demand of the EV chargers remains within the maximum demand permitted, as agreed with the power supply authority, as illustrated in the above image. From a billing perspective, it is envisaged that each user will have an account with the EV charger operator, and a proprietary billing system will is used to charge people for the use of the system. The specific logic chosen for the power management system will be further developed during the documentation stage of the project. Some examples of different power management systems are outlined in the above image. There are several fire engineering and fire safety requirements. These are fast evolving as the industry gets up to speed with this technology. We recommend that a workshop with the BCA consultant, fire engineer services consultant and the broader design team is undertaken to understand these requirements fully. These can include items such as a dedicated isolator switch on the main fire panel enabling the brigade to turn off power to the EV circuit, amongst other things.

HYDRAULIC SYSTEMS

5.5m (l) x 3m (d) x 2.4m (h)

Cold water plant room size

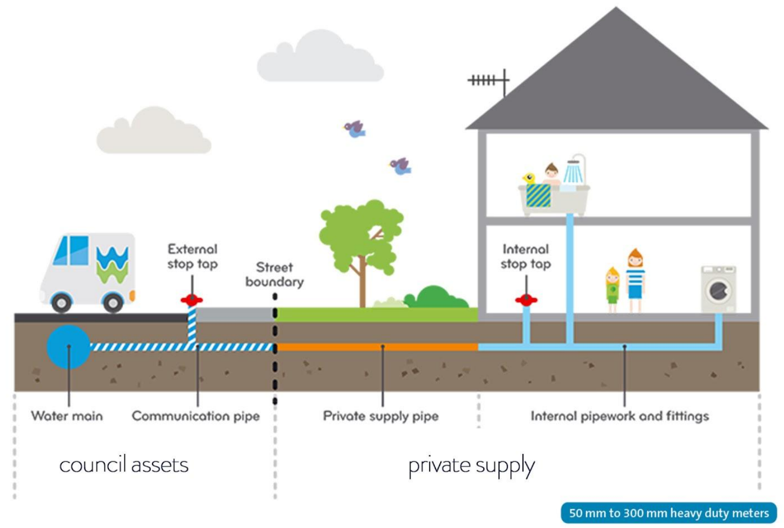
3.3m (l) x 0.5m (d) x 1m (h)

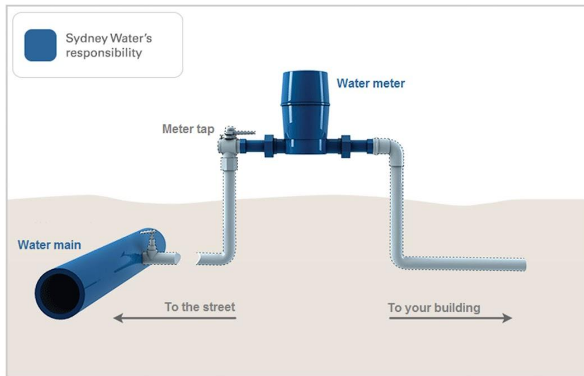
Water meter size

Tip: Locate the room close to the street at the botom of the building, ideally close to the supply authority water main connection point.

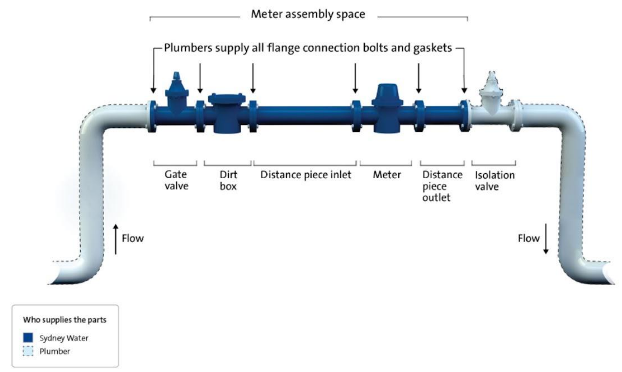
Water booster pump example

Cold water booster pump room image.





Typical council water assets arrangement



Arrangements for larger water meters (see blurb for sizes)

Cold water pump room

Based on the design inputs section, the development will require a water booster pump to enable effective delivery of water supply throughout the development. For preliminary planning purposes, allow for a 5.5m (l) x 3m (d) x 2.4m (h) pump room located within the lower levels of the building. Refer to the above image for details. Note where retail or mixed-use tenanies exist, we have assumed they will be on their own stratum and have allocated dedicated authority meters and pumps to serve them within this room dimension. If that is not the case, there may be an opportunity to rationalise the size of this room.

Cold water meter

We calculate that you will likely require cold water pumps for your development. The spatial provisions for the cold water pump room include the required area for the authority water meter and backflow prevention device within the room.

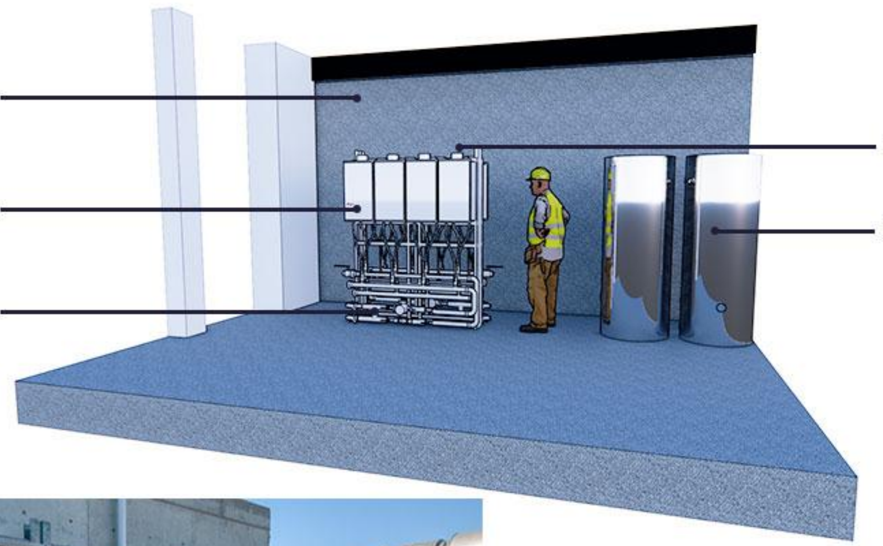
HYDRAULIC SYSTEMS

500mmØ x 885mm (h)

Hot water unit size

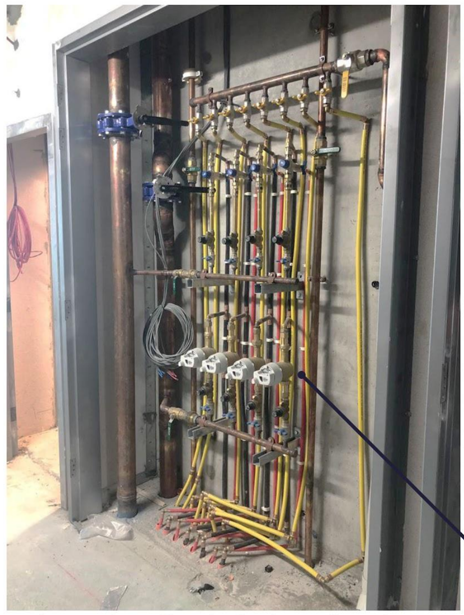
0.9m (l) x 0.5m (d) x 2.3m (h)

Water meter cupboard

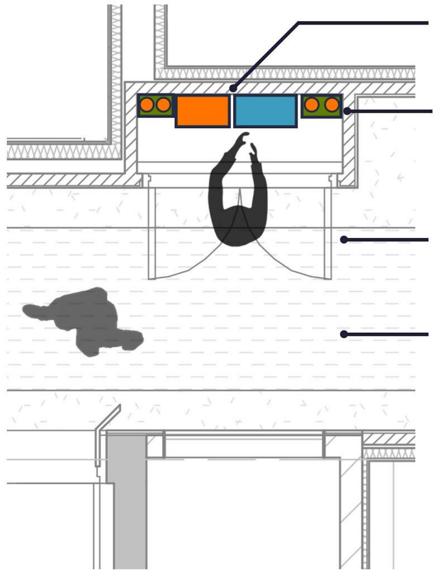


An Image of hot water heaters located outside on a roof

Tip: Locate the water meter cupboards centrally to minimise the length from each hot water meter to the furtherest hot water fixture on that floor. Max distance 15m.



A typical on - floor hydraulic cupboard



Hot water plant

Apartments require hot water. The design inputs section notes that the preference is not to have a centralised hot water plant and that gas is not desired for the site. The alternative option is localised hot water storage units within each apartment.

Water meter cupboard

The design input section indicates that the preference is not to have a gas hot water system for this development. For this reason, each apartment will require a single cold water meter. These water meters are typically located together within an on floor water meter cupboard. A single 0.9m (l) x 0.5m (d) x 2.3m (h) cupboard should be provisioned for on each level, centrally located, vertically aligned up through the building within the common corridor with clear access for maintenance.

Separate to the above, for preliminary planning purposes, allow for a 2m (l) x 0.8m (w) hydraulic riser centrally-located up through the building. This riser will house items such as rainwater, venting and cold water pipework.

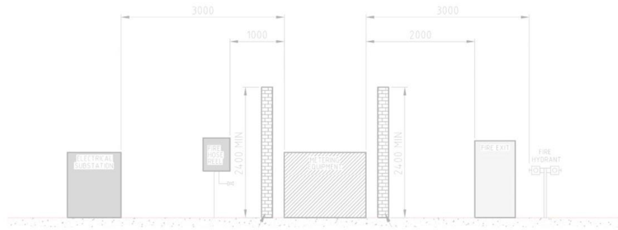
HYDRAULIC SYSTEMS

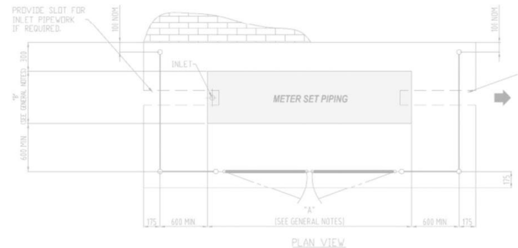
5m (l) x 5m (w) x 2.2m (h)

Rain water tank size

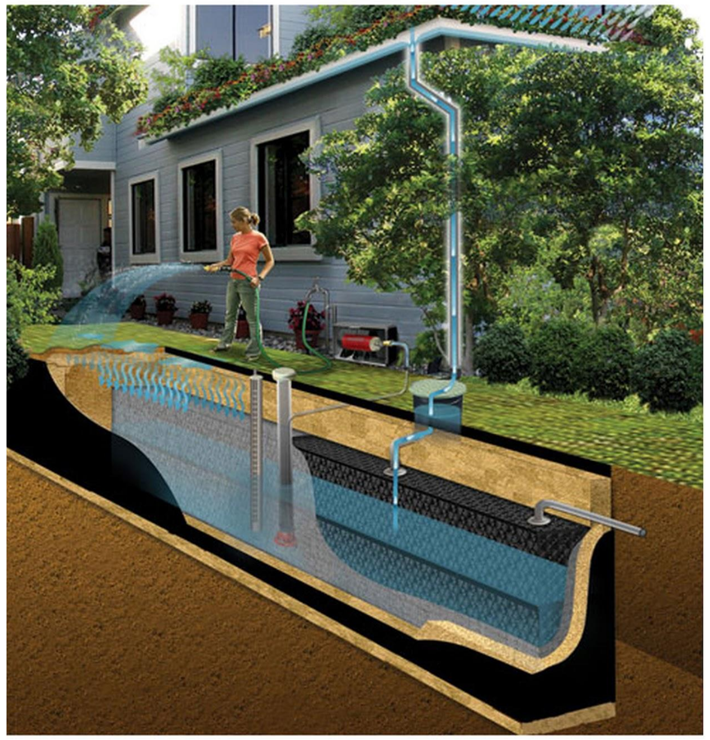
n/a

Gas meter size

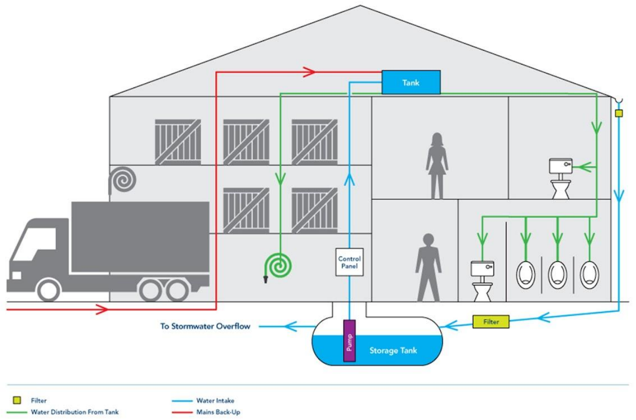




Tip: Placing the tank lower than the external stormwater in the street is not recommended due to the size of the pumps required to pump out this water and the potential flooding risk should those pumps ever fail.

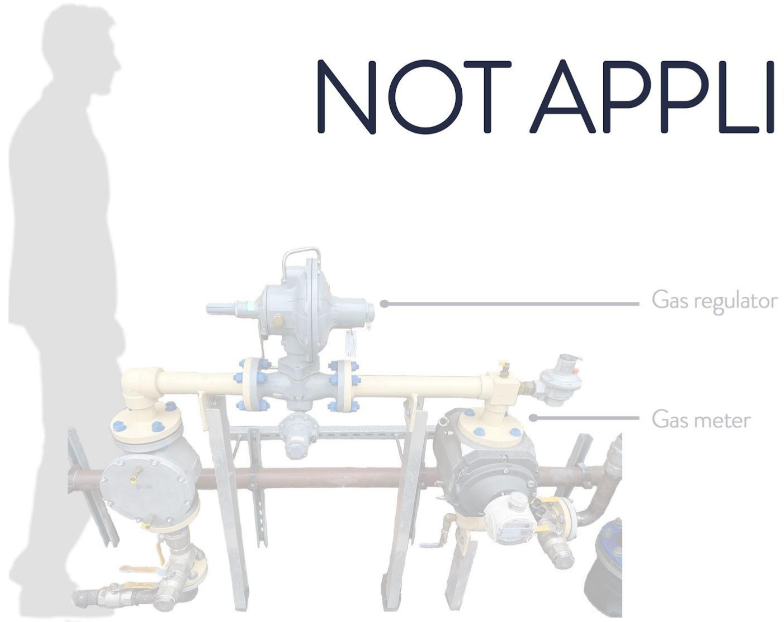


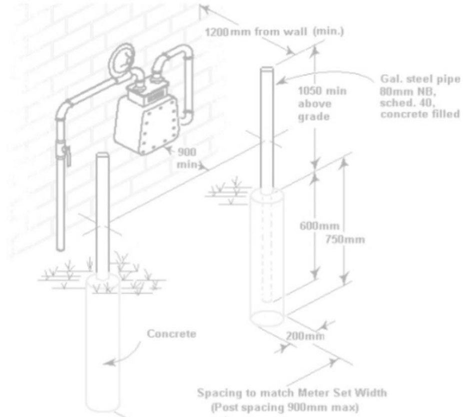
Example layout of an inground rainwater tank



Rainwater harvesting system arrangement

NOT APPLICABLE





Gas regulator and meter set (external)

Rainwater Reuse tank

A sustainability consultant will confirm if a rainwater tank is required to meet the desired or required sustainability targets for this development. In our experience, a rainwater tank will likely be required. For preliminary DA planning purposes, allow for a 5m (l) x 5m (w) x 2.2m (h) space for a tank somewhere within the development. The tank location is flexible, noting structural coordination will be required as this is a significant weight. The proposed tank, depending on the sites civil stormwater requirements should be located above ground. If the tank is located below ground, an overflow pipe is required for discharge that is no more than 600mm below ground level or ideally placed next to the OSD tank (if there is one) so the overflow can discharge into that tank. Placing the tank lower than the external stormwater in the street is not recommended due to the size of the pumps required to pump out this water and the potential flooding risk should those pumps ever fail. Tip: the proposed tank holding capacity in m3 requires a physical volume of 1.2 times this size to allow for tank infill and overflow connections. The rainwater tank will need a pump to reticulate the rainwater throughout the development. Allow for a 2m x 1.2m space for the pumps adjacent the rainwater tank. This system also requires a secondary filtration system before the pumps. Allow 1m x 0.6m for this equipment.

Meter and regulator set

The design inputs section notes the preference not to have gas to your development. For this reason, there is no gas regulator required.

FIRE PROTECTION SYSTEMS

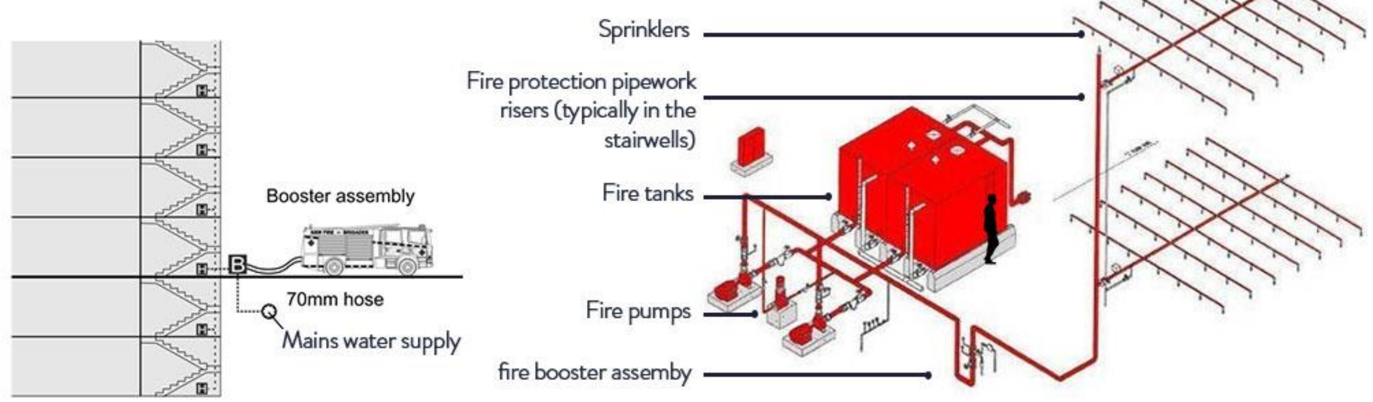
4m (w) x 0.7m (d) x 1.8m (h)

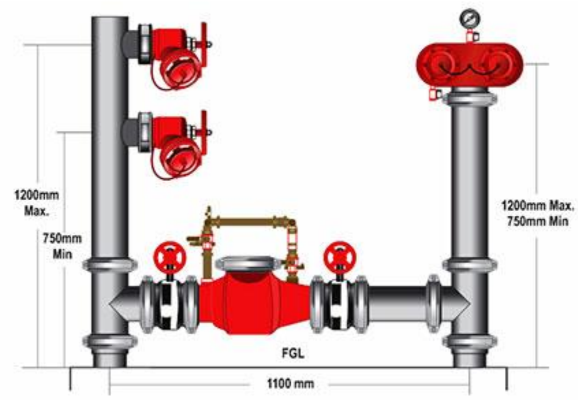
Fire booster assembly size

7m (l) x 5m (w) x 2.4m (h)

Fire pump room size

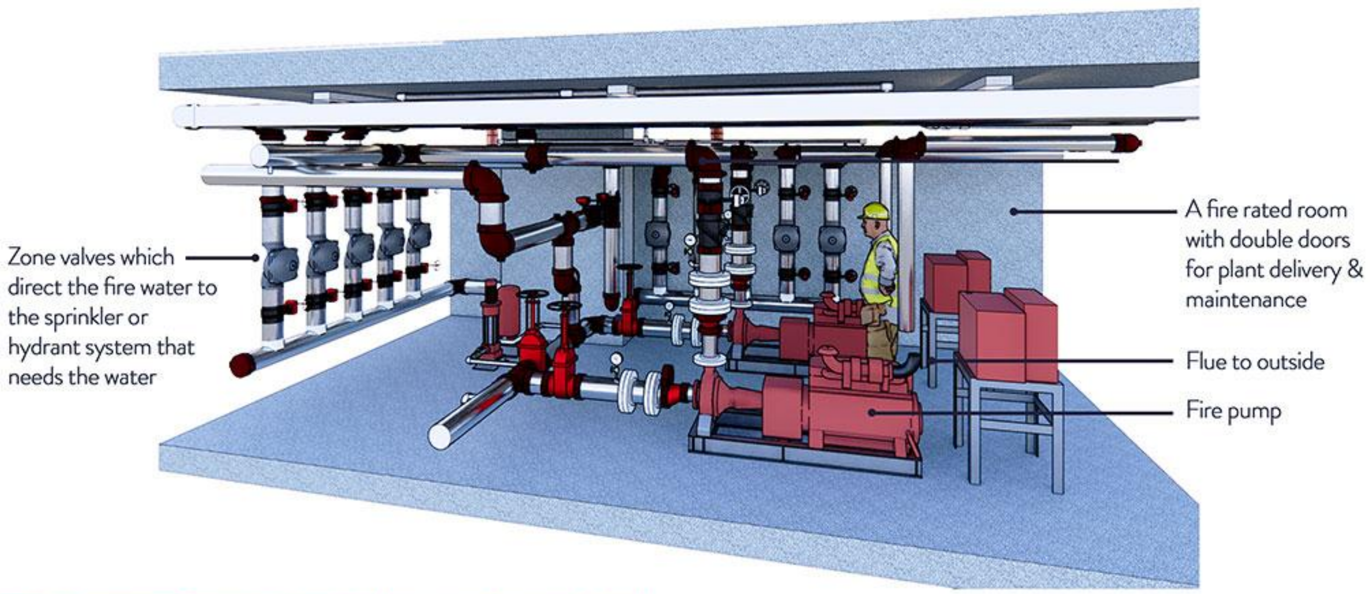
Tip: Locate the booster assembly facing the street within 8m a dedicated area for the fire engine to park





Fire booster assembly

A fire engine connecting to the fire booster assembly in the event of a fire.



Fire brigade booster assembly

When the fire brigade arrives at a building to fight a fire, they essentially by-pass the building's fire pumps and use the fire engine to supply water to the building. To achieve this, the fire engine must be able to park adjacent to the building. On one side it connects the fire engines suction side of the booster assembly and on the other side, it connects the fire engines outlet to the building via the boost side of the booster assembly set. For this reason, the booster assembly must be located externally (within a metal cabinet is acceptable) within 8m of the fire engines "hardstand" (a dedicated area for the fire engine to park). By code, it must face the street and not be perpendicular to the street. Allow 4m (w) x 0.7m (d) x 1.8m (h) space for the booster set. If located within 10m of the main building it must be located within a fire-rated enclosure. Locate a minimum of 10m away from any substations. Based on the inputs the development will require hydrants within the stairwells on each level. Refer to the image above for details and spatial requirements.

Fire pump room

Fire pump(s) housed within a dedicated room are often required to boost the water pressure to meet the fire fighting code requirements when the town's mains pressure is insufficient. Complete the "Services Infrastructure Report" to confirm final requirements. Based on the design inputs section a fire pump room will likely be required at 7m (l) x 5m (w) x 2.4m (h). If an alternative shaped pump room is desired, note that a minimum of 1m clearance is required around every pump. By code, the fire pump room must have direct access from the street via a fire-rated egress (stairs or passage). If this room is placed adjacent a fire stair, allow for an airlock between the pump room and the fire stair. For preliminary planning purposes, provide a 400mm x 400mm fire rated shaft to install the pump flue from the pump room to discharge to atmosphere. For preliminary planning purposes, allow for an 800mm x 400mm riser centrally located up through the building for fire protection pipework and cable trays. Note this is in addition to fire protection pipework located within each stairwell.

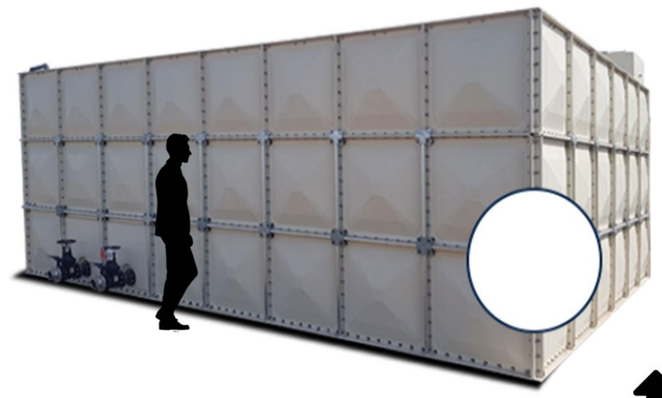
FIRE PROTECTION SYSTEMS

68 m2

Fire tank size

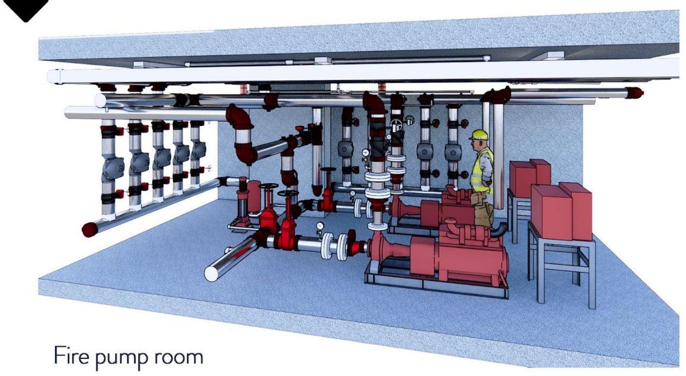
4m (l) x 2.5m (w) x 2.4m (h)

Fire control room/centre size



A modular fire tank.

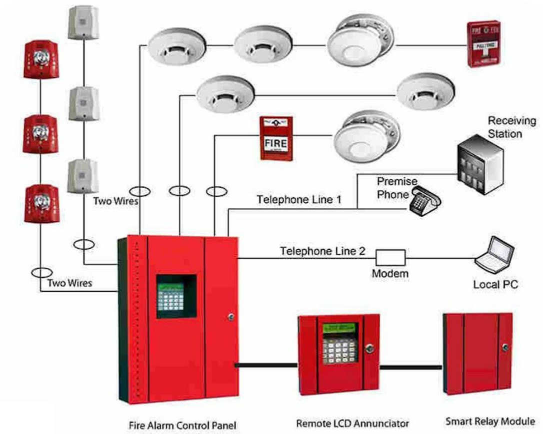
Tip: Ensure the fire tank is located either adjacent to the fire pump room on the same level, or on any level **higher** than the fire pump room.



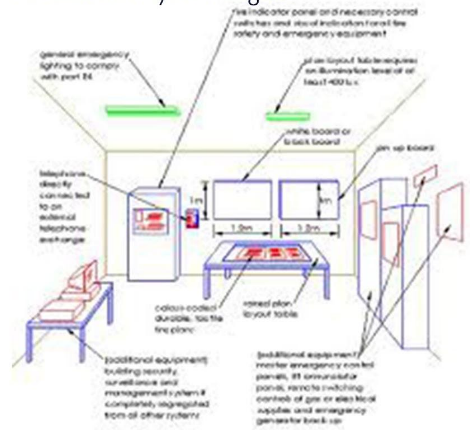
Fire pump room

Tip: Carefully read the below blurb outlining the strict code requirements for a fire control room.

Fire alarm control panel



Fire detection system diagram



Typical fire control room layout

Fire Water Storage Tank

A fire tank is required when there is insufficient water flow in the mains water connection to serve the buildings fire systems (hydrants and sprinklers) in the event of a fire. The size of the tank is calculated from the difference between how much water is required in the event of a fire and the capacity of the water main servicing the development. The "Services Infrastructure Report" has been completed. Based on the outputs of that investigation and the design inputs section, a fire tank will be required for this development.

For preliminary planning purposes, provision a fire water tank capacity of 88m3. The tank can be located on the roof (exposed), ground-level or one level below ground level (most popular). The fire water tank is to be located on the same level or any level above the fire pumps to ensure positive suction head. Fire tanks can be constructed with either modular panels or concrete in-situ. These tanks require safe access for maintenance. For concrete in-situ tanks, access space is required from the top, and for modular tanks, access is required around the tank (600mm). For example, if you have a 2.5m high tank that fits within a 3m high level, then provision a 68m2 space for the tank. This larger size is to account for tank access, air gap at the top of the tank and sludge zone at the bottom of the tank to establish what is called the tanks "effective holding capacity".

Fire Control Room

Based on the design inputs section, a dedicated fire control room will be required for this project (required for all buildings with a building effective height of over 50m). A fire-rated room (minimum FRL 120/120/120) of not less than 10m2 is required by code with a minimum height of 2.4m. All internal sides must not be less than 2.5m in length.

The room must be accessible from two paths of travel, namely one from the front entrance of the building and one from a public place or fire isolated passageway which leads to a public space. The door must have an FRL of not less than -/120/30.

DESIGN GUIDE

LIFTS

3	2500mm (w) x 2500mm (d) mm
Number of lifts	Lift shaft size (per lift)

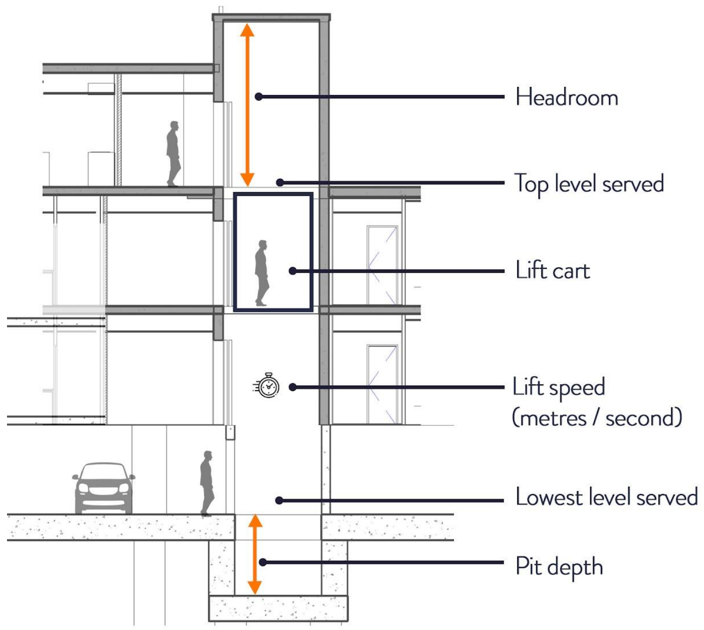
Lifts are required to provide vertical circulation for goods and building occupants, including people with disabilities. There are minimum code requirements for lifts; however, the optimal lift solution must balance the cost, desired quality, speed and quantity of lifts.
Lift requirements such as lift shaft sizes, pit depths, headroom etc. differ between suppliers. The following suggested allowances contemplate the most conservative supplier requirements to ensure multiple vendors can competitively tender on the project.
Based on the number of apartments and levels along with the "mid-range" preference selected for this development, the recommended spatial provision for lifts is as follows.
3 number single entry passenger lifts with stretcher facility at a speed of 3.0m/s. Each lift has the following dimensions:
- lift shaft 2500mm (w) x 2500mm (d),
- lift pit 3200mm,
- lift headroom 5300mm,
- lift door 1100mm (w) x 2100mm (h).

The lift pitt must be accessible via an access doorway (sliding or outwardly opening) at the pitt floor level. Minimum door size 600mm (w) x 1980mm (h). It must have clear access within the shaft, i.e. not encroached by the lift cart or platform and may require an additional stairwell down to this lift pitt door depending on the detailed arrangement on the lowest level.
This option will alleviate issues with the redundancy of service in the event of a lift failure or required maintenance. Please note, due to the scale of this development, it is strongly recommended that a specific lift traffic analysis is undertaken to optimise the standard and quality of the lift service. For further details, refer to the adjacent image.

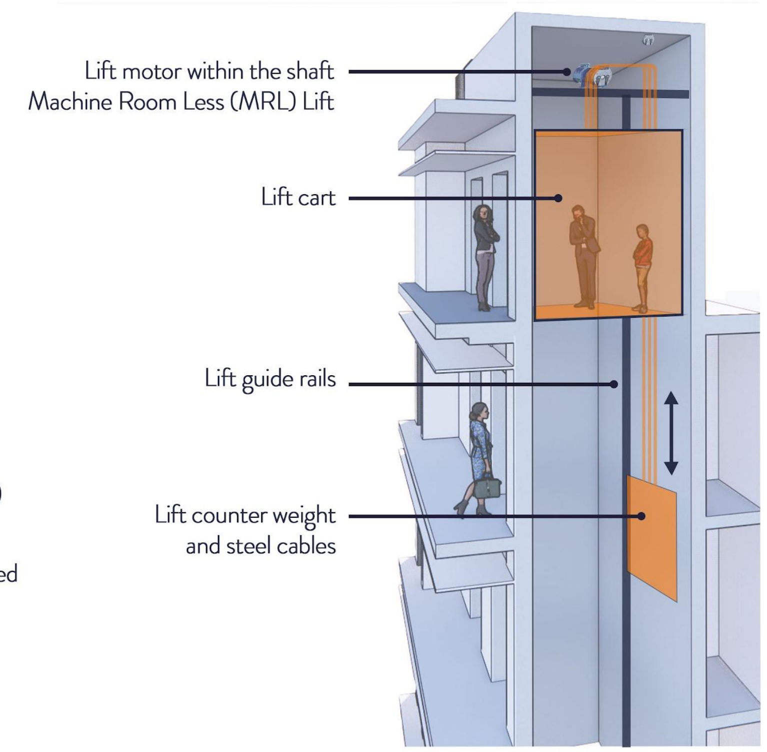
Occupants will likely use the lifts to move in and out of apartments. Therefore consideration should be given to typical furniture sizes that may need to be transported in the lifts. Larger furniture includes:
- King size bed (1.85m (l) x 2m (h)).
- Kitchen tables (i.e. a 7ft table at 1.1m(l) x 2.2m (h)).
- A three-seat couch (2.1m (l) x 1m (h)).
- A treadmill (2m (l) x 1m (h)).
- A large fridge (1.5m (l) x 1.8m (h)).

We recommend, at a minimum, one of the lifts serving each core be sized for such equipment; however, ultimately, this is a client decision.

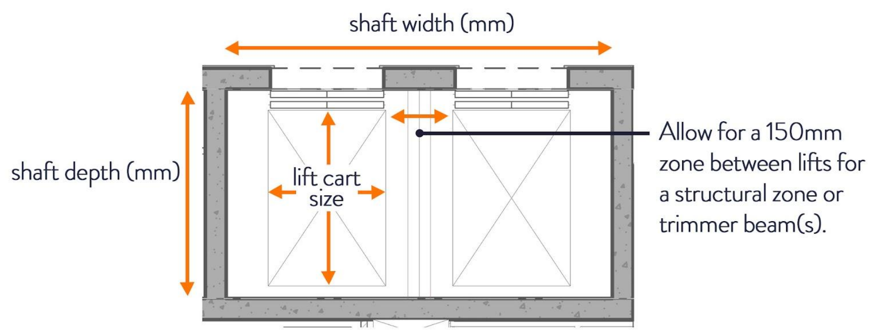
Tip: Invest in good quality lifts for your development. Poor lifts often make up a high majority of post occupancy complaints.



Typical lift terms explained



Typical lift components



2 x single entry lift plan dimensions explained

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DESIGN GUIDE

TYPICAL APARTMENTS

Apartment AC

Air Conditioning (AC) to the apartment is typically provided via a fully ducted system consisting of a concealed Fan Coil Unit with ductwork connecting to each room requiring AC via supply and return air grilles. The FCU dimensions vary based on the detailed heat loads within the space; however, for spatial planning purposes, allow for a single 360mm (h) x 1200mm (w) x 900mm (d) FCU. The FCU will require a 600mm clear space next to it for maintenance access to filters and coils. It can be located within a bulkhead or (if unavoidable) within a bathroom false ceiling. Note locating FCU's above bathrooms should be avoided where possible to limit coordination issues with drainage pipework from the bathroom on the level above. Typical ductwork sizes are up to 250mm (d) x 600mm (w) including insulation. Typically return air is via the false ceiling with no ductwork and only grilles letting air up into the false ceiling returning to the FCU. Acoustics treatment is an important consideration in high-end solutions and needs to be analyzed during detailed design. Note the FCU requires a power cable, 2 x 80mm (incl. insulation) refrigerant pipes connecting it to the condenser and a 20mm condensate pipe connected to a tundish provided by the hydraulic trade to take away any condensed water while cooling.
Design tip: locate the supply grilles as close as possible to the hottest part of the apartment, i.e. near external glazed areas where the sun heats the space. Most FCU's can typically only throw air a maximum of 4m.
Note if appropriate, we recommend the inclusion of low energy comfort devices such as ceiling fans in living rooms and bedrooms to reduce the reliance on air conditioning to maintain comfort conditions.

Apartment Exhaust Systems

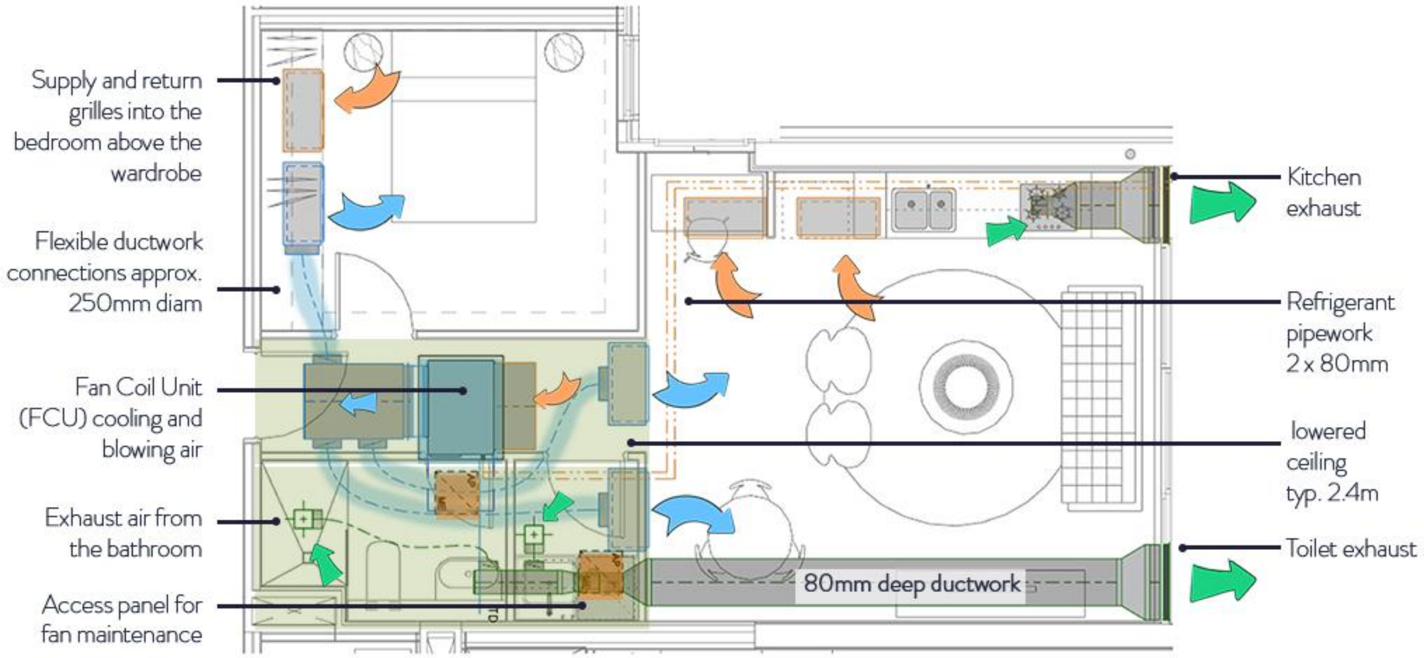
There are several ventilation systems required for a typical apartment including, toilet exhaust, laundry exhaust, kitchen rangehood exhaust and exhaust make-up air requirements. Toilet and laundry exhaust systems are often combined using run-on timers and switch contactors to control the fan operation. Exhaust fans range up to 300mm diameter and if possible should be located above the bathrooms lowered ceiling typically set at 2.4m (h). Flat ductwork (80mm high) can be used to duct the exhaust air out to the balcony facade or building facade within the 100mm false ceiling. Refer to the adjacent image, which shows the penetration detail options to connect to the facade grille. Kitchen range hood ductwork can also be 70mm (d) x 600mm (w) and should run directly to the balcony or facade grille. Always try to avoid duct runs which exceed 5m or include multiple changes in direction, however, if unavoidable allow space for a booster fan 100mm diameter. Exhaust make-up air is important to ensure the effective operation of exhausts systems. These are typically provided via operable vents in the facade and are rarely ducted unless noted in the apartment exhaust section for upper levels in tall buildings. Ducted systems can be considered for high-end apartments.

Apartment fresh air

Apartments require outside air for occupant ventilation and make-up air for the apartment exhaust systems. Outside air is typically provided via facade window openings equating to 5% of the occupied area as required by code. Where operable windows cannot be used for outside air, such as developments with acoustic or planning constraints, specific facade treatments or a mechanical system could be required. Should this be required, speak to your engineer during the next phase of the design. Make-up air is also required to avoid the risk of mould build-up during winter months. This situation typically occurs when windows are left shut while cooking, washing, drying is occurring, leaving moisture trapped within the apartment. There are several solutions to address this issue, and some options are illustrated in the adjacent image. A typical solution involves ventilation openings on the facade or trickle vents integrated into or around the windows frames. Alternatively make-up air can be fed into apartments from a supply air source in the corridor via an opening above each apartment door that includes a fire, smoke and non-return damper. The chosen options should be work shopped while developing MEP spatials. Heat recovery ventilators are sometimes required for sustainability purposes. If they are desired for this project, we recommend holding a workshop with the sustainability consultant to discuss the viability of this additional system.

Tip: Always allow for a 100mm false ceiling throughout and utilise bulkheads to conceal larger services as shown.

Supply grilles within the kitchen joinery



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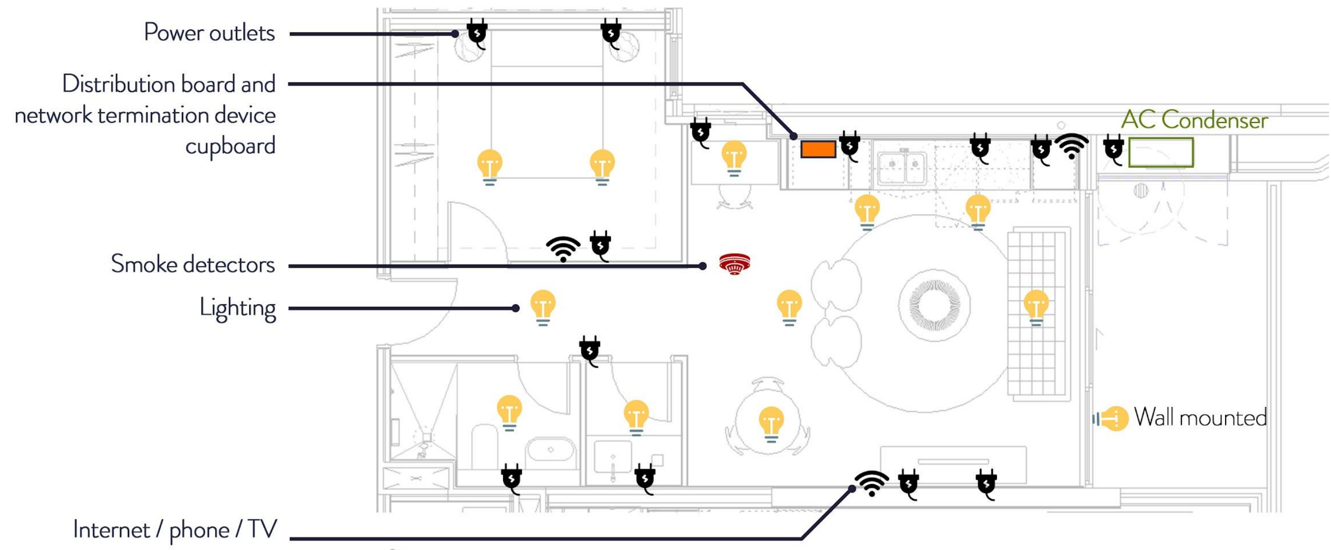
TYPICAL APARTMENTS

Apartment electrical design watch-points

The electrical distribution system extends from the main electrical riser to individual apartment distribution boards. Typically, these are located within the joinery. Their spatial requirements are detailed in the adjacent image. Space is also required for communication cabling and termination devices. Typically these are located within the kitchen in a cupboard or concealed within joinery. They should not be located in bathrooms or laundry areas. Their spatial requirements are detailed in the adjacent image. The apartment lighting and fire detection system can be located within a 100mm deep ceiling void subject to further detailed design.



Apartment distribution board
350mm (L) x 220mm (H) x 110mm(D)

Network Termination Device
330mm (L) x 570mm (H) x 100mm(D)

Tip: Locate the electrical distribution board and network termination device either within a linen cupboard or joinery cupboard above the fridge. Provide a 100mm false ceiling throughout to run cabling.

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DESIGN GUIDE

TYPICAL APARTMENTS

hot & cold water main connections (within false ceiling)

laundry drain

toilet / sink drain

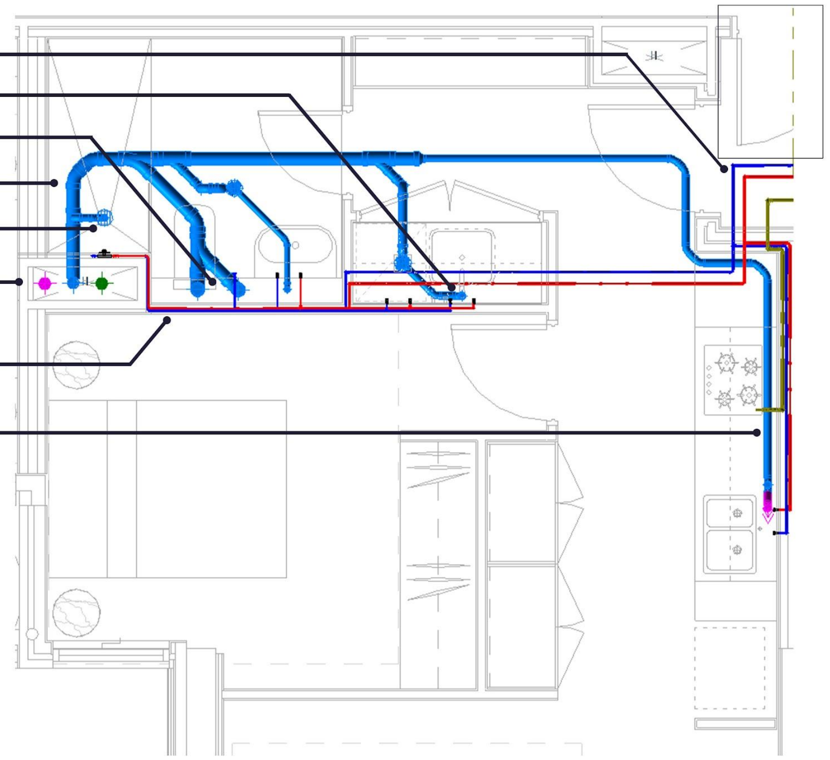
sloped sanitary pipe (level below)

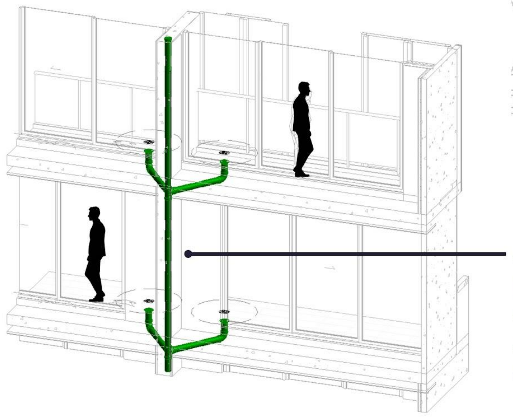
shower drain

Hydraulic riser behind the shower for stormwater, sanitary & stack venting

Hot & cold water to the bathroom and laundry (blue/red)

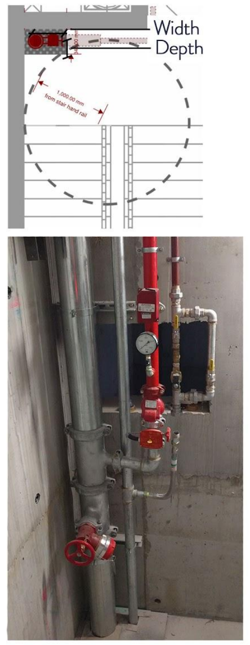
Kitchen gas connection to hob (green)
Hot & cold water to the sink (blue/red)
Kitchen sink sanitary (large blue)





An option where balcony drain points drain back into a concealed riser as shown. Alternatively they can be exposed outside.

Tip: Sanitary pipes slope therefore minimising the length of the pipe will help with coordination. Vertically stack elements that require sanitary connections as much as possible



Typical arrangement within fire stairs. Note the equipment must be located outside of the 1m clearance zone as per the BCA.

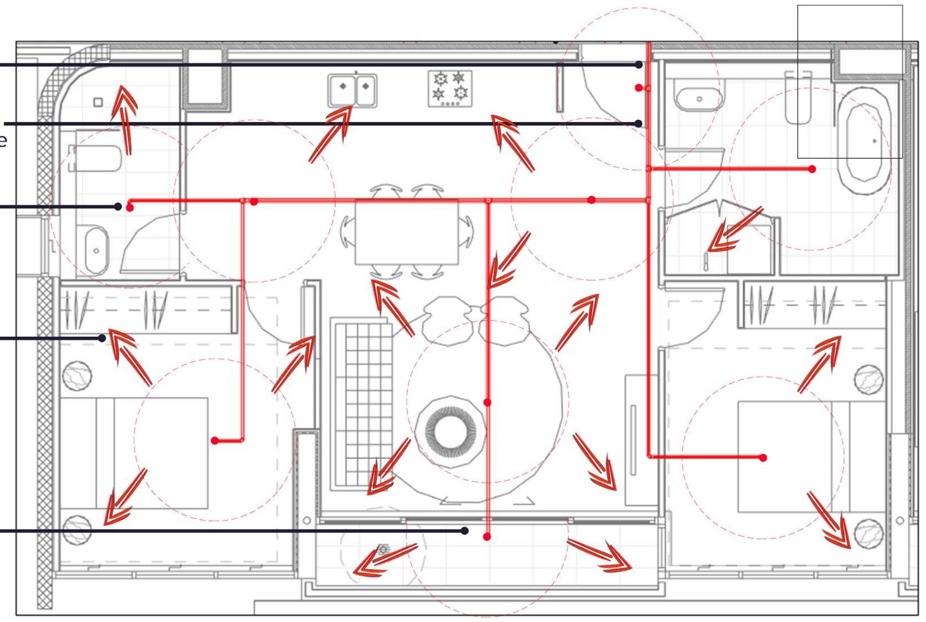
main sprinkler connection

sprinkler pipework within a 100mm false ceiling

sprinkler head

Typical sprinkler coverage approx. 4m

Balcony sprinkler head



Sprinkler head types

Apartment hydraulic design watch-points

The typical apartment arrangements should consider the wet areas and the coordination with structural and mechanical designs. Where typical apartments are vertically stacked, it is advised to maintain wet areas above wet areas for dropped ceiling and acoustic advantages. Where wet areas do not stack vertically, the development risks include dropped ceilings or bulkheads in habitable areas, which is not the desired outcome. The building height noted in the design inputs section indicates that the likely sewer stack size is 150mm and requires minimum vertical risers associated with each bathroom of 250mm (d) x 600mm (w). All other wet areas need to be assessed during detailed design; however, all kitchens and laundries, unless adjacent to other wet areas should be provided with a dedicated sewer riser. Consideration should be given to locating recessed pipework or fittings on fire-rated walls. The recessing of pipes may impact the fire rating integrity, and wall types should be carefully considered, which may impact the wall thicknesses. You have selected not to have a central hot water plant. The options include internal electric units or gas fire instantaneous units located on balconies. The balcony option requires specific consideration of ventilation requirements. Where adequate code compliance for ventilation is not available, (generally all apartments except corner apartments), then you require a flue diverter to the exterior facade line. This likely impacts your development application in terms of your facade designs.

Apartment fire protection design watch-points

The fire protection requirements within typical apartments should be consistent with your favourable reflected ceiling plan layouts whilst complying with the minimum sprinkler distance locations. Generally, the sprinkler protection requirements can be accommodated above 2.7m high ceilings where the floor to floor height is 3.1m. If the floor to floor height is lower than 3.1m, it is recommended to review the detailed sprinkler layout for reticulation within ceiling voids during the next stage of the design.
One each residential level, locate a fire extinguisher within 10m of each apartment door. Fire hose reels are not required on residential levels.
In each car park level, locate a fire hose reel (typically with a 36m length hose) within 4m of an egress door. The hose reel may be located within a 850mm (w) x 310mm (d) cupboard if desired.

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DESIGN GUIDE

RETAIL DESIGN CONSIDERATIONS

Retail Overview

The design inputs section indicates that there are retail tenancies nominated for this development. However, you are not sure of a proposed tenant mix. Based on project experience, residential projects with retail provisions are generally focused on food and beverage. For this reason, we have provided some general advice on spatial allocation for you to consider in your development. The key planning considerations are outlined below.

Retail Air Conditioning (AC): This will typically consist of a Fan Coil Unit (FCU) within each retail tenancy and a dedicated AC condenser. Refer to the spatial matrix for the AC plant sizing for each tenancy. Locate the AC condensers outside, close to the retail tenancy. If that is not possible, locate within a well ventilated internal space such as a car park or loading dock. Consult with your mechanical engineer during the detailed design phase to fully resolve this design item.

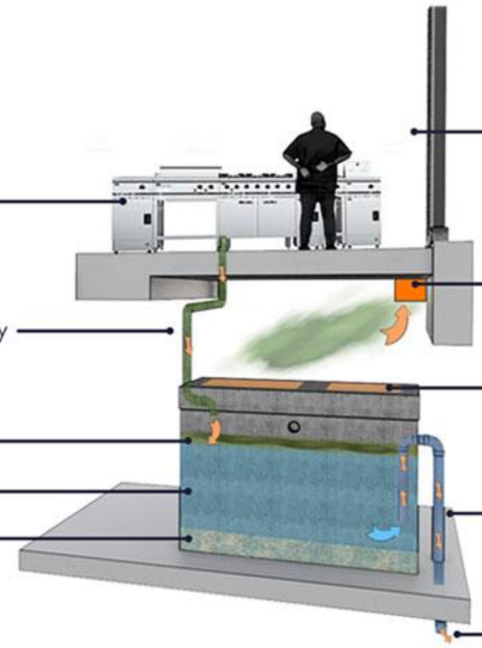
Food & beverage tenancies typically have commercial kitchen hoods to extract grease and odours from the cooking areas and discharge them to the roof area vertically away from the building. Based on these inputs, for preliminary purposes allow for 2 number 0.8m2 kitchen exhaust shafts. Note: each shaft must be fire rated. Tip: minimise horizontal runs of kitchen exhaust ductwork from the point of use to the riser as they require access panels every 3 metres for cleaning. Some kitchen exhaust risers may be combined; however, this will require further analysis during the next phase of the design. There are constraints with this approach, including max/min air flow rates and separating solid fuel and other cooking types. This information is often not known at this early planning stage; therefore, separate kitchen exhaust shafts are recommended for preliminary planning purposes.

Make-up air: Where there are kitchen exhaust hoods within a retail tenancy typically make-up air is drawn in from the front facade and ducted directly to the kitchen.

Electrical: Provide space within each retail tenancy for an electrical distribution board, typically 800mm (l) x 300mm (d) x 600mm (h) each. Also, provision a communications board (network termination device) within each tenancy adjacent the electrical board at 400mm (l) x 300mm (d) x 400mm (h) each.

Grease Arrestor: In retail outlets where cooking occurs, cooking oil, grease, and food solids regularly end up in the building's sanitary pipework. If not treated over time, this results in blockages and maintenance issues. For this reason, local authorities require operators to pre-treat the wastewater before it enters the sewer system. To achieve this, you will need a Grease Arrestor to be installed on-site. For preliminary planning purposes, allow for 1 room(s) to house a 5.6m (l) x 3.8m (w) 2.8m (h) 3.5m (l) x 2.2m (w) 2.8m (h) & a grease arrestor(s) at a lower elevation than the retail tenancy. Locate the grease arrestor(s) centrally to the tenant(s) served. The grease arrestor can be located below ground/a basement level below. The tank needs to be emptied periodically. The room will require clear access from above or an appropriate access strategy for a small grease waste truck.

Tip: locate the grease arrestor below & close to the kitchen it serves. This will ensure that the fats in the wastewater do not cool and become stuck in the pipework before getting to the grease arrestor.



Tip: A typical compliant cold shell for future retail fit-out. Note the installed electrical board, sprinklers, capped pipework conections, hose reel and smoke detectors .

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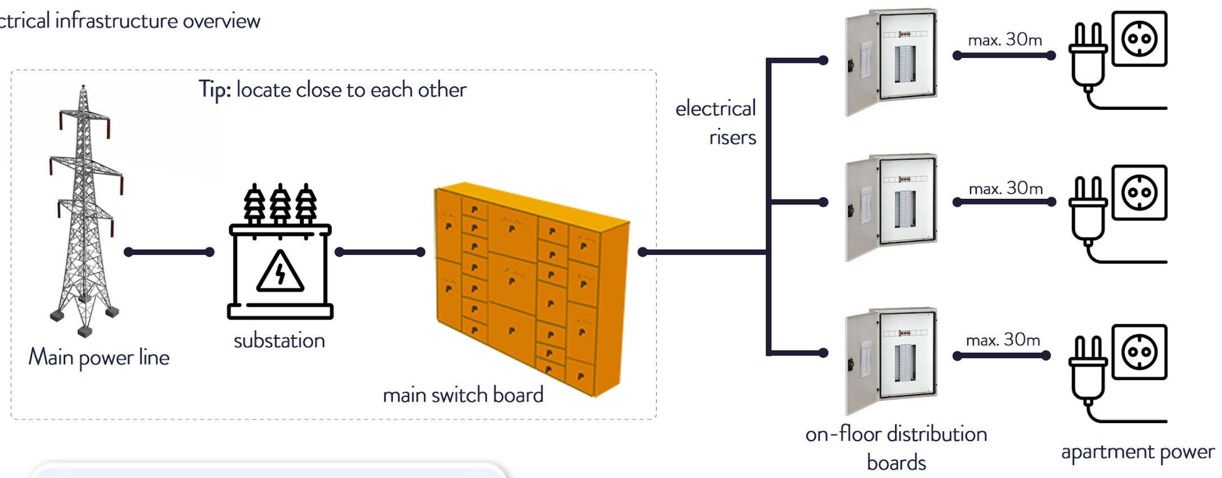
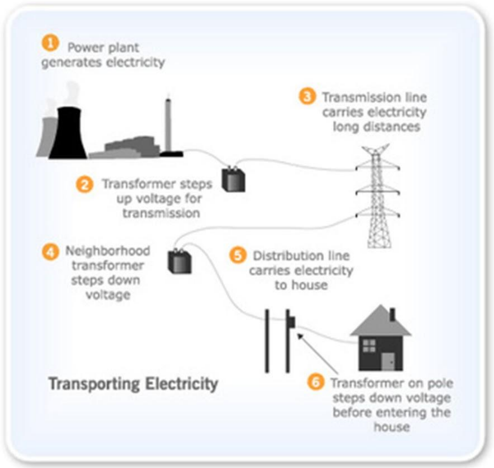
AUTHORITY CONNECTIONS

1,883 amps

Maximum demand

Electrical infrastructure overview





How electricity is transferred

Tip: locate your substation (where required) close to the street where the power connection enters the site to minimise large and expensive electrical cabling traversing your site.

Main power connections

As previously noted in the substation section of this report, the estimated maximum demand for this proposed development will be approximately 1,883amps. This is a significant new electrical load that will need new power connections from the street, typically one per substation. An application to the relevant power supply authority is required to connect to the grid, outlining the new development's electrical load. The power supply authority will assess your application and respond with a design information pack.From there each supply authority has its own specific design and approval workflow. This process typically can take a significant amount of time depending on the size of the connection and design constraints including any aspects of the design that do not align with their preferred arrangements and design standards.

For this reason, substations are often a critical path design item for the project. There are many factors the power supply authority will consider when deciding substation requirements for this site. To begin this process, it is recommended that as a minimum, a Services Infrastructure Report and investigation is undertaken. Neuron can do this for you. This report provides high-level feedback on existing power infrastructure in the surrounding area of the proposed development to limit the project programme and cost risks.

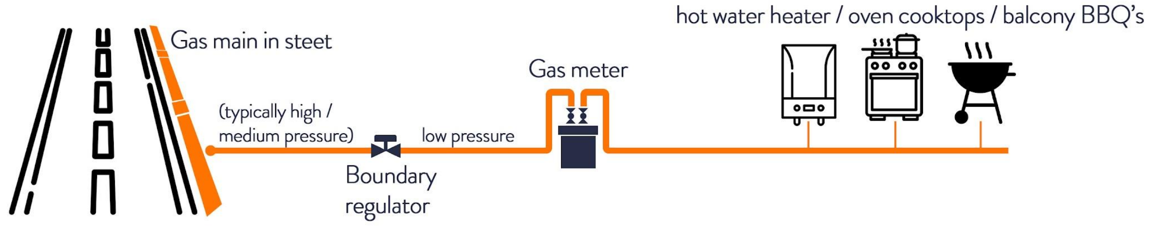
AUTHORITY CONNECTIONS

50 mm

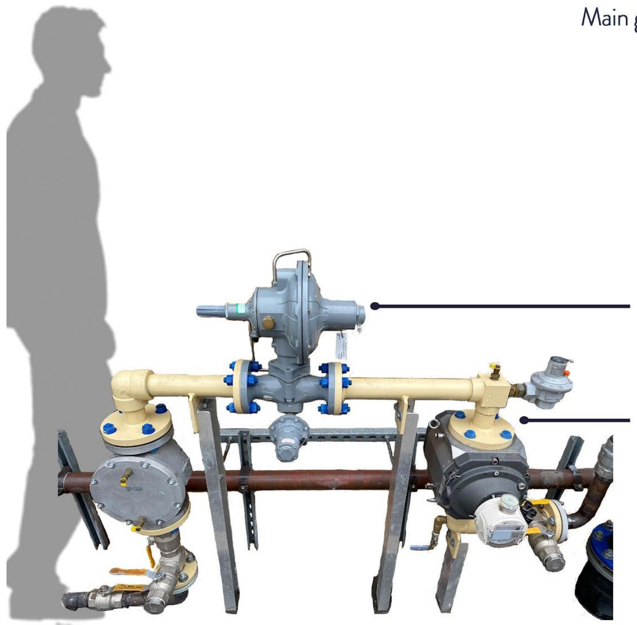
Internal gas connection size

200 mm

Main water connection

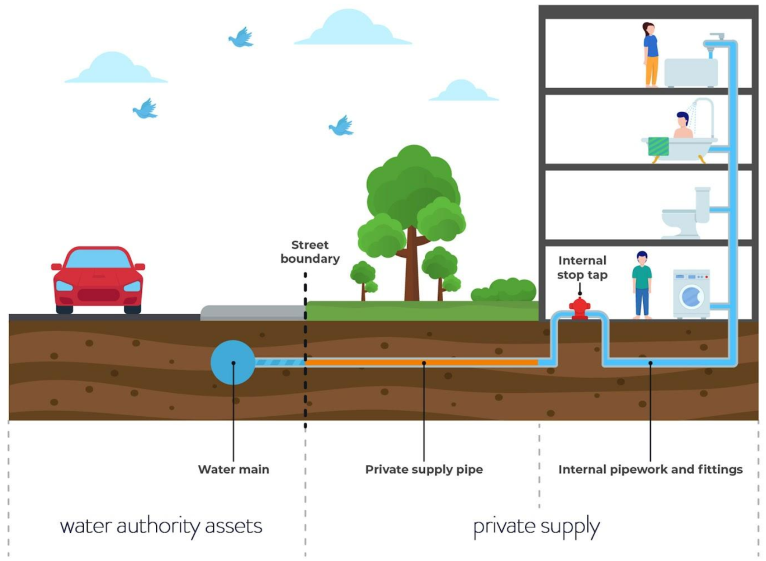


Main gas connection overview



Gas regulator and meter set (external)

Tip: Read the blurb for options regarding locating the gas regulator and meter set.



Tip: Complete a services infrastructure report to confirm if and council water mains or easements run through your development site. If so, negotiations may be required to re-route them. This cost is put on the project.

Example council water line running through a property.

Main gas connection

The design inputs section notes the preference not to have gas supplied to your development. Typically gas is used for centralised hot water heating, apartment cooking, balcony BBQ's and retail cooking (if required). If no gas is required in the building then a gas connection will not be required. The decision not to supply gas to your development will have an impact on your electrical infrastructure. Refer to the electrical section for further information.

Main water connection

Based on the design inputs section, this development will likely use 39.4kL/day of water and require one new 200mm mains water connection(s) to the street. Due to the size of this development, the Services Infrastructure Report must be completed. This is required to confirm that there is sufficient water flow and pressure available in the mains to serve this development.

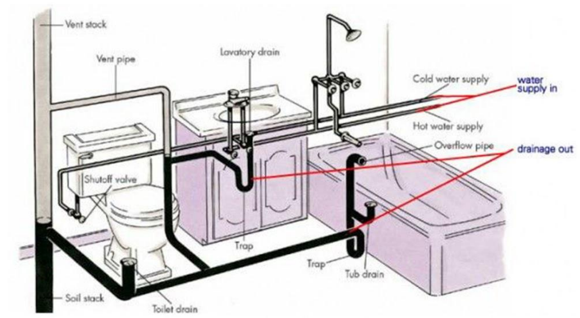
AUTHORITY CONNECTIONS

225 mm

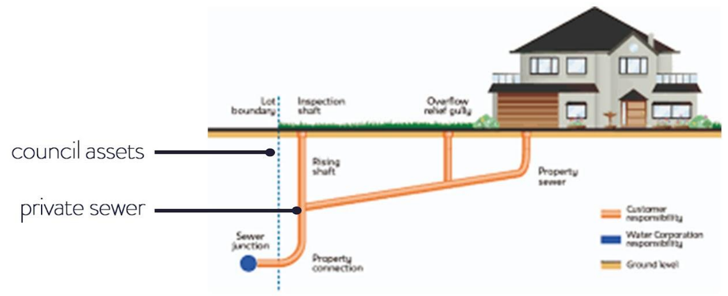
Main sewer connection

Main sewer connection

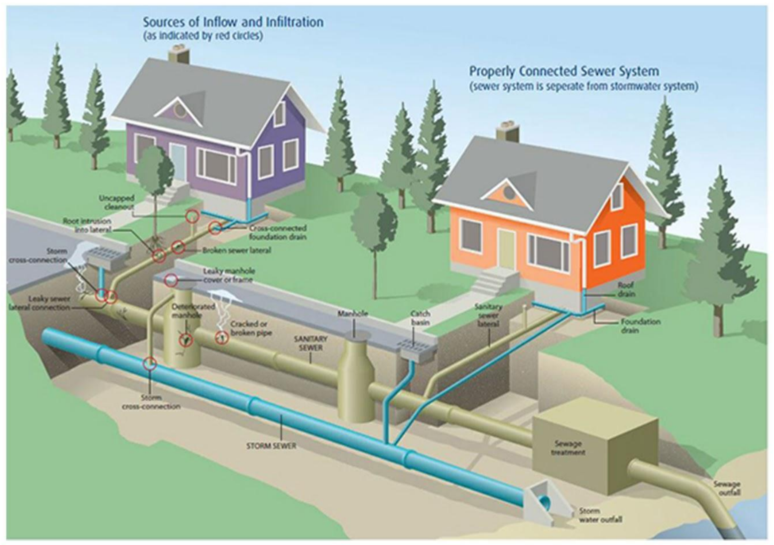
Based on the design inputs section, we estimate that this development will create 31.5kL/day of sewage and will likely require a new 225mm mains sewer connection to the street. Refer to the Services Infrastructure Report which has been completed and contains details of the sewer connection to the street. Based on this investigation and its findings, it appears that there is not sufficient capacity in the street mains to serve this development. Refer to the Services Infrastructure Report for further details and the suggested next step to resolve this issue.
Note there is a line item in the spatial matrix noting a potential requirement for a sewer and stormwater pump station. A detailed invert level study will be required to assess if the sewer and stormwater connections from the building can gravity fall to the street mains or if a pump station will be required within the basement to assist.



Typical apartment bathroom sanitary waste arr

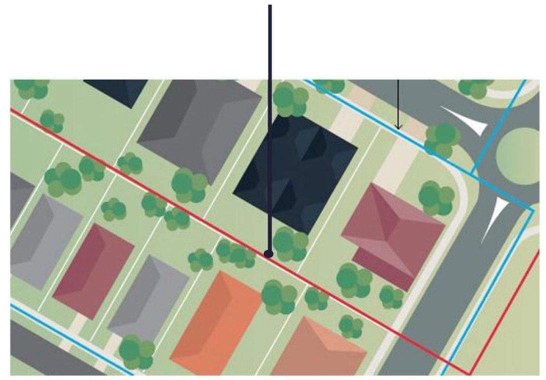


Example dividing line between private and council assets.



Typical street sewer and stormwater infrastructure

Tip: Complete a services infrastructure report to confirm if and council sewer assets or easements run through your development site. If so, negotiations may be required to re-route them. This cost is put on the project.



Example council sewer line running through a property.

DESIGN GUIDE

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DESIGN ASSUMPTION

The intent of this section is to outline the inputs and assumptions applied in establishing the preliminary engineering system spatial allocations required to service this development.

Mechanical Services

External Conditions

The assumed external design temperature set-points, which are in line with industry standards are as follows:

- Summer: 31.6 °C Dry Bulb, 23.7 °C Wet Bulb allowing for direct solar load
- Winter: 7.1 °C Dry Bulb with no solar load (worst case scenario)
- BCA Climate Zone: 5 (Sydney, NSW)
- Click here to see climate map

Internal Conditions

The assumed internal design temperature set-points, which are in line with industry standards are as follows:

- Cooling: 24 °C Dry Bulb (+/- 1.5 °C)
- Heating: 21 °C Dry Bulb (+/- 1.5 °C)

Population Density

The assumed number or people for each space type is as follows:

- Studio Apartments: 2 people
- 1 Bedroom Apartments: 2 people
- 2 Bedroom Apartments: 3 people
- 3 Bedroom Apartments: 4 people

Ventilation Assumptions

The below assumptions and code requirements have been applied to ventilation related spatial allowances

- Carparks: Ventilated to AS 1668.2 requirements (where applicable)
- Bathrooms: 50 l/s/room to AS 1668.2 requirements
- Apartment laundry spaces: 40 l/s/room
- Garbage rooms and storage areas: Ventilated to AS 1668.2
- Apartment kitchen areas: range hood ducted to the façade (unless otherwise noted)
- Electrical and hydraulic plant rooms: Ventilated to AS 1668.2 requirements (typically 5 l/s/m^2)

Cooling Load Assumptions

The below assumptions and code requirements have been applied to cooling load related spatial allocations

- Apartment lighting and power: 40 W/m^2
- Glazing cooling loads: Assumed glazing meets NCC 2022 section J requirements with a solar heat gain coefficient (SHGC) of 0.5 or less or as required by Sustainability.
- Wall construction: thermal performance as outlined in NCC 2022 section J requirements

Electrical Services

The below assumptions and code requirements have been applied to the power and communication infrastructure related spatial allocations

- The maximum demand for this development has been calculated according to Tables C1 and C2 in AS/NZS 3000.

DESIGN GUIDE

DESIGN ASSUMPTION

Hydraulic Services

- Hot Water Storage Temperature minimum 60 °C for domestic use
- Supply Temperature (to all ablution fixtures) maximum 50 °C
- Supply Temperature to all disabled facilities maximum 45 °C
- Stormwater – box gutter systems have assumed to have an average recurrence interval (ARI) 1:100 years (intensity 270 mm/hour for a duration of 5 minutes
- Stormwater - Eaves gutter systems have assumed to have an average recurrence interval (ARI) 1:20 years (intensity 220 mm/hour for a duration of 5 minutes (Data obtained from the BOM Hydrometeorological Advisory Service)
- Grease arrestors (where applicable) to follow statutory trade waste requirements:
    - Minimum of 1,000 litres per food tenancy
    - 800-1,000 meals or seats per 5,000 litre grease arrestor
- Understanding of operations and procedures to size equipment
    - Potable Cold Water
        - Design Velocities
            - Above ground pipework; 1.8m/s, Inground pipework 3m/s
            - Design Pressures; At outlet 200 kPa (excluding specific equipment requirements) up to 80% of maximum pressure rating of pipework
    - Potable Hot Water
        - Design Velocities
            - Flow pipework 1.2m/s, return pipework 1m/s
            - Design Pressures; At outlet 200 kPa (excluding specific equipment requirements) up to 80% of maximum pressure rating of pipework
        - Temperature
            - Storage and flow system - minimum 60 °C
            - Supply (retail and commercial ablution fixtures) - maximum 43.5 °C
            - Supply (guestrooms) - maximum 50 °C
            - Supply (accessible fixtures/rooms) - maximum 43.5 °C
            - Supply (apartments) - maximum 50 °C
- Operation of two fire hose reels - Flow rate 0.33l/s @ 250 kPa per fixture

Apartment Conditions

Consider Water Efficiency Labelling Standards (WELS) rating requirements that may form part of the sustainability requirements that identify maximum flow rates for fixtures,including the below list which is to be used as a guide only.

- Showers – 6-9 litres per minute
- Hand basins – 6 litres per minute
- Sinks – 6 litres per minute
- Toilets – Dual flush 6/3 litres (4 ½ litres also available)

Fire Protection Services

The design criteria are predominantly driven by the code requirements outlined in the Design Standards section however these requirements may change based on the outcomes and recommendations within the Fire Engineering Report (FER) or per the determinations of the building certifier.

The fire hydrant system needs to be capable of delivering the minimum required pressure and flow to the most disadvantaged point in the system (the worst case scenario location i.e. top floor or last connection served) to meet the BCA and Australian Standards requirements.

Budget estimates - how it works?

The budget estimates are compiled using two streams of costs. The first is a budget estimate for itemised costs for each engineering element i.e. a fire pump room cost, a kitchen exhaust fan cost and the like. Secondly, there are area based rates used to cover non itemised elements such as on-floor reticulation. These figures are derived from the selected system types.

The budget estimate is a high level concept estimate only. The intent of showing high level budget estimates in Neuron is purely to aid with concept engineering design decision making i.e. what is the rough cost difference between a kiosk substation or a chamber substation? Or what is the cost difference of air conditioning condensers on apartment balconies or on the roof.

Neuron's concept budget estimate is not a quantity surveyor cost plan. No architectural plans have been reviewed in the compilation of these concept level budgets and therefore should not be relied upon for detailed project costing. Always seek professional quantity surveyors advice for detailed project cost plans.

Specific budget estimate exclusions:

- All builders works
- Authority fees and charges
- Cost risk for ground conditions
- Where there is retail budget estimates allow for cold shell retail only as described in the retail section of the design guide
- Escalation
- Margins
- Infrastructure connection costs. Complete a services infrastructure report to gain a detailed understanding of these costs (gas, power, sewer, telecommunications and water)

DESIGN STANDARDS

Design Standards

The intent of this section is to outline the standards applied and referenced when establishing the engineering requirements for this development.

The assumed Building Code of Australia (BCA) building classification:

- Residential: Class 2
- Retail: Class 6 (if applicable)
- Carpark: 7a

Mechanical Services:

The mechanical design spatial provisions are based on the following codes:

The National Construction Code (NCC) 2022 & the Building Code of Australia (BCA) and in particular the "deemed to satisfy" conditions of:

- NCC 2022 Section J3.5 & J3.7 Building Sealing - exhaust fans & evaporative coolers
- NCC 2022 Section F4.5 Ventilation of rooms
- NCC 2022 Section J5 Air conditioning and ventilation systems
- NCC 2022 Specification J5.2 Ductwork insulation and sealing

Australian Standards as follows:

- AS 1530 Methods for fire tests on building materials, components and structures
- AS 1668.1 The use of mechanical ventilation and air conditioning in buildings - Fire and smoke control in multi-compartment buildings
- AS 1668.2 The use of mechanical ventilation and air conditioning in buildings - Mechanical ventilation in buildings
- AS 1668.4 The use of ventilation and air conditioning in buildings - Natural ventilation of buildings
- AS 1677 Refrigerating Systems
- AS 1682 Fire Dampers
- AS 1851 Maintenance of Fire Protection Systems
- AS 3000 SAA Wiring Rules
- AS 3666.1 & 2 Air Handling and Water Systems of Buildings – Microbial Control
- AS 4254.1 Flexible Ductwork – Fire resistance & sealing only
- AS 4254.2 Solid Ductwork – Fire resistance & sealing only

Electrical Services

The electrical design spatial provisions are based on the following codes:

- The National Construction Code (NCC) 2022
- Current statutory requirements and guidelines including supply authorities, council requirements, fire and emergency services requirements.

Applicable standards by system:

- AS 1680.1 – 2006 Interior Lighting
- AS 2293.1 – 2005 Emergency Evacuation Lighting in Buildings
- AS/NZS 3000:2018 Electrical installations (the Wiring Rules)

Hydraulic Services

The hydraulic design spatial provisions are based on the following codes:

- The National Construction Code (NCC) 2022 & the Building Code of Australia (BCA)
- Current statutory requirements and guidelines including Water Authority, Fire Brigade, Health Department and the Department of Environmental Protection.

Applicable standards by system:

- AS 3500 (2018) National Plumbing and Drainage Code incorporating:
  - Part 1 Water Supply
  - Part 2 Sanitary Plumbing and Drainage.
  - Part 3 Stormwater Drainage.
  - Part 4 Heated Water Services.
- AS 5601.1 (2013) Gas Installations
- AS 2441 (2005) Installation of Fire Hose Reels

The National Construction Code (NCC) 2022 & the Building Code of Australia:

- NCC: Volume 1 Class 2 to 9 buildings.
- NCC: Volume 3 Plumbing and drainage associated with all classes of buildings
- NCC Section J Specification J6.

DESIGN STANDARDS

Fire Protection Services

The fire protection design spatial provisions are based on the following codes:

- The National Construction Code (NCC) 2022 & the Building Code of Australia (BCA)
- Current statutory requirements and guidelines including council, water authority, fire and emergency services authority and the Department of Environmental Protection.

Applicable standards by system (unless alternative solutions are provided as a departure to the deemed to satisfy provisions of the BCA):

- AS 1851(2012) Routine Service of Fire Protection Systems and Equipment
- AS 1670.1 (2018) Fire detection, warning, control and intercom systems – System design installation and commissioning - Part 1: Fire
- AS 1670.1 (2018) Fire detection, warning, control and intercom systems – System design installation and commissioning - Part 4: Emergency Warning and Intercom Systems
- AS 2118.1 (2017) Automatic Fire Sprinkler Systems - Part 1: General Requirements
- AS 2118.6 (2012) Automatic Fire Sprinkler Systems - Part 6: Combined Fire Systems
- AS 2419.1 (2005) Fire Hydrant Installations - Part 1: System Design Installation and Commissioning
- AS 2441 (2005) Installation of Fire Hose Reels
- AS 2941 (2013) Fixed Fire Protection Installations – Pumpset Systems

Vertical Transportation Services

The vertical transportation design spatial provisions are based on the following codes:

- The National Construction Code (NCC) 2022 & the Building Code of Australia (BCA)

Applicable standards:

- AS1735 Lifts, escalators and moving walks
- AS1735.1:2016 General requirements
- AS1735.5:2015 Escalators and moving walks
- AS1735.11 Fire-rated landing doors
- AS1735.12:1999 Facilities for persons with disabilities
- EN81-20 Safety rules for the construction and installation of lifts - Lifts for the transport of persons and goods - Part 20: Passenger and goods passenger lifts
- EN81-28 Safety rules for the construction and installation of lifts - Lifts for the transport of persons and goods – Part 28: Remote alarm on passenger and goods passenger lifts
- EN81-50 Safety rules for the construction and installation of lifts - Lifts for the transport of persons and goods – Part 50: Design rules, calculations and tests of lift components
- EN81-58 Safety rules for the construction and installation of lifts - Lifts for the transport of persons and goods – Part 58: Landing door fire resistance tests
- AS4431:1996 Guidelines for safe working on new lift installations in new constructions
- AS/NZS 3000 Wiring Rules
- AS/NZS 3008 Electrical Installations – Selection of Cables – Cable sizes for lift installations

AS1418.8:2008 Cranes, hoists and winches – special purpose appliances

The intent of this section is to outline the inputs and assumptions applied in establishing the preliminary engineering system spatial allocations required to service this development.

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DESIGN GUIDE

DESIGN INPUTS

Question	Answer
Number of rooms	185
Total building area	16287
Number of levels (above ground)	23
Total number of levels in the building (incl. any underground levels)	24
What is the buildings total effective height? (m)	74.2
Maximum number of rooms per level	11
Number of stairwells above ground?	2
Type of development?	Mid-range
Is an external kiosk substation acceptable (recommended if possible)	Yes
Are 1.9m high rooftop plant acceptable on this development?	No
Is centralised domestic hot water plant acceptable? (recommended)	No
Do you want natural gas in your development	No
Are air-conditioning condensers acceptable on balconies?	Yes
Air conditioning to both bedrooms and living areas?	Both bedrooms and living areas
Preferred air-conditioning indoor unit type?	Fully ducted AC
How many electric car charging points are preferred	5
Does your building have an underground carpark?	Yes
Number of levels of underground car parking	2

Question	Answer
Total area of underground parking spaces	2163
Total number of underground car parking?	60
Number of basement stairwells	2
Does your carpark have a loading dock that is more than 10m deep / from an external opening?	Yes
Are there mixed-use tenancies in your development?	Yes
Overall area of all mixed-use	2168

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