

ATTACHMENT 4

Arup, Adaptive Reuse Strategy,
1 Spring Street, September
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Adaptive Reuse Study

1 Spring Street

Reference: SPR-ARP-SP-001

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1. Overview

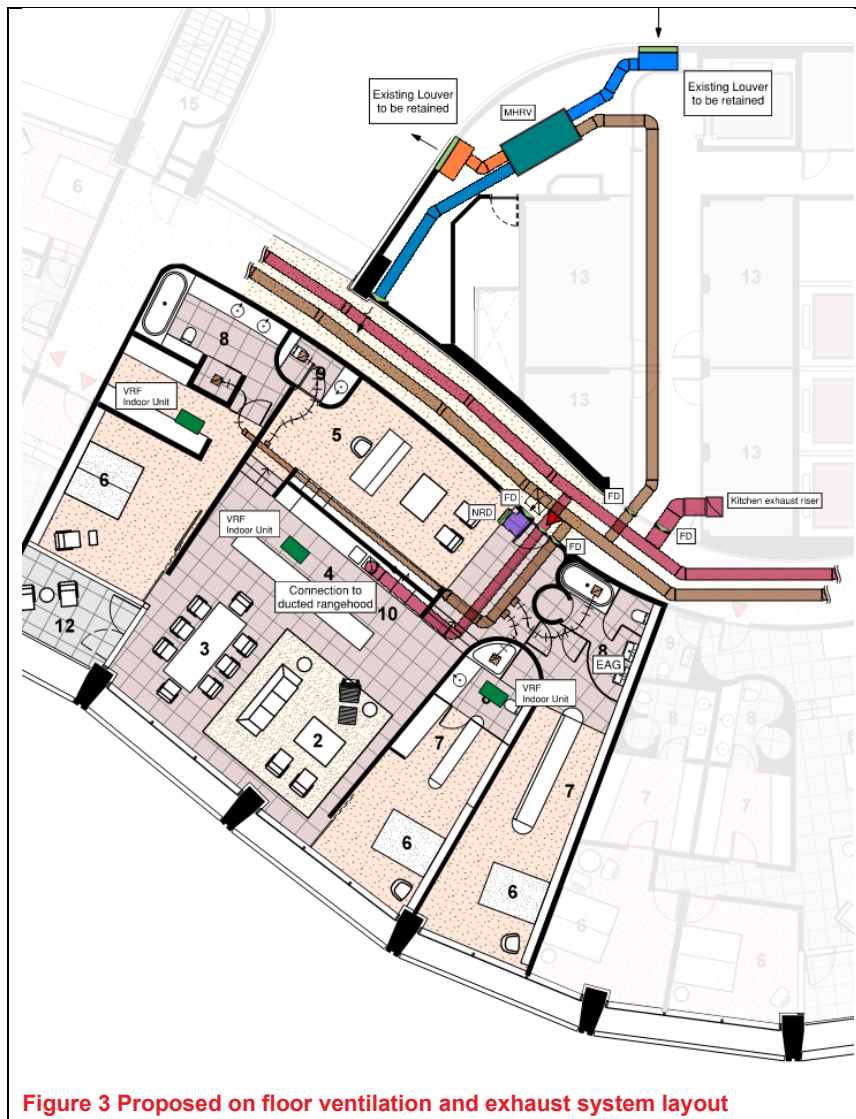
This report presents a strategy to adapt 1 Spring Street into residential use by upgrading and integrating the services needed to support that change within the existing building envelope and at roof level. The purpose of this report is to outline the mechanical, electrical, hydraulic, fire protection and vertical transport services which are required to be upgraded, replaced or removed entirely. The study is intended to test overall feasibility and identify how the existing asset can support a residential conversion, noting that all findings remain subject to further development, design coordination and detailed technical assessment.

A key part of the approach is to make the best possible use of the building's existing and redundant spaces and equipment, including service risers, plant areas and selected lift infrastructure, to accommodate the new residential services efficiently. This helps limit the extent of major structural change while creating space for the systems required to support apartments and shared building functions. The design of the residential floor levels is also intended to bring services together in a coordinated way, so that layouts can work efficiently, space can be used effectively, and relevant code and compliance requirements can be addressed as the design progresses.

Ventilation and Exhaust Strategy

The ventilation strategy utilises a central Heat Recovery Ventilator (HRV) on each floor, which will be located within existing plant enclosures. The HRVs serve bedrooms, living rooms, bathrooms, and laundry cupboards. Exhaust air from sanitary compartments will be fully ducted to the HRV and discharged to outside. The waste heat from this exhaust stream will then be partially recovered and transferred to the outside air stream, which is supplied to common corridors before migrating to apartments via acoustic transfer ducts. The HRV is recommended over separate supply and exhaust fan arrangements, as it helps to reduce overall energy use and electricity costs, and it provides balanced, constant background ventilation to improve indoor air quality without reliance on opening windows.

Apartment kitchen rangehoods are connected to a common exhaust riser within the structural core, discharging via a centralised exhaust fan at roof level. Existing smoke management control strategies for the development, including stair pressurisation and relief, will be largely retained subject to further design development.



Conference, Restaurant and Amenity spaces

Conference and restaurant spaces on podium levels 1-3 shall be ventilated and conditioned via direct-expansion (DX) air handling plant that are positioned in close proximity to the areas served. Supply and return ductwork shall deliver conditioned air to each space via variable-air-volume boxes and ceiling-mounted diffusers.

Indoor pool areas (level 3 and level 28) shall be ventilated via dedicated air handling units complete with components suitable for corrosive pool environment conditions, including epoxy-coated coils, fabric ductwork etc. The pool water treatment and pumping systems will include all necessary dosing and filtration

equipment required. Pool water heating will be via connection to the building's secondary heating hot water circuit, complete with heat exchangers for hydraulic separation. The level 3 and level 28 pool hall ventilation and water treatment systems are located in plant enclosures directly adjacent to the pools served. The level 27 terrace pool treatment plant will be located within an enclosure that is recessed into the new podium structure supporting the pool. The pool services strategy is subject to further assessment during design development.

3. Electrical

Electrical System Overview

The proposed electrical strategy transitions the building to a fully electric residential system. Existing infrastructure, including the onsite substation, is expected to be reused where feasible, subject to confirmation with the power supply authority and resolution of commercial and residential arrangements. This approach minimises major upgrades while supporting the shift to modern residential services.

The estimated total electrical demand for the building is approximately 2.4 MVA. This includes power for all apartments, shared building services such as lifts and common areas, and an allowance for future capacity. The majority of the demand is driven by residential usage, reflecting an all-electric design where heating, cooling and hot water are electrically supplied. A contingency allowance has been included to provide flexibility for unknown loads and future expansion.

Power Supply Arrangement

The building is served by an existing substation containing three transformers, each rated at 2,000 kVA. Initial assessments indicate that these will be sufficient to meet the proposed residential demand without major modification, although further confirmation is required with the local authority. Retaining the substation reduces the need for new infrastructure and supports a cost-effective upgrade of the building.

Electrical distribution within the building follows a typical residential arrangement, with separate supplies for base building services and individual apartments. This ensures that shared services such as lifts, lighting and mechanical systems are clearly separated from tenant power use.

Metering Strategy

Each apartment will be individually metered, allowing occupants to be billed directly for their electricity use. Meters will be located in central meter rooms on each floor to simplify distribution and maintenance access. This arrangement aligns with standard residential practice and supports a conventional ownership model.

Opportunity for an embedded network is under consideration, noting that this may influence how electricity is purchased and distributed within the building.

Backup Power and Generators

The existing backup generators are at the end of their service life and are not considered suitable for reuse. For residential buildings, backup power is not generally required; however, a smaller generator is proposed to be installed at level 30 to provide standby power for essential services.

If provided, a generator of approximately 800 kVA would be proposed and would be integrated into existing high-rise plant enclosures. The existing generator plant space is much larger than the new requirements, which potentially releases floor area for future electrical infrastructure or other building uses.

4. Hydraulics

Domestic Hot Water

The proposed domestic hot water system adopts a centralised, all-electric heat pump solution located at roof level. This system will generate hot water centrally and distribute it throughout the building to all apartments via insulated pipework. Locating the plant on the roof avoids using valuable internal floor space and allows the equipment to operate efficiently with access to outdoor air.

Hot water will be stored in central tanks and circulated through the building, ensuring a consistent supply to all apartments. This approach is more energy efficient than installing individual systems within each apartment and supports the overall electrification strategy. Subject to further design resolution, the existing hot water tanks located on level 29 may be reused, with additional storage added to meet the residential tower's hot water demand.

Hot water will be distributed through vertical risers and horizontal pipework within common corridor ceiling spaces. In some cases, local risers may be located closer to apartment bathrooms to simplify connections. While this requires coordination within shared ceiling spaces, the existing building is expected to provide sufficient height to accommodate these services without significant impact to usable areas.

Drainage Strategy

The drainage design is based on a combination of raised floor distribution and conventional vertical stacks. A raised floor system of approximately 250 mm will be used where possible to route drainage horizontally to stack locations. This helps to mitigate disruption to neighbouring apartments in the event of a blockage or other maintenance activities.

Where drainage cannot be accommodated within the raised floor, drainage pipework will typically drop to the level below and connect to vertical stacks. This ensures flexibility in apartment layouts while maintaining effective drainage performance.

To reduce the number of stacks and simplify installation, bathrooms and kitchens are proposed to be arranged back-to-back wherever possible. This allows multiple apartments to share common drainage risers and improves efficiency in both construction and operation. Loggias (Balconies) are to be aligned vertically to streamline drainage connections.

Pool facilities

Water supplies to the pools and associated plant on levels 3, 27 and 28 will be provided by the building's domestic cold water system. Domestic hot water shall be provided via heat pump plant to serve the associated pool amenities. The system may be provided as a standalone installation or separately metered as part of the building wide domestic hot water supply.

Drainage for the pool areas shall be connected to the main sanitary drainage system. Discharges will be required to comply with Greater Western Water trade waste requirements including water quality which may require some pre treatment.

5. Fire Protection

Fire Protection and Detection

The existing fire protection systems, including sprinklers, fire detection and alarm systems, and emergency warning and intercom systems, will be upgraded to suit the new residential scheme. This may involve reconfiguring the existing systems or, where more practical, replacing them throughout the residential floors while retaining the main vertical risers.

Fire hydrants and hose reels are expected to be largely retained and modified to suit the architectural layout, subject to further design development. These systems are generally compatible with residential use and can be adapted without substantial redesign.

Central plant components, such as fire pumps, booster assemblies, indicator panels etc are likely to be at the end of its service life and will require replacement as part of the redevelopment.

6. Vertical Transportation

Current Lift Arrangement

The existing building is served by a large number of lifts designed for commercial office use. This includes separate lift groups for low-rise and high-rise floors, along with additional lifts serving goods and car park areas. While this arrangement suited the original building use, it is more complex than required for a residential development and does not efficiently support apartment living or typical residential movement patterns.

Performance Criteria and Assumptions

The lift design has been assessed against typical residential performance targets, focusing on wait times and the ability to move residents efficiently during peak periods. The analysis assumes realistic occupancy levels for different apartment types and considers both upward and downward travel demand throughout the day.

Performance targets aim to keep average waiting times within acceptable limits and ensure the lifts can handle peak demand without excessive delays. The assessment also allows for a scenario where one lift may be temporarily unavailable, ensuring that the remaining system can still operate effectively.

Lift Traffic Analysis

A series of calculations were carried out to understand how many lifts are required and what speed they should operate at. The results indicate that a minimum of three lifts is required to comfortably meet residential expectations for waiting and travel times. Increasing lift speed also improves performance, but the number of lifts has a greater overall impact on service quality.

Proposed Upgrade Approach

Based on the analysis, the recommended approach is to simplify the lift system and align it with residential needs. This involves reducing the total number of lifts and introducing a smaller, more efficient lift group. The current recommendation is to provide three main passenger lifts, supported by an additional lift that can be used for service functions such as moving furniture or maintenance.

These lifts would operate at speeds suitable for a residential tower and be configured to serve all levels efficiently. This approach improves usability, reduces complexity, and avoids maintaining an oversized system. Spare redundant lift shafts can be reused for other purposes such as storage and waste removal.

Key Considerations for Implementation

Before confirming the final solution, further review of the existing lift shafts and structural layout is required. The ability to reuse existing lift infrastructure will influence cost, required modifications, and the overall feasibility of each option.

There is also an opportunity to replace older lift equipment if it is nearing the end of its service life, which could improve energy efficiency and reduce long-term maintenance costs. The final design will need to balance upfront cost with operational performance and long-term reliability.

7. ESD

Building Permit Requirements

The redevelopment must comply with current sustainability and building regulations. Key requirements include achieving an average 7-star NatHERS energy rating under the National Construction Code (NCC 2022), as well as meeting Apartment Design Guidelines for cooling performance. The project may also target a 5 or 6 star Green Star rating, with additional sustainability measures such as renewable energy and urban greening considered where required. These requirements set the baseline for energy efficiency, comfort and environmental performance of the building.

Current Building Performance

The existing building fabric performs below the required NatHERS standard, with an average energy rating of around 4.5 stars. Without upgrades to improve performance, some of the proposed apartments would perform as low as 3.5 stars, particularly those with greater exposure to sun and weather, while the best-performing apartments would achieve approximately 5.5 stars. The analysis shows that several apartments would exceed allowable cooling limits, meaning they are likely to overheat in warmer conditions. Overall, while the building has reasonable baseline performance for its age, upgrades to the building fabric are required to meet modern energy and comfort standards.

Internal Wall Insulation

To improve thermal performance, internal insulation will need to be added to the existing external walls. This can typically be achieved by installing insulated plasterboard directly onto the internal face of the concrete walls. This approach helps reduce heat loss in winter and heat gain in summer, improving overall comfort for occupants. In some cases, more robust wall build-ups may also be considered to address condensation and moisture risks, although these would reduce usable floor space. The addition of internal insulation is a key measure required to achieve the target energy ratings.

Window Upgrade Requirements

The existing windows will need to be upgraded to high-performance double glazing with improved thermal properties and airtight detailing. This reduces unwanted heat transfer and improves energy efficiency across the building. Upgraded glazing, with operable elements, will also help control solar heat gain, which is critical for meeting cooling performance targets. Importantly, both window upgrades and wall insulation are required together; upgrading only one element is not sufficient to achieve compliance with current standards.

5 Star Green Star Requirements

To meet City of Melbourne expectations and sustainability targets, where applicable, the development is expected to achieve at least a 5 star Green Star rating. This involves delivering an all-electric building with improved energy performance, reduced environmental impact, and enhanced occupant comfort. Key requirements include higher energy efficiency targets than minimum code compliance, integration of renewable energy, and broader sustainability measures such as waste management and water efficiency.

The adaptive reuse of the existing building provides a strong advantage in achieving Green Star outcomes, as retaining the structure significantly reduces embodied carbon compared to new construction. However, additional upgrades to building systems and the façade will still be required to meet performance targets.

8. Façade Access

Hierarchy of Controls

The façade access strategy is guided by a “hierarchy of controls”, which prioritises safety above all other considerations. The aim is to minimise risk wherever possible by choosing the safest and most practical method of access for cleaning and maintenance.

Where feasible, access is carried out from ground level using simple tools such as cleaning poles. If this is not practical, fixed solutions such as walkways or platforms are considered to provide safe and stable working areas. Only where these options are not possible are more complex systems, such as roof-mounted access equipment, introduced. This structured approach ensures that risk is reduced as much as reasonably practicable while still allowing full maintenance access to the façade.

Options Comparison

Two primary options have been considered for façade access: a Building Maintenance Unit (BMU) and industrial rope access. Both options are capable of meeting compliance requirements, but they differ in safety, cost, operational efficiency and long-term maintenance implications.

The BMU option is generally considered safer, as it provides a controlled working platform that reduces reliance on manual techniques. It also allows faster cleaning cycles and can accommodate tasks such as material replacement and façade maintenance. The disadvantages of a BMU include significant additional structural support and higher upfront cost. Subject to further design resolution, there may be a visual impact at roof level, however the current BMU strategy has been developed to achieve minimum visibility from the public domain when not in use.

Industrial rope access offers greater flexibility and lower initial cost, with less structural impact on the building. However, it requires specialist technicians, involves more complex safety procedures, and results in higher ongoing operational costs. There is also potential for increased wear on façade elements due to rope interaction, as well as more disruption over time due to maintenance requirements.

Roof Building Maintenance Unit

The existing building maintenance unit is approaching end of life, and the preferred replacement solution is a roof-mounted Building Maintenance Unit, which provides a permanent and efficient system for accessing the façade. The BMU is a crane-like structure installed at roof level that lowers operators in a suspended platform to clean and maintain the building exterior.

For this development, a single BMU is proposed to service the entire façade. It will be positioned at the roof and designed with sufficient reach to cover all areas of the building, including recessed façades. The system will include a telescopic arm to maximise coverage while minimising its footprint when not in use.

The BMU will be fixed permanently to the roof structure and replaces the existing approach of relocating smaller units between levels. This provides a more efficient, reliable and safer long-term solution and careful consideration of structural capacity, vibration, noise and visual impact has been undertaken.