AUSTRALIAN MUSEUM

DA REPORT AND SERVICES BRIEF

1 William Street,
Sydney, NSW, 2000

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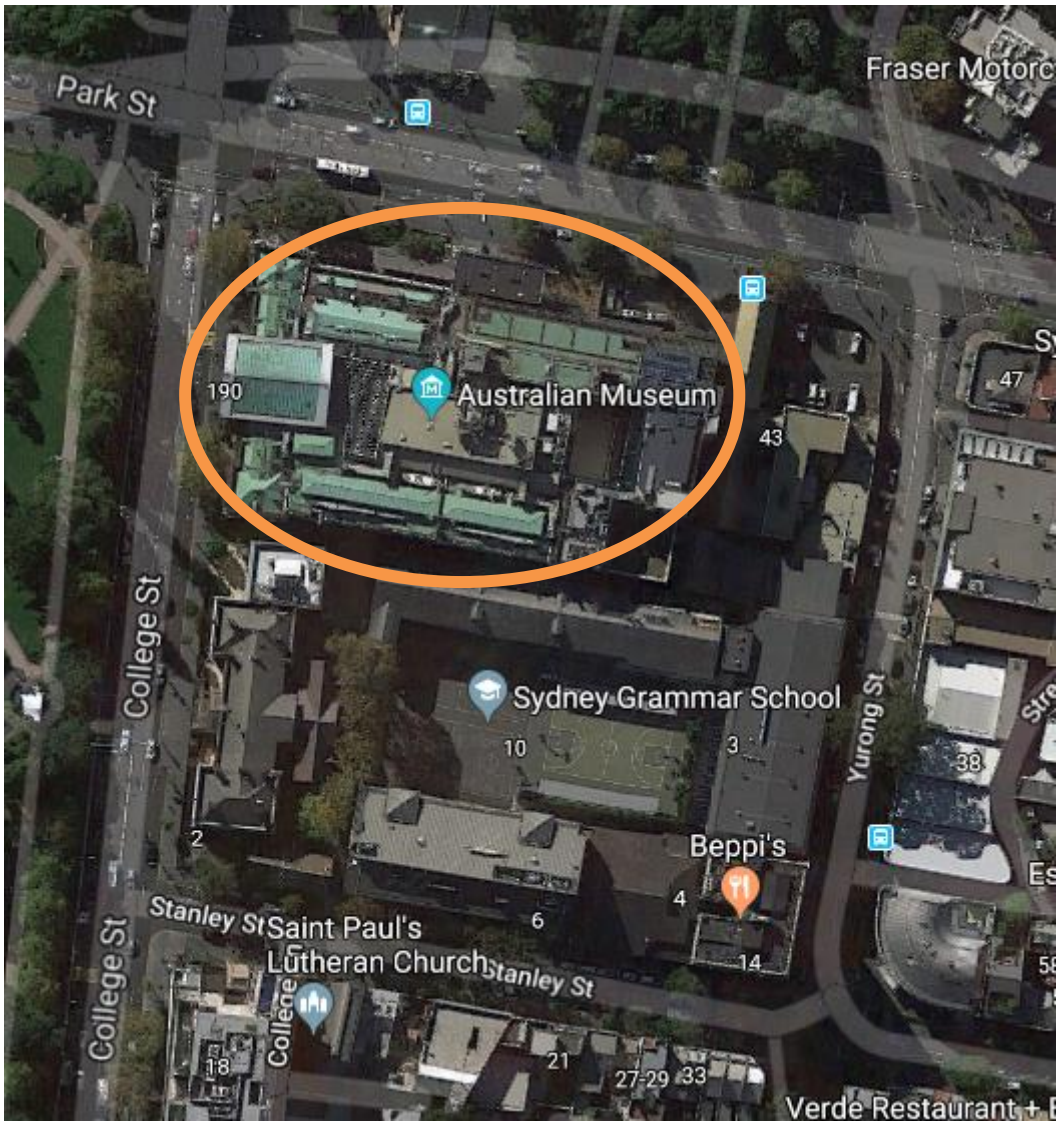
Contents

1. INTRODUCTION

1.1 PURPOSE

The Australian Museum is located at 1 William Street, Sydney, NSW, 2000. It is the oldest museum in Australia and feature collections of vertebrate & invertebrate zoology, mineralogy, palaeontology and anthropology.



SITE MAP

ADP have been engaged to undertake upgrade to the existing building services to cater for the "Tutankhamun – Treasures of the Golden Pharaoh" exhibition. ADP have undertaken site inspections to

understand the existing services employed for the development and their conditions. This report summarises our findings and provide a services brief for the building services scope associated with the building upgrade.

The extent of services covered in this report includes –

- Mechanical Services;
- Electrical Services;
- Hydraulic Services;
- Fire Protection Services;
- Vertical Transportation.

1.2 REGULATIONS AND STANDARDS

The building services design shall meet the requirements of the following Regulations and Standards with any variations thereto accompanied by approvals from the relevant authorities including amendments agreed pursuant to fire engineering analysis and reporting:

- National Constriction Code (NCC) 2016.
- Occupational Health and Safety Act 2004.
- AS 2107 - Recommended Design Sound Levels and Reverberation Times for Building Interiors.
- AS/NZS 1668 Part 1 – Part 4 – Ventilation and Air conditioning in Buildings
- As 1657 – fixed platforms, walkways, stairs and ladders
- AS 1670.1 Fire detection, warning, control and intercom systems
- AS 2293 – Emergency escape lighting and exit signs
- AS 3666.1- for Control of legionella and microbial growth
- AS 3000 - Wiring Rules.
- AS 3080 - Telecommunications Installations.
- AS 3666 - Air Handling and Water Systems in Buildings – Microbial Control.
- AS 4254 – Ductwork for air handling systems in buildings
- AS 4282 – Control of the obtrusive effects of outdoor lighting
- AS/NZS 1680 – Interior Lighting – Safe movement

2. MECHANICAL SERVICES

2.1 GENERAL

The following section of the report provides a description of the mechanical services.

2.2 Description of existing mechanical services

2.2.1 Central Thermal Plantroom (Plantroom 1)

Plantroom 1 is currently located adjacent the loading dock. The major chilled water and heating water network serving the site are served by central plant located in Plantroom 1.

Chilled water is currently provided by combination of old and new chiller plant, including several Trane chillers which appear to be at least 15-20 years old. A new magnetic bearing, centrifugal Powerpax chiller has been recently installed with 1800kW capacity.

It is likely the Powerpax chiller can be retained and re-utilised as part of the redevelopment works. Further investigation is required to determine whether the Trane chillers can be re-utilised, however, due to their age they may no longer be suitable to cater for the new site load conditions.

2.2.2 Existing Cooling Towers

Condenser water is provided throughout the site via a combination of existing rooftop cooling towers.

Cooling towers are currently located on top of the Still Addition, Parkes Farmer, and AMRI buildings. These cooling towers will be retained, and additional cooling towers provided where required to suit any additional site cooling demand.

2.2.3 Air Handling Units

2.2.3.1 Still Addition Building

Conditioned air is currently supplied throughout the Still Addition building via multiple four-pipe air handling units (AHUs) located in Plantroom 2 and Plantroom 8.

Chilled water and heating water is reticulated via multiple existing networks throughout the site. The chilled water and heating water network serving the Still Addition building is located in Plantroom 1 near the loading dock.

2.2.3.2 Still Addition Level 6 plantroom & AHUs (plantroom 8)

Plantroom 8 is currently located on Level 6 of the Still Addition building, which is to be retained as part of the proposed redevelopment. Based on our review of the existing as-built documentation and initial site investigations, the AHUs in Plantroom 8 primarily serve the Still Addition building and the adjacent atrium.

With the demolition of Ground floor and Level 1 Still Addition, AHU-6.4, AHU-6.5, AHU-6.6 will become redundant and can be demolished.

Chilled water and heating water is reticulated to Plantroom 8 from Plantroom 1 via a riser through the Still Addition building the adjacent to the existing lift core near the sub-basement plantroom.

AHUs located in the Lewis Building and Barnett Wing are currently provided chilled water and heating water via the existing riser in the Still Addition building. Any modification to the existing chilled water riser will take into consideration the impact to these areas.

2.2.3.3 Sub-basement AHU plantroom (plantroom 2)

Plantroom 2 is currently located beneath the Still Addition building on the sub-basement level. AHUs in Plantroom 2 currently provide conditioned air to basement and lower ground of the Still Addition building. This includes the anthropology store and associated offices.

Chilled water and heating water is currently reticulated to Plantroom 2 from Plantroom 1.

The proposed modifications to the existing anthropology areas will affect the AHUs in Plantroom 2. It is likely the existing AHUs will require modification and replacement to suit the new design conditions. New touring exhibition rooms with high occupant numbers, which will also be utilised as large function rooms, will require new AHUs to cater for the specialised design conditions.

New outside air ductwork will be required to provide additional outside air from atmosphere to Plantroom 2. A suitable location will need to be coordinated to suit the proposed architectural design and staging requirements.

2.3 DESCRIPTION OF PROPOSED MECHANICAL SERVICES

2.3.1 General

All equipment requiring regular access for service and maintenance such as air-handling units, fans, etc shall be located within secure Plant Rooms. Plant Rooms shall be accessed from service and support areas, and not from public spaces.

The Air Conditioning and ventilation systems will be designed to provide flexible operation, with separate air handling units provided to serve different functional areas. The air conditioning to each functional area will be self-contained, with supply and return air ducted directly from the area see Air Conditioning systems shall provide stable environmental conditions with close humidity and temperature tolerance control, to all Gallery spaces, exhibition spaces, Collection Storage spaces, and other areas containing artefacts.

The delivery of air conditioning to gallery and exhibition spaces will be designed to minimise air movements. The design of supply and return air be designed to accommodate regular changes in the configuration of the connected gallery and exhibition spaces and their exhibition contents without affecting the sustainability of the indoor environmental conditions.

Access openings shall be provided to all balancing dampers, risers and other items of equipment located outside plant rooms. For all public spaces any access openings shall be coordinated with the architect and be sympathetic with the aesthetics of the space. All supply air, return air, exhaust air and ventilation air shall be directly ducted to and from the space served.

All components will be of high standard and fit for purpose. All visible components in public areas, such as diffusers, grilles, sensors, exposed ductwork, etc. will be of a functional, technical and aesthetical quality to the finish used in international museum buildings. Wall temperature and humidity sensors will provide minimal visible impact where installed.

Any control sensors, equipment, or visible components mounted on walls, floors and ceilings in all public areas will be co-ordinated with the Architect prior to design, documentation and installation due to the high desired aesthetic standard of the spaces.

2.3.2 Environmental Control

The main design goal for all galleries and areas where art is stored is to maintain environmental conditions to conserve the art stored or exhibited in the area. This involves narrow control bands for temperature and humidity, but also reduces minimal air movements within the space. Please refer to the Mechanical Zone Schedule at the back of this section to identify areas with AAA-conditions.

2.3.3 Air Movements and Dust Control

All systems shall be designed to minimize dust from entering the building and from spreading between spaces if inside the building. Generally, the all areas where works will be undertaken shall be pressurized, and all openings to the outside shall be controlled via air locks, air curtains, automatic doors or other suited solutions. All areas where artefacts are stored shall be pressurized to a higher level than other parts of the building. Generally, air is spilled from exhibition into circulation areas.

Due to the narrow environmental conditions for many spaces, controlling air movement is of high importance. This applies especially between galleries and circulation areas, which will be subject to further modelling and development through the documentation process.

2.3.4 Plant Redundancy

All Air Handling Units for the touring exhibition and other areas where exhibits are stored shall be provided with essential power supply for operation during a power failure. Additionally, the Touring Exhibition Storage and Communications / Equipment Rooms shall be provided with 100% standby/redundancy plant, to ensure that specified environmental conditions are maintained should the Air Handling Unit serving those spaces fail or require lengthy service or maintenance.

Large exhibition spaces shall be served by at least two air handling units to ensure internal environmental conditions for the whole space can be maintained should one plant fail.

The internal environmental consequences of plant failure will be investigated further during the documentation process as the air conditioning loads are finalised and form the basis for a detailed strategy developed together with the user groups (Australian Museum).

2.3.5 Specialist Touring Exhibition Areas (i.e. AAA-Areas or similar)

The control strategy and function for AAA-areas shall have a focus on maintaining the close temperature and humidity conditions at all times. Air Handling Units for AAA-areas shall be capable of dehumidification via a combination of “coil by-pass” and “re-heat”.

To conserve energy when AAA-conditions are not required the systems serving AAA-areas shall have a function to relax the environmental conditions in min. four (4) steps:

	Temperature (°C)	Humidity (%RH)
AAA-conditions:	±1	±5
Relaxed humidity	±1	±10
Relaxed temperature and humidity	±2	±10
Normal A/C conditions	±2	No direct humidity control

The steps in above table are indicative only and the exact energy functions of the system are subject to detailed energy modelling as part of the documentation process.

2.3.6 Air Handling Equipment

Conditioned air will be provided to the new and refurbished areas via new four-pipe AHUs located in the following new and existing plantrooms:

1. Existing basement plantroom 2, to serve the new touring exhibition area.
2. Existing AHU plantrooms in Parkes-farmer
3. Existing level 4 plantroom 8, to serve the new atrium area, touring exhibition area, and modified level 2
4. New touring exhibition AHU plantroom on LG level
5. New in-ceiling fan coil units, to be coordinated with the architectural design.

Conditioned air will be delivered from the new AHUs via supply and return risers through the building cores. Risers will be required in each new and refurbished area to reticulate ductwork. The supply and return ductwork will branch off at each level and reticulate throughout ceiling voids or between exposed structural beams.

Humidity control will be provided to the exhibition areas where required.

2.3.7 Smoke Exhaust Systems

The existing smoke hazard management system will be modified to suit the new fire engineering report requirements, to be coordinated with the fire engineer.

A compliant system will be provided utilising a combination of the existing smoke fans and new smoke exhaust fans where required to achieve the necessary smoke exhaust air volume rates nominated by the fire engineer.

2.4 DESIGN CRITERIA

2.4.1 External Ambient Conditions

We have allowed for the following external ambient design parameters for Sydney Airport:

External Temperature: 32°C DB / 23°C WB (summer), 3.3°C DB (winter)

2.4.2 Air Conditioning Design Conditions

We have allowed for the following design parameters:

Space Type	Room Temperature	Population[2] (m²/pers)	Lighting Load (W/m²)	Equipment Load (W/m²)	People (Sensible W/pers / Latent W/pers)	Noise Level[3] (dB(A))	Outside Air (L/s/pers)
Basement Touring exhibition	TBC by AM	TBC by AM	-	-	-	-	10
Ground touring exhibition	TBC by AM	TBC by AM	-	-	-	-	10
Museum shop	TBC by AM	TBC by AM	-	-	-	-	10
Atrium	TBC by AM	TBC by AM	-	-	-	-	10
Level 2 Cafe	TBC by AM	TBC by AM	-	-	-	-	10
Level 2 kid space	TBC by AM	TBC by AM	-	-	-	-	10
Level 2 education space	TBC by AM	TBC by AM	-	-	-	-	10

1. Default population densities only.
2. The acoustic environment within the occupied areas of the building shall comply with the acoustic consultant noise criteria.

2.4.3 Ventilation Design Conditions

We have allowed for the following design parameters:

Space Type	Ventilation Type	Ventilation Rate
Commercial kitchen exhaust	Exhaust	TBC
Toilets	Exhaust	Greater of 25 l/s per fixture or 10 l/s/sqm
Miscellaneous specialist exhaust systems	Exhaust	TBC

2.4.4 Building Envelope Thermal Performance

We have allowed for the following design parameters in our heat load calculations:

Element	U-value (W/m2.K)	SHGC
Internal partition walls between conditioned and non-conditioned spaces	TBC pending Section J advice	TBC pending Section J advice
External roof	TBC pending Section J advice	TBC pending Section J advice

External walls	TBC pending Section J advice	TBC pending Section J advice
Suspended/Overhanging floor	TBC pending Section J advice	TBC pending Section J advice
Glazing	TBC pending Section J advice	TBC pending Section J advice

3. ELECTRICAL SERVICES

3.1 GENERAL

The following section of the report provides a description of the electrical services.

3.2 EXISTING CONDITIONS

Australian Museum is an existing building, therefore a description of existing services will be provided, the services to be described will be -

- Substation;
- Switch rooms;
- Generator;
- Communications rooms.

Each of these are identified in the following sections.

3.2.1 SUBSTATION

The Australian Museum incoming supply is from William College Substation No. S35223 belonging to Ausgrid via a number of transformers with 11kV/415V ratio, located at Loading Dock Level in William Street.

Substation S35223 is feeding two main switchboards called MSB 1 and MSB 2 located at Basement Level in Collection and Research building.

ADP will require confirmation:
It is unknow the size of the transformers feeding the Australian Museum. Any existing Single Line Diagram apart from the one shown at the Main Switchboard Room is required to be able to determine the transformer size.
Spare capacity of the substation is also unknown. But an enquiry to Ausgrid was submitted and approval to connect an extra 400A was received.

3.2.2 MAIN SWITCH ROOM

Based on a site inspection, ADP was able to determine that the existing substation is feeding two main switchboards, Main Switchboard 1 (MSB1) and Main Switchboard 2 (MSB2). These are located on Basement Level within the Collection and Research building.

MSB1 is serving Power Factor Correction Cubicle 1 (PFC1), WSE 1 (sub-main distribution board) and other distribution boards located within the Loading Dock, Basement, Lower ground and Ground Levels.

MSB2 is serving Power Factor Correction Cubicle 2 (PFC2), WSE 2 (sub-main distribution board), essential services such as Fire Indicator Panel, Goods Lift and essential mechanical boards in the roof. It is also feeding distribution boards from Level 1 to 4, mechanical services located on the roof and the Yurong street distribution board.

A Generator Switchboard is also located within the Main Switch Room which is serving the distribution boards in disaster and security room and provides power to lifts. This board appears to be connected to the site generator allowing for the services to be provided with back-up power in the event of loss of mains.

3.2.3 GENERATOR

A diesel generator is currently installed on site, adjacent to the loading dock. The single line indicates, within the Main Switchboard Room the generator is providing back-up power to the essential services of MSB 2, but it seems that a provision to back-up MSB 1 was made as well.

It is understood that there is no load shedding operation within the museum.

ADP will require confirmation:
Also, at the time of the inspection, it was not possible to appreciate the nameplate of the generator. Maintenance services schedule would be required, or nameplate must be provided.

3.2.4 COMMUNICATIONS ROOM

Based on the site inspection carried out on the 18th May of 2018, ADP identified two locations where existing incoming communication infrastructure are terminated –

- Comms room, next to main switchboard room in collection and research building.
- Room adjacent to the lift in Basement Level next to the collections-science room.

3.3 EXISTING INCOMING INFRASTRUCTURE

3.3.1 ELECTRICAL

Based on the information obtained from the dial before you dig search, the existing HV cabling exits the in-road pit located underground at William Street. The cable travels inground along William Street and enters the site, connecting onto the existing chamber substation.

Information also indicates the existing substation is not dedicated to site. An application to the authority was submitted and spare capacity is available to connect extra load.

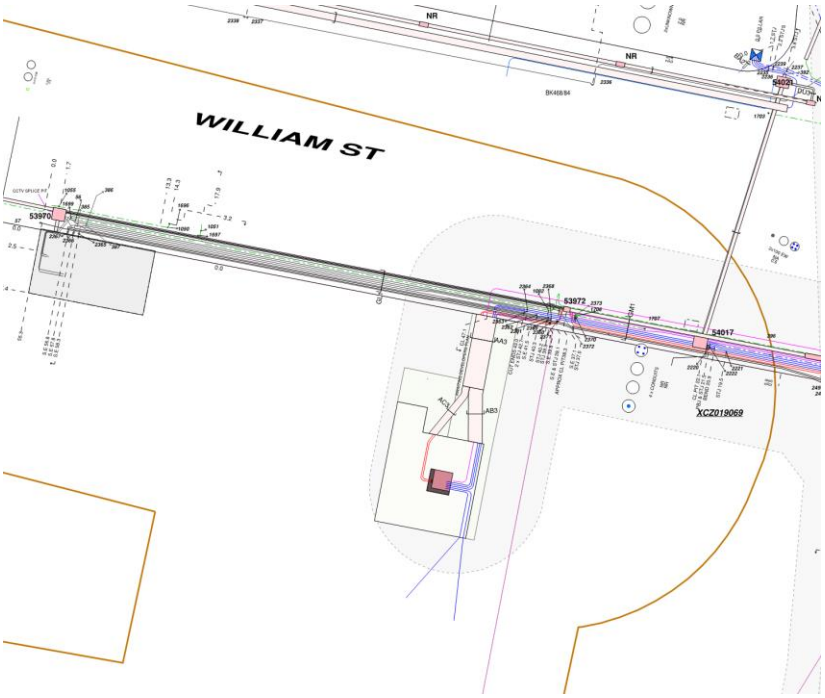


Figure 1: Existing HV connection entering site William St

3.3.2 COMMUNICATIONS

During the site inspection carried out on 18th May 2018, it was identified that the following telecommunication services enters and services the site –

- Optus;
- Telstra;

Figure 2: Existing Optus communications connection entering site William St

There also appears to be major communication services reticulating near the site –

- Vocus – Along William and Yurong Street;
- NBN – Along College and William Street
- Aarnet – Along Yurong Street;

3.4 PROPOSED ELECTRICAL SERVICES

3.4.1 DISTRIBUTION BOARDS AND COMMUNICATION EQUIPMENT WITHIN NEW CUPBOARDS

BASEMENT LEVEL:

Distribution boards affected by new works will be:

- DB-M and DB 0/1.
- DB-M is shown within the SLD to be feeding at least four boards including DB 0/1. DB/01 will be decommissioned and DB-M will be replaced by new in locations shown on sketches layout. The remaining boards will be back fed from the new one.

Moreover, ADP has carried out a preliminary maximum demand calculation based on VA/m^2 for the new exhibition. The results are as follow:

- The new touring exhibition will require at least a minimum of 300A supply, this figure must be confirmed at later stage based on the client's requirements.
- The site maximum demand will increase by approximately 200A due to the addition of new areas and spare capacity of the substation has to be determined.
- MSB 1 (collection and research building) shows 2x100A spare within the SLD that can be used to feed the new area after some replacement works to suit the supply size of it take place.

It is proposed to provide a new and separate electrical and comms cupboard to the new touring exhibition based on the values obtained above.

Proposed reticulation was considered to follow existing cabling route and use existing cable support where is possible.

Spare capacity is available within MSB 2 (essential and non-essential supply) to feed new escalator and lift.

As per document Tut Golden Pharaoh Exhibition Rider_180620 provided by the client, the new Touring Exhibition requires a power supply of 400-600A, 3-phase at 120/208V ratio. Based on the documentation provided a step-down transformer will be required to transform the incoming 415V supply to the 208V supply required for the exhibition.

ADP will require confirmation:
Confirmation of required incoming supply for new touring exhibition equipment and detailed equipment power specification or datasheets are needed to be able to provide advice regarding the use of a step-down transformer.

LOWER GROUND LEVEL:

Additional load required for the new areas within this level (new education and members lounge area) will not increase the site maximum demand since it will replace the existing one. New boards are proposed to be installed to feed the new areas in locations shown on sketches layouts. Distribution boards and floor distributors affected during demolition works will be decommissioned.

Proposed reticulation for new board was considered to follow existing cabling route at Basement Level and use existing cable support where is possible. However, a new riser is proposed at new BOH area to run new electrical and communication services for new cupboards required.

ADP will require confirmation:
Due to demolition works affecting the existing BMS and Security room in Lower Ground Level, ADP will require specific details of this area and its equipment to be able to suggest adequate relocation of existing services equipment, cabling and reticulation.

GROUND LEVEL:

All the equipment and services around the relocated opening lift core area must be removed, and areas affected will be back fed from new distribution board in location shown on sketches layouts.

A new board is proposed to be installed to feed the new areas in location shown on sketches layouts.

It is assumed that the load required for the new areas within this level will not increase the site maximum demand since it will replace the existing one.

Possible refurbishment works to existing floor distribution cupboard and the board located around the lift core area will be required to suit new layout.

LEVEL 1:

Following the renovations proposed in Level 1 to include the demolition of the existing mezzanine and stair, we proposed to decommission, make safe and tidy up all redundant services within existing floor distribution cupboard riser and replace them to suit the new layout.

LEVEL 2:

Following the renovations proposed in Level 2 to include the addition of new areas such as a new kitchen, café, toilets and education space, we proposed to decommission and make safe all the existing distribution boards and communication floor distributors affected and replace them with new in locations shown on sketches layouts.

ADP has carried out a preliminary maximum demand calculation based on VA/m^2 for the new areas. The results are as follow:

- The new areas will require at least a minimum of 150A supply, this figure must be confirmed at later stage based on the client's requirements.
- The site maximum demand will increase by approximately 100A due to the addition of new areas and spare capacity of the substation has to be determined.

- MSB 1 (collection and research building) shows 2x100A spare within the SLD that can be used to feed the new café and kitchen area.

A new electrical cupboard to the new café and kitchen area should be provided based on the values obtained before.

The proposed reticulation for this board is the same one used for floor reticulation through the existing cupboard riser, this strategy has to be investigated and discussed at further stage. If this option is not suitable a new riser has to be considered to feed the new board.

3.4.2 LIGHTING

ADP envisage new general lighting to be provided to the new works area.

Based on the project brief, the exhibition operator will be providing specific security and CCTV requirement base on the Tutankhamun's exhibition. Off-site CCTV access is also required based on the current brief.

ADP will require confirmation:
Due to refurbishment works ADP will require specific requirements in order to provide advice or generate a complete design package.

3.4.3 SECURITY SYSTEM (CCTV AND ACCESS CONTROL)

ADP envisage the existing security and CCTV installation to be modified to cater for the development. Details from the existing museum security specialist required to confirm suitability of expansion of existing system. Direction from the museum is required to cater for the security upgrade for the new works areas.

Based on the project brief, exhibition operator will be providing specific security and CCTV requirement base on the Tutankhamun's exhibition. Off-site CCTV access is also required based on the current brief.

ADP will require confirmation:
Further specification details will be required regarding the equipment to be installed in order to allow integration with existing security system. Also, model, type and operation description of the existing system used will be required.

3.4.4 MATV SYSTEM

The MATV system is to deliver fee-to-air television, staff education and public information channels to televisions located throughout the Museum. The system consists of antennae located on the roof of the building, positioned for optimized signal strength and to the Architect's approval, head end equipment located in the Communications Equipment Room and a cabling distribution network.

The existing MATV system will be maintained and additional points to be added to areas where required.

ADP will require confirmation:
Further specification details will be required regarding the existing equipment and the new one in order to allow integration between existing and new.

3.4.5 PUBLIC ADDRESS SYSTEM

The public address system is to deliver zoned public address paging and background music (PA/BGM) via unobtrusive aesthetically pleasing speakers within all public areas. The PA/BGM system consists in separately zoned within an area in particular.

It is envisaged that the existing PA/BGM system will be re-zoned to suit the new works.

ADP will require confirmation:
Further specification details will be required regarding the existing system and the requirements of the new one in order to allow integration between them. Also, rearrangement of zones in each area will be required.

4. HYDRAULIC SERVICES

WATER

4.1 EXISTING INCOMING INFRASTRUCTURE

An Incoming 50mm Water Supply is fed from William St under the main entrance adjacent the café. Access provided via cupboard under stairs.

ADP require confirmation:
Meter location TBC- not witnessed during site inspection
Existing Backflow prevention schedules and locations including test records

4.2 COMMERCIAL

A 25mm Cold water provision to the new café/ kitchen with authority meter

ADP require confirmation:
Proposed Fixtures and appliances to new commercial kitchen

4.3 DOMESTIC HOT WATER

Local 50L Hot Water Units to supply amenities- reuse existing tanks where required
Retail tenancy to supply own HW system

4.4 PRPOSED WATER SERVICES

- Incoming water supply to the development shall be extended from the Authority water main to service fire hydrants, hose reels, sprinklers and domestic cold water in accordance with the requirements of the Building Code of Australia, AS/NZS 3500 and Sydney Water.
- Sanitary fixtures and fittings to be specified subject to further Architectural briefing and confirmation during the Detailed Design phase.
- Diversions of Water services where conflicting with architectural and structural
- Domestic cold water supplies complete with isolation valves will be provided for the retail and commercial tenancy for extension by the tenant.

NATURAL GAS

4.5 EXISTING INCOMING INFRASTRUCTURE

The site is currently services by 2 x incoming gas supplies services.

An Incoming 25mm Gas Supply is assumed to be fed from 210kPa William St under the main entrance adjacent the café- access via access cupboard under stairs. We assume this feeds the existing café tenancy.

> ***NB Ventilation and clearances of this meter location should be reviewed with Jemena guidelines- We would advise the temporary power supply board to be relocated from this location as this may be a source of ignition and safety risk.***

A Gas Meter and Boundary regulator in the loading dock adjacent the Security Station. We assume this feeds the mechanical plant and rooftop boilers

ADP require confirmation:

- *Current gas loads to the existing retail tenancy*
- *Any available gas appliance information throughout the museum*
- *Proposed Gas appliance schedule to new tenancy's*

4.6 PRPOSED GAS SERVICES

- Review of Gas appliance schedule to the new and existing retail tenancy
- Review existing retail tenancy location/ ventilation and clearances.
- Pending authority advice review of current loads location, meter location and Service extension to be confirmed

SANITARY, TRADE WASTE AND STORMWATER DRAINAGE

4.7 SANITARY PLUMBING AND SEWER DRAINAGE

The Museum drainage shall drain via gravity to the authority point of connection where practical.

- The sanitary plumbing to extend to all sanitary fixtures connecting to the sewer drainage system and discharging to the Authority sewer main in accordance with the requirements of AS/NZS 3500.
- Divert services where conflicting with architectural and structural proposed works.
- Sanitary plumbing pipework located in the ceiling space transition levels are to be coordinated with architectural details and other services to ensure minimum ceiling heights required are not compromised.
- A sealed sewer branch will be provided to the retail tenancy for connection by the tenant.
- Acoustic insulation/lagging to acoustic consultant requirements.

4.8 TRADE WASTE DRAINAGE

- Grease arrestor devices complete shall be provided for waste generated from the retail tenancy, prior to discharge to the sewer drainage system. The size of the grease interceptor trap will be provided upon confirmation on the use the retail tenancy during the Detailed Design phase and existing loads.

  Sydney water require a minimum 1000L Capacity per Tenancy- which can increase on seating numbers

  Review current grease arrestor location and ventilation
- A trade waste branch will be provided to the retail tenancy for connection by the tenant. Refer to retail tenancy provision schedule for more details.

4.9 EXISTING TRADEWASTE INFRASTRUCTURE

An existing 1500L Grease arrestor is currently located in the loading dock adjacent the Hydrant booster assembly- pending confirmation of below this may require an upgrade to a larger tank size

ADP require confirmation:

- *Current Grease arrestor schedule*
- *Current seating numbers to the existing café/tenancy*
- *Proposed seating numbers to the new café/tenancy*
- *Any available Grease arrestor Cleaning contractor information e.g. clean out schedule how often the grease arrestor is cleaned out.*

4.10 ROOF AND BALCONY DRAINAGE

- Additions and diversions of above ground downpipes and overflows where conflicting with architectural and structural proposed works
- The roof drainage system will be sized to AS 3500 requirements with provision for 100% overflow
- Provision for drainage connection from soffit gutters

5. FIRE SERVICES

5.1 GENERAL

The Fire Services installation shall include, but not be limited to, the main items of equipment as generally described below and as detailed on the tender drawings. All the necessary components required under the relevant Australian Standards and for the effective and efficient operation of each system must be provided under this Contract, including:

- Fire sprinkler system;
- Fire hydrant system
- Fire Hose reel system
- Automatic fire detection and alarm systems;
- Emergency warning and Intercommunication systems (EWIS);
- Portable fire extinguishers;
- Removal of Gaseous system in existing storage area
- Removal of VESDA system in existing storage area

5.2 DESIGN CRITERIA

Design criteria presented herein form the basis for the design of the works;

Item	Design Criteria
Fire Sprinkler System	AS2118.1- 1999 *(2017)*
Fire Hydrant System	AS2419.1- 2005, and NCC/BCA as applicable unless varied via fire brigade approval.
Fire Hose Reel System	AS2441- 2005, and NCC/BCA as applicable. Full floor coverage using 36m long hoses.
Automatic fire detection and alarm systems;	AS1670.1-2004 *(2015)*, AS1668.1, AS/NZS 3000, and NCC/BCA as applicable
Emergency warning and Intercommunication systems (EWIS);	AS1670.4- 2004 *(2015)*, and NCC/BCA as applicable
Portable Fire Extinguishers	AS2444- 2001, and NCC/BCA as applicable

The fire protection services systems shall be designed in accordance with the requirements of the fire safety engineering.

5.3 DESIGN APPROACH

5.3.1 FIRE SPRINKLER SYSTEM

Generally, Fire sprinklers are provided throughout the building and comply with AS2118.1-1999.

Existing fire sprinkler protection and associated pipework shall be modified, or new pipework added throughout the renovated and new areas in accordance with the requirements of BCA, AS2118.1-1999 and Arup fire engineering report.

ADP Require confirmation:
While 1999 is the currently utilised version of 2118.1, this will be superseded by version 2017 with the new BCA which will be brought into effect March 2019. ADP advises designing to the newer standard to avoid any potential problems leading up to, or during construction. Implications to the currently documented design would be minor, if any.

Existing fire services (Sprinkler system, Smoke detectors VESDA, Gas system and EWIS system) within existing storage floor to be removed and new fire service layout shall be provided throughout the proposed 'Touring Exhibition' gallery and associated areas.

All sprinklers below false ceiling are subject to full co-ordination with architect's requirements

5.3.2 FIRE HYDRANT SYSTEM

Generally, fire hydrants are provided throughout the building.

Fire Hydrants are to be provided throughout the renovated and new areas in accordance with the requirement of AS 2419.1-2005. The existing, unaltered areas of the museum shall remain as per the existing strategy as per Arup fire engineering concept, Issue 1.0 dated 13th July 2018.

Areas where compliant coverage is not achieved shall be provided with additional hydrants.

Fire hydrants coverage shall be provided throughout the building so that all parts of the new area will be within 40m (30m hose + 10m water spray) of a hydrant.

5.3.3 FIRE HOSE REEL SYSTEM

Generally, fire hose reels are located throughout the building.

Fire hose reels are to be provided throughout the renovated and new areas in accordance with the requirement of AS2441-2005. The existing, unaltered areas of the museum shall remain as per the existing strategy as per Arup fire engineering concept, Issue 1.0 dated 13th July 2018.

Areas where compliant coverage is not achieved shall be provided with additional hose reels.

Fire hose reel coverage shall be provided throughout the new part of the building so that all parts of the new area will be within 40m (36m hose + 4m water spray) of a hose reel. Hoses are not permitted to pass through fire or smoke doors to achieve hose reel coverage.

5.3.4 AUTOMATIC FIRE DETECTION AN ALARMS SYSTEM

Generally, Fire detection system is provided throughout the building.

Fire detection system shall be modified or add new throughout the renovated and new area in accordance with the requirements of AS1670.1-2004.

The fire detection system shall be interfaced with Mechanical Services for smoke hazard management purposes.

5.3.5 EMEGENCY WARNING AND INTERCOMMUNICATION SYSTEMS (EWIS)

Generally, EWIS is provided throughout the building.

The sound system & intercom system for emergency purposes (SSISEP) shall be modified or add new throughout the renovated and new area in accordance with the requirement of AS 1670.4-2004.

5.3.6 PORTABLE FIRE EXTINGUISHER

Generally, portable fire extinguishers are provided throughout the building.

Portable fire extinguishers shall be modified or added throughout the renovated and new areas in accordance with the requirements of AS 2444-2001.

5.3.7 GASEOUS FIRE SUPPRESSION SYSTEM (CONFIRMATION REQUIRED)

The existing gas protection system for the existing storage floors (Touring Exhibition gallery) shall be removed, Confirmation is required for removing the Gas system and proving the Fire sprinkler system.

5.3.8 VESDA SYSTEM (CONFIRMATION REQUIRED)

The existing VESDA protection system for the existing storage floors (Touring Exhibition gallery) shall be removed and detection system to be provided in the new Touring exhibition. Confirmation is required for removing the VESDA system.

6. VERTICAL TRANSPORTATION

6.1 EXISTING LIFTS

It is understood that the existing lifts are to remain as is.

ADP will require confirmation:
The provision for a back-up generation for MSB 1 has to be confirmed.

Also, at the time of the inspection, it was not possible to appreciate the nameplate of the generator. Maintenance services schedule would be required, or nameplate must be provided.

6.2 PROPOSED LIFTS

1 off new lift and 1 off new escalator set is to be provided for the museum as part of the new works.

The lift dimensions below are provided based on the available products from 3 different reputable manufacturers. The pit depth and headroom height of the lift shafts will vary based on the lift speed. Headroom height and pit depth for standard lift speeds has been provided in the table below. Higher lift speeds will reduce down the passenger waiting times.

Description	Car Dimensions(mm)	Shaft dimensions(mm)	Headroom(mm)	Pit Depth(mm)	Type	Speed
Through car lifts will add approx. 100mm in depth The headroom dimensions are based on 2400mm car						
1275kg(17 persons)	2000 D x 1450 W	2550 D x 2350 W	4200	1850	Single Entry	1.5m/s
1600kg(21 persons)	2100 D x 1650 W	2550 D x 2680 W	4200	1850	Single Entry	1.5m/s
2000kg(26 persons)	2700 D x 1500 W	3200 D x 2400 W	4200	1850	Single Entry	1.0m/s

The escalator dimensions below are provided based on the available products from 3 different reputable manufacturers. The pit depth will vary based on the final manufacturer selected. Escalator length, rise and pit depth been provided in the table below. Option for single run and switchback is provided.

Escalator	Inclination	Vertical Rise (mm)	Overall length	Pit Width	Pit Depth	Pit Length
Single Run (1000mm Step width)	30	7800	19159	1730	1250	4300

Note spatial provision are preliminary. Final detail to be confirmed during the detail design phase.

6.3 COMPLIANCE

All designs to meet the Australian code requirements. Designs to stipulate which lifts are stretcher or Emergency compliant.

6.4 SPATIAL REQUIREMENTS

Designs are to minimise the lift core dimensions and general spatial requirements; whilst still allowing for all lift suppliers equipment, to enable a competitive tender process.

Pit access to be considered in the design, in accordance with the BCA requirements.

Where practical, the designs should endeavour to encompass any lift machine rooms within plant levels.

6.5 LIFT TYPE

All proposed lift assets shall have been in continuous operation for a minimum of three (3) years and have a proven track record of reliability and easy maintenance schedule.

All lifts to be traction lifts encompassing Gearless Machines and VVVF Drives.

Passenger lifts are to have a rated capacity of 1,600 kg, suitable for stretchers.

6.6 LIFT CARS AND DOORS

Car and landing doors will have a minimum clear opening width of 1100mm by 2400mm high.

6.7 CONTROLS

Lifts to utilise a group collective control system. Any designs proposing a destination system as an alternative will need to qualify the performance or feature benefits for the additional expenditure.