



Sydney International Convention Exhibition and Entertainment Precinct Interim Facility

Services Brief

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Revision B

UNITED
BY OUR
DIFFERENCE



TABLE OF CONTENTS

1. BRIEF	5
1.1 OBJECTIVE	9
1.2 APPLICABLE DOCUMENTS	9
1.3 LIMITATIONS	9
1.4 SOURCES OF INFORMATION.....	9
 2 ELECTRICAL SERVICES	 11
2.1 GENERAL	14
2.2 ELECTRICAL SUPPLY	15
2.3 TARIFF METERING	15
2.4 ENERGY METERING	15
2.5 ELECTRICAL RETICULATION	15
2.6 EARTHING.....	15
2.7 STAND-BY POWER GENERATION.....	16
2.8 POWER FOR LIFE SAFETY SERVICES.....	16
2.9 UNINTERRUPTIBLE POWER SUPPLIES	16
2.10 SUPPLEMENTARY GENERATION FACILITIES	16
2.11 POWER QUALITY	16
2.12 MOTOR CONTROL CENTRES.....	16
2.13 ELECTROMAGNETIC EFFECTS	16
2.14 LIGHTNING PROTECTION.....	17
2.15 GENERAL POWER.....	17
2.15.1 GENERAL	17
2.15.2 EXHIBITION HALLS	17
2.15.3 PUBLIC DOMAIN, PLENARY AND FOYER SPACES.....	18
2.16 LIGHTING	18
2.16.1 GENERAL	18
2.17 EMERGENCY AND EXIT LIGHTING	19
2.18 ELECTRICAL SERVICES – EQUIPMENT NOISE	19

3 FIRE SERVICES	22
3.1 FIRE SPRINKLER SYSTEM	22
3.2 FIRE HYDRANT SYSTEM	23
3.3 FIRE HOSE REEL SYSTEM	24
3.4 FIRE DETECTION AND ALARM SYSTEMS	24
3.5 EMERGENCY WARNING SYSTEM	25
3.6 SMOKE HAZARD MANAGEMENT	25
3.7 FIRE EXTINGUISHERS	25
3.8 RISK SPECIFIC FIRE SUPPRESSION SYSTEMS	26
3.9 EVACUATION PLANS	26
3.10 STANDARDS	26
3.11 FIRE SAFETY OBJECTIVES	27
3.12 PUBLIC REALM CONSIDERATIONS	27
3.13 FIRE SPREAD AND COMPARTMENTATION	28
3.14 STRUCTURAL FIRE RESISTANCE	28
3.15 EMERGENCY EGRESS PROVISIONS	28
3.16 FIRE FIGHTING AND EMERGENCY SERVICES ACCESS AND OPERATIONS	28
3.17 SMOKE HAZARD MANAGEMENT	28
 4 MECHANICAL SERVICES	 29
4.1 GENERAL	30
4.2 DESIGN CRITERIA	30
4.3 AIR CONDITIONING SYSTEMS	31
4.3.1 GENERAL	31
4.4 VENTILATION SYSTEMS	31
4.4.1 GENERAL	31
4.5 AIR QUALITY	32
4.6 SMOKE CONTROL	33
4.7 CENTRAL THERMAL PLANT	33
4.8 BUILDING MANAGEMENT SYSTEM (BMS)	33

5 ENVIRONMENTALLY SUSTAINABLE DESIGN SERVICES.....	35
6 ACOUSTICS SERVICES	36
6.1 NOISE & VIBRATION SCOPE	36
7 HYDRAULIC SERVICES	37
7.1 GENERAL	37
7.2 AUTHORITY WATER SUPPLY MAINS	37
7.3 COLD WATER METERING.....	37
7.4 AUTHORITY SEWER MAINS	37
7.5 SANITARY DRAINAGE AND PLUMBING	40
7.6 COLD WATER SERVICES.....	40
7.7 HOT AND WARM WATER SERVICES.....	41
7.8 GREASE AND TRADE WASTE DRAINAGE AND PLUMBING	41
7.9 RAINWATER HARVESTING, ROOF DRAINAGE AND PLUMBING	41
7.10 LPG GAS SERVICES	42
7.11 BUILDING SERVICES NOISE – HYDRAULIC SYSTEMS NOISE LEVELS	42
7.12 STANDARDS	42

1 EXECUTIVE SUMMARY

The aim of this report is to provide an understanding of the infrastructure currently located within and around the proposed site, in which the services the (D&C) design and construct contractor shall incorporated within there design proposal, which is critical for an Interim facility of this size to operate effeciantly.

This document shall be read in conjunction and reference to the Director Generals Environmental Assessment Requirements (DGR's). This document will be incorporated into the overall Agency and Council submission.

The DA seeks approval for:

- *construction and use of a new purpose-built temporary exhibition facility comprising:*
 - *25,000m² of exhibition space (part of which may only be used intermittently);*
 - *formal entrance and foyer area;*
 - *registration / reception area;*
 - *pre-function space; and*
 - *public facilities including food and beverage outlets and bathroom amenities;*
- *use of the site as an exhibition centre, 'function centre' and 'food and drink premises';*
- *hours of operation;*
- *building signage and advertising structures;*
- *design and construction of a new link road onto Robert Street and roundabout on Sommerville Road;*
- *vehicular access from James Craig Road to the south-west and exit onto Sommerville Road and Robert Street to the north-west;*
- *car parking for 1,000 vehicles;*
- *construction of a temporary private wharf within the waterway adjacent to the north-east corner of the site; and*
- *dismantling and removal of structures.*

The DA also seeks development consent for the use of the short-stay car park at White Bay 5 as detailed in the approved White Bay Cruise Passenger Terminal Part 3A project (MD 10_0069) when the Cruise Passenger Terminal is not in use and land at White Bay 4 for overflow car parking.

Development consent is sought for a period of four (4) years.

The site is comprised of three parts: the larger of the three is located within Glebe Island, the second is an area to the south-west of the Robert Street and Sommerville Road intersection, adjacent to the White Bay Power Station and the third is comprised of land at White Bay Wharves 4 and 5.

This report has been collated from information gathered from multiple sources, on the existing Sydney Harbour infrastructure, that is located within the Glebe Island site.

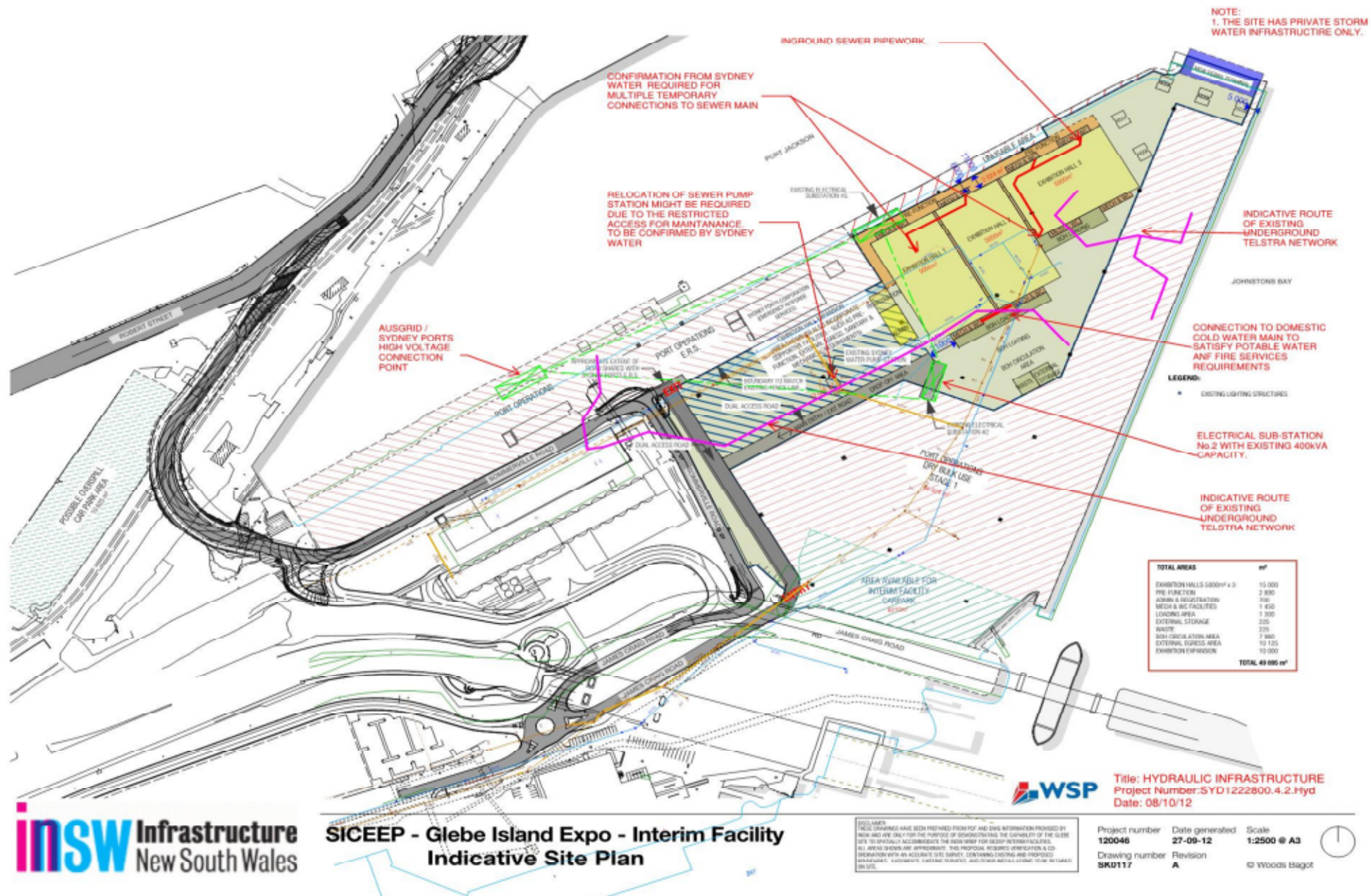
There are multiple critical services which reticulate through the site that could cause implications to the site development. Services which must be avoided or explicit consent obtained from relevant utilities and authorities are listed below. The remainder of existing infrastructure located within the site is not anticipated to constrain the development of the proposed site provided relevant approvals are obtained and necessary remedial works carried out.

The following existing service infrastructure are considered critical to Interim planning consideration:-

- Telstra main cable ducts (runs through the centre of the Proposed site)
- Sydney Water - Water Mains (Existing infrastructure to remain, with remedial works undertaken to use existing capacity)
- Sydney Water – Sewer Mains (Existing infrastructure to remain, with remedial works undertaken to use existing capacity)
- Sydney Port High voltage infrastructure.

The plan on the following page outlines the indicative locations of the above existing infrastructure currently identified as critical for this development. A survey of the exact locations and depths of services is required to be carried out further to this report.

Further investigation and discussions with the relevant utilities are recommended, to determine the full extent of limitations to the development and opportunities to develop around proposed interim structure.



2. BRIEF

The services design and installation will be undertaken on a Design and Construct (D&C) basis, where it is the contractor's responsibility to become completely aware of all project requirements incorporated in the design intent documents and fully co-ordinate with all other services, building structure and site infrastructure. The contractor is to ensure that their obligations with respect to the brief, including design, installation, testing and commissioning are to meet the performance requirements of the design intent documentation.

The D&C contractor shall ensure the design incorporates all requirements within other accompanying project specific documentation including room data sheets issued by INSW and the documentation referenced in section 1.2 of this document.

Services and Obligations by the Contractor

The contractor will provide the D&C design intent and the deemed to satisfy (DTS) documentation to INSW appointed design consultants for review and comment prior to appointment of contract. This shall include but not limited to the following:

- Preliminary negotiations with statutory authorities
- Review of design intent documentation
- Initial maximum demand calculations
- Mechanical design solution for the internal areas within the facility.
- Fire engineered services solution (DTS)
- Storm water solution
- Security and Traffic analysis report and documentation.
- External lighting calculations and clarifications of existing system.
- Site excavation requirements to allow connections into existing below ground infrastructure systems.
- Preliminary coordination
- Typical services schematics
- Preliminary cabling reticulation routes
- Preliminary spatial allocations for equipment
- Preliminary schematic design of all services proposals
- Preliminary main switchboard single line diagrams

As the design progresses the deliverables for each stage of design process will be confirmed to the D&C contractor to suit the proposed scope of services. This will include any requirements for offsite testing of plant and equipment; thermal or computational fluid dynamic modeling to confirm environmental conditions, laboratory and bench testing required to demonstrate that performance objectives will be satisfied.

The services descriptions within this document shall be considered for the proposed Exhibition halls and Pre-function areas, Amenities and break-out areas.

1.1 OBJECTIVE

The objective of this return brief is to define the design concepts and parameters to be agreed and adopted for the design of the following building services:

- Mechanical Services (Heating, Ventilation and Air Conditioning)
- Electrical Services (Supply, reticulation, lighting, power, communications)
- Hydraulic Services (Sanitary plumbing, domestic hot and cold water)
- Fire Services (Sprinklers, hydrants, hose reels, smoke detection, EWIS)
- ESD (Environmentally sustainable design)

1.2 APPLICABLE DOCUMENTS

The following documents should be read in conjunction with this services brief.

- Assessment Report for NCC 2012 Compliance to be provided.
- National Construction Code Building Code of Australia;
- NSW Statutory Regulations;
- Relevant Australian Standards including but not limited to AS 1668.1, AS 1668.2, AS 3666, AS 4254, AS 1432, AS 3000, AS 3008, AS 1170 etc.;

1.3 LIMITATIONS

The design approach for each of the building services disciplines is based upon preliminary concept planning solutions and layouts.

1.4 SOURCES OF INFORMATION

This report is based upon the following information:

- Existing record drawings for the site issued by APP
- Various meetings/discussions with the relevant APP and INSW personnel

- GNCC Green Star objectives, considered as best practise.
- Room Data Sheets issued by INSW

1.5 SUBMISSIONS

The D&C contractor shall provide within their final submission the following documents to review.

- Authority Applications
- Services Assessments and reports from specialist consultants
- Design Standards
- Design and Construction role and clarifications
- Programme of works.
- Clarification of existing networks and systems to be utilised for the facility.

2 ELECTRICAL SERVICES

The majority of existing infrastructure is not expected to provide any significant impact upon the proposed development, except for the critical infrastructure identified. Pending relevant approvals non-critical assets could be either removed or diverted as applicable to the final development plans.

2.1.1 High Voltage Infrastructure

A number of underground high voltage distribution infrastructures currently reticulate around the Glebe island site. The infrastructure forms part of the Sydney Harbour port network.

Distribution Infrastructure

The distribution network within the site consists primarily of 11kV cable networks buried in trenches. This cabling is not anticipated to hinder development as it is predominantly dedicated to serving temporary facilities.

Transmission Infrastructure

The two high voltage cable pathways run directly across the site from the supply authority (Ausgrid) provider to the transformer substations as indicated on the previous page. Both reticulation of cables are by excavation and through PVC ducts.

Existing Substation – Glebe No. 5 Details

This substation is located by the water's edge. The substation has 2 transformer bays, one bay is spare, and the other contains a 750kVA transformer. This substation feeds an existing tenant compound on the site, therefore (approximately 100kVA load) that is to be retained.

This substation does not have the installed capacity (in the transformers) to feed SICEEP interim facility with its current configuration. However, the substation appears to have sufficient high voltage facilities – H.V. ring main cabling and switchgear – to facilitate an upgrade.

For this substation to feed SICEEP interim:

- Two 1500kVA transformers would need to be added, the existing transformer removed from site.
- A new LV cubicle provided to feed existing tenant and SICEEP facility.

Existing Substation – Glebe No. 2 Details

This substation is located in the middle of the facility, almost directly adjacent the load centre of the SICEEP Interim facility. The substation has eight transformer bays, one bay is spare, and there are 4x1000kVA transformers installed, 3x1000kVA energised, and 1000kVA spare.

This substation feeds the main ports dock lighting and misc. power (approximately 250kVA load) that is to be retained. Sydney Ports did mention they may want additional load from this substation for future development.

This substation does have the installed capacity (in the transformers) to feed SICEEP interim facility with its current configuration. It also offers existing redundancy facilities (through the bus coupling system), which is not available at the Glebe No. 5 substation.

The substation also offers the ability to potentially house the SICEEP main switchboard in a combined installation with the LV cubicle (refer to sketches below) which would offer cost savings to the above. Again, advice is subject to final location suitability with respect to the exhibition halls.

For this substation to feed SICEEP interim:

- A new LV cubicle provided to feed SICEEP facility only, with energy metering, and the remainder of existing LV switchboards to be retained by Ports for their operations.

SICEEP Interim Facility Electrical Demand Requirements

The electrical demand of the SICEEP Interim facility has been estimated as follows:

- Exhibition Halls 1-3 plus prefunction and amenities = 1,800 kVA
- Expansion area capacity = 800kVA (for power lighting and air conditioning).

The total maximum demand capacity required is approximately 2,600kVA.

Refer to sketch below indicating possible connection details for new interim facility

2.1.2 Substations

Substations are located both within and around the perimeter of the site. The substation locations shall remain as they fall outside of the Interim facilities area of construction. Reticulation shall be derived from the proposed sub-station to new L.V. infrastructure within the interim facility.

The following observations have been made on the existing substations at Glebe Island for the SICEEP Interim facility:

1. Glebe Island is a high voltage customer to Ausgrid, metered at the Ports sub.
2. Ausgrid site supply feed has physical capacity to support SICEEP interim facility.
3. Sydney Ports existing ring main cabling installed underground.
4. Condition unknown – cables have failed once in last 8 years.
Cables are old – PILCPVC type would indicate 30+ yrs. age.
5. Ausgrid/Ports substation high voltage switchgear is heavily aged from use.
HV Equipment is well maintained apart from note of busbar fault occurrences.

Further investigation is recommended to be undertaken to determine the exact supply arrangement, and advise on any works required to decouple the electrical supplies and allow remedial works to occur.

2.1.3 Low Voltage Infrastructure

This infrastructure is related to public domain lighting and minor consumer connection points to the Interim facility areas and exhibition halls.

The infrastructure investigations have not yet identified any third party ownership of low voltage services.

2.2 GENERAL

General other electrical service elements to be considered for the development shall be as follows:-

- (i) Power supply and distribution;
 - (ii) Tariff Metering;
 - (iii) Portable standby power generation and connectivity
 - (iv) Uninterruptible power supplies;
 - (v) Power Quality;
 - (vi) Lighting
 - (vii) Emergency and exit lighting
 - (viii) Lightning protection.
 - (ix) ICT Works
 - (x) Communications
-
- (a) All electrical services must meet the requirements of the National Code of Construction (NCC) and all relevant Australian Standards.
 - (b) The design and implementation of the electrical services systems shall not be based on a lowest initial capital cost, but provide the best holistic solution using a whole of life design and cost analysis, considering issues such as initial, running and maintenance costs.
 - (c) Electrical capacity to the site is sufficient, however careful consideration shall be undertaken in confirming which private high voltage sub-station shall be modified to suite the requirements of SICEEP. Currently on site there is a High voltage network ring that supplies a number of sub-stations throughout. A validation process shall be undertaken to determine the load capacity of these substations and the remedial works required to update the rooms to the relevant code requirements. Estimated electrical load required for SICEEP site is in the region of 2.6MVA.

2.3 ELECTRICAL SUPPLY

- (a) Electrical mains supply shall be derived from the existing Private high voltage network. The design of the electrical infrastructure for the Project shall achieve a high overall availability to ensure continuity. The infrastructure shall also incorporated resilience of supply throughout the campus network.
- (b) Modifications to existing high voltage networks systems shall be undertaken, with reticulation provided for new low voltage distribution. Formal approval shall be obtained from Sydney Ports.
- (c) The degree of availability of electricity is required to experience unplanned downtime of the electrical infrastructure for not more than 1 hour annually.

2.4 TARIFF METERING

- (a) Provide Supply meters on new sub-main connections from the sydney harbor private high voltage network. The meters shall be installed on the output side of the high voltage network supplying new low voltage switchboards located around the facility.
- (b) Power metering shall be installed so that the overall consumption can be monitored and serperatly billed to SICEEP.
- (c) Provide an energy metering system throughout the entire installation to meter all energy uses. All meters shall be interfaced into the overall campus building management system.

2.5 ELECTRICAL RETICULATION

- (a) Electrical reticulation shall be provided through a network of switchboards and cabling. All sub-main and final ciruit reticulation shall be above ground and supported throughout the the development in accordance to AS3000.
- (b) Switchboards shall incorporate circuit breakers and achieve a fully discriminating electrical reticulation system throughout the entire system.

2.6 EARTHING

- (a) Provide a complete earthing system for all electrical equipment utilizing single point topology.

Communications and technology equipment shall be provided both with mains power earth and a functional “technical” earth system, which must be coupled at the main earthing points of the entire installation.
- (v) The earthing system shall provide bonding to earth all metallic structural elements, façade elements, cable and equipment support elements and permanent architectural elements e.g. access floors and fixed seating.

Existing Earth network for the site shall be validated and fully tested for code compliance, any remedial works required for the SICEEP interim site shall be documented and issued to the project team for review and comment.

2.7 TEMPORARY POWER AUGMENTATION

- (a) Provide additional facilities to connect temporary, mobile standby power generation plant to each source of mains power to the Project.

In the event of a network extended power outage, provide the ability to connect mobile generation equipment at each main switchboard, rated to support all connected capacity.

The standby power generating plant shall comply with the acoustic performance criteria and emissions requirements of the Authorities.

Specialist events hosted within the facility space may require additional power or supplementary back-up support, the contractor will endeavour to design an overall system which will implement the generator provision when required.

2.8 POWER FOR LIFE SAFETY SERVICES

- (a) The systems required to operate in any fire and life safety (DTS) solution.

2.9 POWER QUALITY

- (a) Provide electrical services and equipment connected to the electrical distribution system that minimise electrical harmonics and the need for power factor correction within the electrical reticulation systems of the Facilities.
- (b) Provide active reactive-capacitive power factor correction equipment to maintain a system power factor minimum of 0.99 throughout the entire Facility.
- (a) Provide additional harmonic mitigation devices to limit harmonics emissions to an upper limit of total harmonic distortion, as defined by AS/NZS61000.3.6, at each connection to the Utility grid.

2.10 MOTOR CONTROL CENTRES

- (a) Provide all fixed appliances with motors, including pumps, fans, compressors and other inductive and combination inductive-resistive loads, with dynamic modulating speed controls, power factor correction at the appliance and harmonics mitigating devices at the appliance.
- (b) Motor control centres shall be monitored and controlled from the BMS.

2.11 ELECTROMAGNETIC EFFECTS

- (a) Provide all parts of electrical reticulation, distribution and function to minimise the effects of electromagnetic radiation to Facilities occupants across the spectrum of 50Hz fields, electric and magnetic, through to radio frequency fields.
- (b) In the case of substations, switchboards, UPS, electrical reticulation routes, provide electromagnetic mitigating facilities in the form of permanently installed shielding to allow the space to be occupied for extended periods of time by infants.

- (c) Consideration of electromagnetic effects shall be given to ensuring suitable operation of equipment and devices, and where necessary providing additional shielding to sensitive equipment and areas of occupation.
- (d) The Australian Radiation Protection and Nuclear Safety Agency guidelines shall be used as the basis for determining the appropriate levels of shielding for mitigation of risks associated with the effects of electromagnetic radiation.

2.12 LIGHTNING PROTECTION – AS1768 : 2007

- (a) Provide lightning protection to the Facilities which protects all:
 - External building structures
 - Internal building services
 - External building services including power, data, hydraulics, services
 - Internal technology, electronics, data services.

2.13 GENERAL POWER

2.13.1 General

- (a) Provide general power services throughout the Facility to adequately support all operation, maintenance, front-of-house and back-of-house functions.
- (b) Mains and sub-mains must be fully reticulated on cable trays and ladders, reticulation of cables shall be above ground throughout the facility. There should be no excavation works allowed for within this submission.

Final sub-circuits shall be reticulated on cable trays for a minimum of 75% of the route length of the cabling. Provide cable reticulation (cable trays, catenaries, ducts) with spare space capacity sufficient to provide for anticipated future services.
- (c) All general power, distribution cabling and containment systems shall be of materials compliant with the environmentally sustainable guidelines.

2.13.2 Exhibition Halls

- (a) Provide additional general power services to all exhibition spaces to allow general power, data and audio-visual services to be reticulated throughout the spaces via a system of permanently installed cableways, all cableway network services shall be provided at high level and be easily accessible for each individual event.

2.13.3 *Accessible areas and Foyer Spaces*

- (a) Provide additional general power services to all foyer spaces to allow general power, data and audio-visual services to be reticulated throughout via a system of permanently installed cableways.
- (b) Provide a network of service pits that contain single and 3-phase power outlets, data and telephone services, for exhibitor use of the Facilities.

2.14 LIGHTING

2.14.1 *General*

- (a) Lighting systems in this section are fixed lighting systems for the building and surroundings. Including (performance lighting of stages and presentation spaces).
- (b) The lighting of the buildings and surrounds shall reflect the iconic nature of the Precinct and support the creation of an interim facility
- (c) Lighting shall be provided to enhance architecture and features utilising direct and indirect lighting.
- (d) Illumination levels for the Facilities must comply with the minimum requirements of AS1680.
- (e) The lighting control system shall link, through software database controls, to provide automatic scheduling controls. The lighting control system shall interface with the BMS across the converged network.

External and Accessable area Lighting

- (f) Existing lighting control to all light towers shall remain in situ, with SICEEP identifying there requirements for energising the associated lights around the site to Sydney harbour. Supplimentry external lighting shall be incorporated within the design for main pathways and routes of egress.
- (g) Existing light towers within the site shall remain, with additional lights added to suite the facilities requirements, D&C contractor shall review all spare light towers currently within Sydney ports storage area, and provide a cost to undertake all remedial works to make them compliant.
- (h) It shall enhance and improve the connection of the Precinct through the use of illuminated elements to create a cohesive and intuitive link between divided and visually obstructed areas.
 - General external lighting shall:
 - Be controlled by intelligent control systems that facilitate static and dynamic lighting scenes;
 - Facilitate pedestrian movement and security patrols, and provide a sense of safety;
 - Provide minimum lighting levels to AS/NZS1158 series for each designated area for its intended use;

- Activate and reinforce main promenades connecting the various elements of the facility through the use of prominent and distinctive lighting elements;
- Provide a suitable aesthetic, and functionally compatible outcome in co-ordination with adjoining areas;
- Be integrated with and enhance the way-finding and signage across the site to be simple and intuitive; and
- Identify Facility entrances and key locations as identifiable destinations.
- All external lighting equipment and controls are to be discrete, vandal resistant, and maintainable, provide glare control, and be energy efficient and effective.
- External lighting poles shall be provided with features that integrate way finding, power, AV, lighting and technology services

Areas external to the buildings allocated for exhibition purposes shall be provided with facilities for the installation of temporary feature lighting.

Explanatory Note: Temporary feature lighting refers to lighting provided by exhibitors, utilising permanent services provided by the D&C Contractor

Provide distinctive lighting on building facades as part of the external lighting scheme. Façade lighting shall be concealed and integrated in the architecture of the building, accenting discrete architectural elements.

Roadway Lighting

The D&C Contractor shall ensure that roadway lighting is maintained to adjoining roadways.

Provide new roadway lighting, in consultation with the Roads and Sydney Ports and City of Sydney where construction development affects roadway lighting. To be designed to standard AS1158.

2.15 EMERGENCY AND EXIT LIGHTING

- (a) Provide centrally monitored emergency and exit lighting throughout the Facilities. Emergency lighting throughout the development shall be designed to AS2293 and NCC requirements.
- (a) Emergency lighting shall incorporate provisions to tiered seating areas, back of house areas including catwalks and technical areas.
- (b) Exit lighting in presentation spaces shall be selected to not adversely impact the darkened environment during performances or presentations.
- (c) Areas of high density occupation and movement, e.g. circulation spaces, Foyers, must be provided with emergency lighting levels in excess of Standards, to a level acceptable for the facilitation of safe evacuation.

2.16 ELECTRICAL SERVICES – EQUIPMENT NOISE

- (a) Noise from all electrical equipment (including standby generators) shall be designed to meet all the Acoustic requirements.

2.17 TELECOMMUNICATIONS SERVICES

There is a large quantity of telecommunications infrastructure both in and around the site. Telecommunications infrastructure across the site consists of both underground services and above ground installations.

Within the site itself there are many underground telecommunications conduit pathways which reticulate straight through the site. These pathways connect existing Sydney harbour buildings to various communication network outlets around the Glebe Island site. It shall be envisaged that the interim facility shall adapt the existing network provision and modify to suit their requirements.

2.17.1 Telstra

Telstra own and maintain the conduits located around the site. They also have major incoming conduits to the Glebe island facility which have a number of fibre cables which are leased to other service providers.

Fig.3 below indicates the existing underground routes of the Telsra network. SICEEP Interim facility shall incorporate this network and install a temporary connection for their requirements.

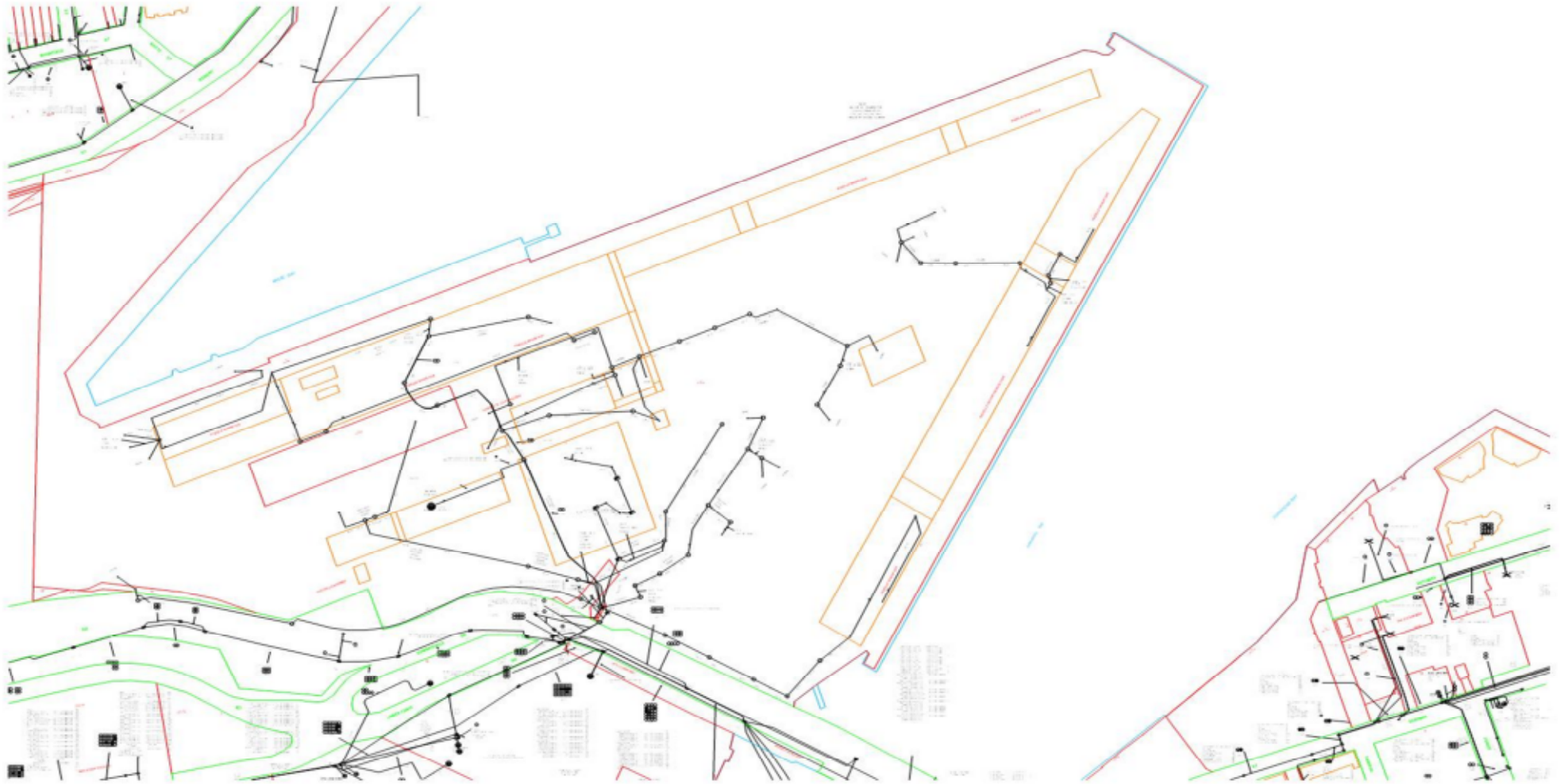


Figure 3 Site Wide Communications Network

Figure 3 above indicates all Telstra owned assets throughout the site. The black coloured cabling is generally considered to be less significant, mostly serving existing Glebe island buildings and other retail customers on site.

3 FIRE SERVICES

3.1 FIRE SAFETY OBJECTIVES

The D&C Contractor must prepare and implement a fire and life safety management plan (DTS), and strategy for the Interim Facility that ensures the life safety of occupants and visitors

The fire engineered solution shall adopt an approach which balances innovation, flexibility of use, sustainability and value for money on a whole of life basis; and provides a holistic approach to fire and life safety requirements for all types of events and combinations of events.

3.2 ACCESSABLE AREA CONSIDERATIONS

(a) The strategy must consider:

- (i) the evacuation and dispersal of occupants from the Interim Facility;
- (ii) the location of the primary arrival point for the fire brigade, particularly in relation to vehicle and personnel access points and other security and emergency services hubs;
- (iii) conflicts between attending emergency vehicles and personnel access with occupant evacuation;
- (iv) location of disabled access and egress points;
- (v) Security provisions and systems failsafe actions.

3.3 FIRE SPREAD AND COMPARTMENTATION

- (a) The strategy must consider what effective means of preventing and controlling fire spread is necessary (e.g. suppression systems, passive separation) through the use of computer aided modelling.
- (b) The strategy must incorporate the mitigation of potential fire loads expected within the Interim Facility for likely events to be hosted.
- (c) The Facilities should permit the hosting of a wide range of events that may incorporate potential fire hazards without the need for additional fire engineering overlays to build infrastructure for events.

3.4 STRUCTURAL FIRE RESISTANCE

- (a) The strategy should consider the appropriate fire resistance levels necessary to maintain stability and prevent the spread of fire in the Interim Facility.

3.5 EMERGENCY EGRESS PROVISIONS

- (a) Conflicts between occupant evacuation, emergency services access, and building security, staff training and evacuation management requirements should be addressed.
- (b) Emergency evacuation for persons with a disability must be addressed.

3.6 FIRE FIGHTING AND EMERGENCY SERVICES ACCESS AND OPERATIONS

- (a) The strategy should be developed taking into consideration emergency vehicular and pedestrian access routes to and within the buildings.
- (b) This must include design and installation of appropriate fire fighting equipment and systems which enable effective fire fighting operations to occur, how a potential event is coordinated and controlled within the Interim Facility, and how the emergency services control and information systems interface with security systems and procedures.

3.7 SMOKE HAZARD MANAGEMENT

- (a) The development of the smoke management strategy needs to consider how systems interface with any fire detection and suppression systems proposed as well as the interface between different uses.

3.8 FIRE SPRINKLER SYSTEM

- (a) The D&C Contractor should consider:
 - (i) Fire sprinkler protection system and its water sources.
 - (ii) fire sprinkler protection system throughout the Facilities to meet the requirements of Authorities, Standards and fire engineering solutions;
 - (iii) automatic booster pumps located in dedicated rooms adjacent to storage tanks;
 - (iv) sprinkler control valves in a dedicated room, located adjacent to the fire services pump room, with direct access to open space; and
 - (v) Brigade booster facilities for both sprinkler and hydrant systems in a location agreed in consultation with relevant stakeholders and Authorities.
 - (vi) Sprinkler system arranged into zones to suit the fire detection and smoke control zones.

3.9 FIRE HYDRANT SYSTEM

- (a) The D&C Contractor should consider:

- (i) fire hydrant system with two independent water sources
- (ii) a fire hydrant system throughout the Facilities to meet the requirements of Authorities, Standards and fire engineering solutions;
- (iii) automatic booster pumps located in a dedicated fire services pump room adjacent to the storage tanks
- (iv) brigade booster facilities for both sprinkler and hydrant systems in a location/s agreed in consultation with Authorities

3.10 FIRE HOSE REEL SYSTEM

- (b) The D&C Contractor should consider:
 - (i) Fire hose reels throughout the Facilities to meet Standards and Authorities and fire engineering solutions.
 - (ii) Fire hose reel system supplied via a dedicated connection to the domestic water supply.

3.11 FIRE DETECTION AND ALARM SYSTEMS

- (a) The D&C Contractor should consider:
 - (i) an automatic addressable fire detection system throughout the Facilities to meet the requirement of Standards, Authorities and fire engineering solutions;
 - (ii) a central fire indicator panel in a central control room and fire panels throughout Facilities, which will output alarm signals to remote monitoring services;
 - (iii) mimic panels at entries to Facilities, security rooms and operations rooms;
 - (iv) interconnection of fire panels with the BMS, fire sprinkler and hydrant systems and occupant warning systems
 - (v) A central fire indicator panel in a central control room and fire panels throughout Facilities, including mimic panels in securities and operations control rooms.
 - (vi) Detectors selected and positioned to suit the risk and to mitigate the possibility of false alarms.
 - (vii) Manual call points located to mitigate the occurrence of accidental or mischievous activation.

3.12 EMERGENCY WARNING SYSTEM

(a) The D&C Contractor should consider:

- (i) an emergency warning and intercommunication system throughout Facilities to meet Standards, Authorities and fire engineering solutions
- (ii) an evacuation control panels adjacent to main fire indicator panels
- (iii) Warden intercom to allow direct communication at the evacuation control panel from each alarm zone.
- (iv) Emergency warning system to allow controlled evacuation of Facilities during a fire, including zoned and cascading evacuation.
- (v) Speakers selected and located to ensure the required speech intelligibility and sound pressure level is delivered to all occupied areas.
- (vi) Break Glass Points provided for activation of the occupant warning system by occupants.
- (vii) Visual warning devices provided in areas with high ambient noise level such as plant areas, and in areas designated for use by hearing impaired occupants.
- (viii) Emergency warning system interfaced with hearing augmentation systems to relay instructions to hearing impaired occupants.
- (ix) Emergency warning system interfaced with Precinct systems and wider area systems including the Sydney Harbour Foreshore Authority Central Services Facility control room to allow communications and monitoring of Facilities status.

3.13 SMOKE HAZARD MANAGEMENT

(a) The D&C Contractor should consider:

- (i) automatic and manual control of ventilation and air distribution systems in the Facilities upon fire alarm, for the control of smoke; and
- (ii) Functionality within the system that does not compromise performance spaces which may utilise performance smoke.

3.14 FIRE EXTINGUISHERS

(a) The D&C Contractor should consider:

- (i) Fire extinguishers adjacent to hose reels, and to all risk areas including but not limited to plant rooms, electrical equipment, and kitchens.

3.15 RISK SPECIFIC FIRE SUPPRESSION SYSTEMS

- (a) The D&C Contractor should consider:
 - (i) suppression systems to avoid damage to equipment from accidental activation of wet fire systems, including data and communications rooms; and
 - (ii) Chemical suppression systems to cooking equipment within the Facilities. Where wet chemical suppression is provided the system will meet the requirement of specific fire engineering solutions.

3.16 VACUATION PLANS

- (b) The D&C Contractor should consider:
 - (i) An evacuation and emergency management plan for the Facilities that integrate with the security and facilities management operations.
 - (ii) An evacuation and emergency management plan including primary and ongoing training in emergency management, the use of emergency equipment, and evacuation and emergency process management.

3.17 STANDARDS

- (a) Without limiting the D&C Contractor's obligation to comply with its obligations under the Project Deed, the Fire Services must comply with the following standards:

National Construction Code / Building Code of Australia

AS 1603 - Automatic fire detection and alarm systems

AS/NZS 1668 Series - The use of ventilation and air conditioning in buildings – Fire and smoke control in multi-compartment buildings

AS 1670 Series - Fire detection, warning, control and intercom systems

AS 2118 Series - Automatic fire sprinkler systems - General requirements

AS 2304 - Water storage tanks for fire protection systems

AS 2419.1 - Fire Hydrant Installations – System design, Installation and Commissioning

AS 2441 Installation of Fire Hose Reels

AS 2444 - Portable fire extinguishers and fire blankets - Selection and location

AS 2941 - Fixed Fire Protection – Pump set Systems

AS 3786 - Smoke Alarms

AS 4428 - Fire detection, warning, control and intercom systems – Control and indicating equipment

AS 1851-2005 - Maintenance of fire protection systems and equipment

3.18 FIRE SAFETY OBJECTIVES

- (a) The D&C Contractor must prepare and implement a fire and life safety management plan, and strategy for the Interim Facility that:
- Ensures the life safety of occupants and visitors
 - Adopts an approach which balances innovation, flexibility of use, sustainability and value for money on a whole of life basis; and
 - Consider a holistic approach to fire and life safety requirements for all types of events and combinations of events.

3.19 PUBLIC REALM CONSIDERATIONS

- (b) The strategy must consider:
- (i) the evacuation and dispersal of occupants from the Interim Facility;
 - (ii) the location of the primary arrival point for the fire brigade, particularly in relation to vehicle and personnel access points and other security and emergency services hubs;
 - (iii) conflicts between attending emergency vehicles and personnel access with occupant evacuation;
 - (iv) location of disabled access and egress points;
 - (v) Security provisions and systems failsafe actions.

3.20 FIRE SPREAD AND COMPARTMENTATION

- (c) The strategy must consider what effective means of preventing and controlling fire spread is necessary (e.g. suppression systems, passive separation) through the use of computer aided modelling.
- (d) The strategy must incorporate the mitigation of potential fire loads expected within the Interim Facility for likely events to be hosted.
- (e) The Facilities should permit the hosting of a wide range of events that may incorporate potential fire hazards without the need for additional fire engineering overlays to build infrastructure for events.

3.21 STRUCTURAL FIRE RESISTANCE

- (f) The strategy should consider the appropriate fire resistance levels necessary to maintain stability and prevent the spread of fire in the Interim Facility.

3.22 EMERGENCY EGRESS PROVISIONS

- (g) Conflicts between occupant evacuation, emergency services access, and building security, staff training and evacuation management requirements should be addressed.
- (h) Emergency evacuation for persons with a disability must be addressed.

3.23 FIRE FIGHTING AND EMERGENCY SERVICES ACCESS AND OPERATIONS

- (i) The strategy should be developed taking into consideration emergency vehicular and pedestrian access routes to and within the buildings.
- (j) This must include design and installation of appropriate fire fighting equipment and systems which enable effective fire fighting operations to occur, how a potential event is coordinated and controlled within the Interim Facility, and how the emergency services control and information systems interface with security systems and procedures.

3.24 SMOKE HAZARD MANAGEMENT

- (k) The development of the smoke management strategy needs to consider how systems interface with any fire detection and suppression systems proposed as well as the interface between different uses.

4 MECHANICAL SERVICES

The D&C contractor will endeavor to design and install an overall mechanical solution, which shall perform and deliver a design temperature value peak summer months, careful consideration of the building structure and materials shall be incorporated within the design.

The contractor shall deem to satisfy and provide an overall design, taking into account the structure and fabric construction.

The design and installation of the heating, ventilation and air conditioning system must ensure that a maximum of 10% PPD is achieved in each space, excluding a maximum of 1.0m from perimeter glazed external façade conditions and within 2.0m of entrance and exit locations.

Humidity Control

In general no in-duct humidifiers shall be provided to control minimum level of Relative Humidity (RH). The conditioned spaces shall generally be above a minimum 30% Relative Humidity. No specific controls for space Relative Humidity control shall be provided. Maximum Relative Humidity shall be generally “controlled” by the method of sizing the AHU cooling coil capacities.

Zoning

Separate zone control must be provided to all individual rooms and zones greater than 35m². Zoning must achieve thermal comfort within single spaces to take account of unevenly distributed loads in the space, including perimeter façade conditions and event spaces where the load is not even throughout the space. All zone set point adjustment must be via the Building Management System, through a suitable set of access or security levels.

Infiltration

Infiltration will be assumed for all areas as 1 ac/h.

The mechanical services elements addressed by this report include the following:

- (i) air conditioning systems;
- (ii) supply and exhaust ventilation systems;
- (iii) natural ventilation systems;
- (iv) smoke management systems;
- (v) central heat and heating hot water systems; and
- (vi) Building management and control systems.

4.1 GENERAL

The design, construction, testing, commissioning, operation and maintenance of the mechanical services must be coordinated with all other building and engineering services systems:

The operational reliability of mechanical systems serving the Facilities, must have an overall availability of service with a cumulative maximum of 1 hour unplanned downtime over a rolling 365 day period. System redundancy must be incorporated accordingly.

The Mechanical services including air conditioning, ventilation, for the building works described below shall be designed and developed in accordance with the following statutory requirements:

- General NCC 2012
- Mechanical Air Handling Systems AS/NZS 1668.1 - 1998 , AS 1668.2 - 1991 & NCC 2012 Clause E2.2
- Mechanical Ventilation Systems AS1668.2 – 1991 & NCC 2012 Clauses F4.5, F4.11, F4.12
- Mechanical Plant AS/NZS 3666.1 – 2002 & NCC 2012 Clause F4.5

4.2 DESIGN CRITERIA

Ambient Design Conditions

	° C dry bulb	° C wet bulb
Summer	35.5°C	24°C
Winter	6°C	saturated

Internal Design Conditions

The following internal environmental conditions should be used for plant selection. Internal conditions will be controlled between the upper and lower limits stated.

A control sensor tolerance of +/- 1.5°C for all stated criteria will also apply to the conditions.

	° C dry bulb	% RH
Summer	23°C +/- 3°C	Uncontrolled
Winter	21°C +/-2°C	Uncontrolled

4.3 AIR CONDITIONING SYSTEMS

4.3.1 General

- (a) Where non-mechanical solutions cannot satisfy the design performance for comfort and indoor air quality, air conditioning systems must be provided, incorporating air handling units and associated heating and cooling plant, to efficiently maintain thermal comfort conditions to satisfy the systems design parameters.
- (b) Systems incorporating mixed-mode strategies, with natural ventilation and air conditioning in series, must be designed to prevent inefficient operation of the air conditioning system.
- (c) Internal and fabric heat gains shall be calculated and air conditioning system sized accordingly to maintain internal comfort criteria during peak conditions.

4.4 VENTILATION SYSTEMS

4.4.1 General

- (a) The air handling systems shall be provided to ensure flexibility of operation.
- (b) Back of House and Front of House spaces must not be served from common air handling systems.
- (c) Independent supplementary extract systems shall be provided for all specialist areas such as kitchens, toilets, chemical/cleaners stores etc.

- (d) The air distribution and diffusion systems shall:
 - (i) maintain thermal comfort conditions throughout the occupied zone in both cooling and heating modes;
 - (i) introduces air in a draft free manner under all operating conditions with maximum room air velocity less than 0.25m/s in occupied zones; and
 - (ii) Do not cause suspended items such as signage, lighting, curtains or other hanging objects to sway.
- (e) Air handling systems serving switch rooms, generator rooms, communications rooms, AV rack room and security room shall be configured with no less than N+1 redundancy.
- (f) Air handling systems serving spaces, greater than 1000m², and spaces with design populations exceeding 200 people, of the Facilities must incorporate supply and exhaust fans with adequate redundancy to automatically maintain operation of the space upon failure of any single item of plant.

4.5 AIR QUALITY

- (a) The mechanical ventilation systems shall:
 - (i) maintain indoor air quality levels at all times;
 - (ii) air handling systems mitigate uncontrolled infiltration of outdoor air;
 - (iii) air intakes are located to minimise impact upon the health and amenity of occupants; and
 - (iv) Air intakes are located to prevent contamination from pollutants e.g. roadways, and odours, under all operating and wind conditions.
- (b) The minimum outside air to be supplied to air-conditioned and ventilated spaces must be no less than 7.5 l/s per person, unless otherwise demonstrated by performance based assessment method under the provisions of AS1668. The rate of outside air may be increased over and above the minimum standards to improve indoor air quality. Demand control strategies for outdoor air provision shall be considered for energy conservation.
- (c) The air conditioning systems shall be provided with the following for plenary and entertainment spaces:
 - (i) discrete control with a combination of supply and exhaust functionality;
 - (ii) distribution control that accounts for performance scenarios e.g. smoke generation systems;
 - (iii) isolation of unoccupied spaces; and

- (iv) Additional capacity for performance related heat gains.

4.6 SMOKE CONTROL

- (a) Smoke control systems shall be provided in accordance with the NCC, and shall interface into the new fire engineered (DTS) solution the D&C contractor is proposing.
- (b) All required interfaces with the fire alarm system shall be provided including all necessary fire trips and firemen override switches.

4.7 THERMAL PLANT

- (a) A central thermal plant shall be provided to serve the Facilities, delivering cooling and heating energy via efficiently designed reticulation.
- (b) The plant and equipment shall be arranged such that available capacity will not be less than 100% on failure of any single plant component.
- (c) The refrigerant must comply with an Ozone Depletion Potential of zero and a Global Warming Potential GWP of 1,700 or less.
- (d) Ensure discharges from plant (such as those from cooling towers, if these are included) prevent contamination of building openings serving the Facilities or adjacent existing and anticipated future building openings and air intakes under all prevailing conditions.

4.8 BUILDING MANAGEMENT SYSTEM (BMS)

- (a) An integrated Building Management System (BMS) shall be provided to control, monitor and automate all engineering services of the facilities, including:
 - (i) mechanical services plant;
 - (ii) building services plant;

The controls shall also be provided with a high level interface with the following stand-alone controls systems

- (iii) fire control system;
- (iv) EWIS system;

- (b) The BMS must be fully Ethernet based and all communications should be via a converged network. The control system must be based on an internet protocol based open protocol system including field devices and field panels networked together and monitored through the comprehensive user interface.
- (c) The BMS must provide maintenance staff with the ability to view and control basic systems from specially developed applications for wireless / mobility device platforms. These facilities must also be provided on a platform to enable and ensure remote interrogation.
- (d) BMS shall monitor general registered alarms throughout the facility with a centralised functional device for overall monitoring.
- (e) The BMS must include the capability to immediately alter space set points to individually controlled zones (e.g. in a single meeting room) in response to requests of users.
- (f) The BMS shall include facilities for optimum plant start, data logging of errors & operational conditions and time scheduling for items of plant and each independently controlled space

4.9 MECHANICAL SERVICES – EQUIPMENT NOISE

- (g) Noise from all mechanical equipment shall be designed to meet all the Acoustic requirements.

5 ENVIRONMENTALLY SUSTAINABLE DESIGN SERVICES

The Interim Exhibition Facilities will be expected to follow well-considered sustainability principles. This should be based on a lean, clean and green hierarchy approach; demonstrable across the design, construction, operation and supply chain of the interim facilities. This should be applied over a wide range of environmental categories, namely energy, water, materials & waste, and indoor environment quality.

The type of temporary structures being considered offer quick wins in terms of waste minimisation due to modularity and off-site fabrication. However, the provision of thermal insulation can be overlooked. Guidance around the appropriate selection of temporary structures needs to be put in place to ensure energy consumption is minimised, i.e. the implementation of the lean hierarchy step. The integration of energy efficient services must also be considered. Typical air conditioning solutions (e.g. split AC systems) will result in high energy consumption for the interim facilities. The functional arrangement of the interim facilities will offer opportunities to shift away from or reduce the reliance on high energy consuming systems through the application of passive strategies (e.g. roof ventilators). Smart controls also offer the ability to rationalise the space use through initiatives such as temperature setback controls for AC systems, and occupancy detection and daylight controls for lighting systems.

Careful and due consideration of the design, construction and resource use of the interim facilities, and its supply chain is needed. Close collaboration with the architect and services consultant is essential to steer a sustainable outcome for the interim facilities. To support this, the following are key considerations for the design of the interim facilities:

- a) Temporary structure selection – thermal performance
- b) Functional assessment and ESD opportunities analysis – application of passive design and energy efficiency measure that reflect the functional space
- c) Modelling to validate passive design and energy efficiency solutions, and thermal comfort
- d) Reporting to demonstrate the sustainable outcomes of the interim facilities
- e) Guideline reporting to facilitate sustainable exhibitions and supply chain implementation
- f) Consideration for rubbish areas, compactor and recycling facilities.

6 ACOUSTICS

The D&C Contractor is to comply with all relevant noise & vibration emissions requirements including those contained within the Noise Impact Assessment and Noise Management Plan, these items shall be addressed and a report prepared by SLR Consulting.

This relates to all noise & vibration sources including (but not limited to) – fixed mechanical plant, operational noise & vibration sources, construction noise & vibration sources.

7 HYDRAULIC SERVICES

7.1 GENERAL

- (a) The D&C Contractor must provide all hydraulic services to the facilities that provides a sufficient redundancy and maintainability to the systems
- (b) Plan and consideration shall be undertaken from the D&C contractor on their overall proposed design for operation of the storm water reticulation in heavy rain conditions.
- (c) All Hydraulic services must meet the requirements of the standards in AS 3500 Parts 1-5, the Building Code of Australia (NCC) and all relevant Australian Standards
- (d) Hydraulic Services must be provided to facilities that provides sufficient capacity to service the demands of major events.
- (e) The existing site infrastructure has no provision for a new tenants gas main supply, therefore the D&C contractor shall allow for LPG gas to the site to facilitate the demands of SICEEP.

7.2 AUTHORITY WATER SUPPLY MAINS

- (a) Cold water supply shall be provided to the Facility from the existing 200 CICL and 300 CICL Sydney Water mains traversing the Project Site.
- (b) Investigations shall be undertaken and approvals shall be obtained from the Water Authority to ensure that the water supply is suitable to provide the site consumer and fire water requirements.
- (c) The existing water mains are to be located and if required removed, amplified, augmented or relocated as required for the proposed Project Works.

7.3 COLD WATER METERING

- (a) Provide Sydney Water meters to the facility or areas specified as requiring separate billing metering.

7.4 AUTHORITY SEWER MAINS

- (a) Sewer discharge from the development shall be drained by gravity to the Sydney water Pump Station SP0071 via the 150 CI sewer mains traversing the site.
- (b) Investigations shall be undertaken and approvals shall be obtained from Sydney Water to ensure that the sewer mains are suitable to except the site sewer discharge requirements.
- (c) The existing sewer mains are to be located and if required removed, amplified, augmented or relocated as required for the proposed Facility.

7.5 IMPACT OF THE DEVELOPMENT ON INFRASTRUCTURE

The following assumptions have been made for the Hydraulic Calculations:

- As per BCA requirements and Preliminary Environmental Assessment Report the interim facility will cater for up to 6,000 people 8 hours a day, 7 days a week. There will be up to 100 workers during operation.
- Fixtures, fittings and equipment will be provided with the minimum 3 star WELS rating.
- Showers will be provided for 10% of the staff.
- No allowance for cooking facilities was made in the calculation.
- It was assumed that 1 in 4 people will use the toilet.
- The site has total of 25,000 sqm of roof area.

Water requirements:

- 7 l/sec flow rate requirements to supply all amenities ablution fixtures and fire hose reel system;
- 20l/sec flow rate for fire hydrant system assuming 5,000 sqm is a maximum fire compartment floor area.
- In addition cold water shall be provided to mechanical systems as required.
- As per Fire Protection Services Report, Fire Hydrant tank should be considered as a second independent water source
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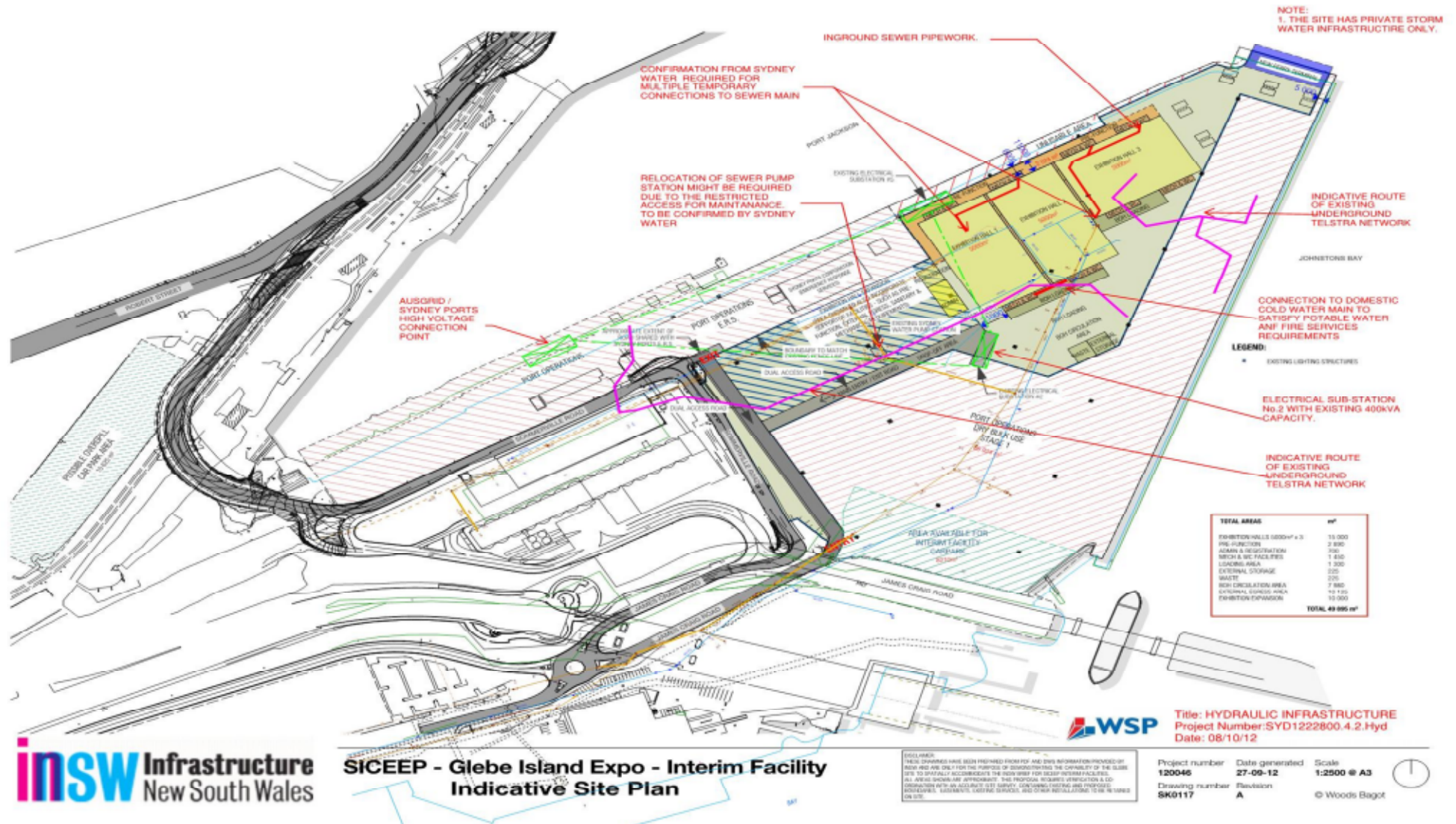
Sewer requirements:

- 10,000 l/day of waste water will be collected to Sydney Water pump station from toilet facilities.
- In addition waste water collection from mechanical equipment shall be provided as required.

Stormwater requirements:

Depending on roof design there are following 2 options provided:

- Option1: 1,620l/s will be collected from roof through series of eaves gutters and downpipes in 1 in 20 years stormwater event
- Option 2: 2,080l/s will be collected from roof through series of box gutters and downpipes in 1 in 100 years stormwater event
- Stormwater from roof areas will be discharged to the existing private stormwater system or as required by Authorities.



7.6 SANITARY DRAINAGE AND PLUMBING

- (a) The sanitary plumbing and drainage system must be the gravity type connected to the Sydney Water sewer mains. Vertical soil waste and vent stacks must be installed within riser ducts and connect sanitary fixtures and drainage. Soil-waste stacks must connect to sanitary drainage systems at their base.
- (b) Consider the provision of an additional systems to cater for discharge from mechanical, fire and hydraulic plant and equipment as required. Floor wastes and tundishes must be provided to receive drainage such as condensate and drain down water from building services equipment.
- (c) Connection to all commercial kitchen fittings and equipment including dishwashers, sinks, glass washers, waste disposal units, self-cleaning hoods and similar equipment shall be provided in accordance with AS4674-2004.
- (d) Fixtures and fittings shall meet a minimum of 3-Star WELS efficiency rating, ablutions fixtures shall be vitreous china, fixtures located in kitchens and related areas shall be stainless steel and be MP52 Watermark Approved.
- (e) Conceal all waste and vent pipes and provide acoustic lagging to all pipework where required to comply with noise levels. Services shall be arranged to ensure that access is readily available at all times for inspection and maintenance.

7.7 COLD WATER SERVICES

- (a) Consider the provision of a potable cold water system to supply all amenities ablution fixtures, kitchens, serveries, bars, and be complete with backflow prevention and booster pumping services as required. The system must also supply hot water, fire hose reel, make-up and re-use systems.
- (b) Consider the provision of a water supply with a reliability to support major events at all times The cold water system shall incorporate stop valves, which must be located in readily accessible locations to enable individual area isolation for maintenance purposes.
- (c) Fixtures, fittings and equipment must be provided with the minimum 3 star WELS rating.
- (d) Consider the provision of individual control valves to control each group of fixtures and wet areas including Kitchens, Serveries, bars and Amenities etc.
- (e) In addition to the Authority meters, provide water meters, connected through the BMS, to monitor the water use of all major water demands and for each area of Amenities Kitchens and outlets etc.

7.8 HOT AND WARM WATER SERVICES

- (a) Consider the provision of a hot water system, in accordance with the requirements of Standards and Authorities that supplies all amenities and outlets of the Facility via a fully insulated, re-circulated flow and return piping system. Provide Individual control valves w to control each group of fixtures and wet areas.
- (b) Hot and warm water temperatures to the toilets and amenities must be controlled by means of the installation of tempering and thermostatic mixing valves.
- (c) Hot water pipework must be constructed from type B copper tube with silver soldered joints and insulated pipework and fittings. Control valves and exposed pipework in wet areas must be chromium plated.

7.9 GREASE AND TRADE WASTE DRAINAGE AND PLUMBING

- (a) Consider the provision of a fully vented modified grease waste systems to serve all food preparation kitchens in accordance Authority requirements.
- (b) Post-treated wastewater from the grease arrestor must discharge to the sanitary drainage system for disposal to the external sewer main.
- (c) Grease stack vents must be terminated to atmosphere, through the highest roof level.
- (d) A grease waste pump-out line must be extended from grease arrestor room and terminated in a truck accessible location at the loading dock.
- (e) Consider the provision of a HDPE pipework and fittings to accommodate anticipated high temperature in the kitchen waste.

7.10 RAINWATER HARVESTING, ROOF DRAINAGE AND PLUMBING

- (a) Consider the provision of a stormwater drainage system to collect roof water and drain external paved areas.
- (b) To consider an overall site storm water management solution, taking into account that now underground drainage modifications and excavations shall be undertaken.
- (c) The system is to be sized to cater for an average storm recurrence interval of 1 in 100 & 1 in 20 year, Open-ended overflows must be provided in the roof guttering system and for the relief of flooding that may occur due to blockages and/or rainfall intensity that might exceed the capacity of the system.
- (d) Pipes shall be acoustically lagged as required to meet the required noise levels.
- (e) All joints shall be welded and passivized.

- (f) Overflow pipes or duplicate downpipes of at least equal capacity to the downpipes shall be provided to all gutters, roof areas and balconies to prevent accidental building flooding.
- (g) The downpipes shall connect to the main trunk stormwater drainage system. Connections are also to be made from planter boxes, courtyards, podium areas and other areas.

7.11 LPG GAS SERVICES

- (a) Consider the provision of a LPG gas services to supply the domestic hot water system, kitchen equipment; and mechanical heating equipment at the required pressures and demands.
- (b) Gas pressure regulators and meters shall be located in dedicated gas regulator/meter rooms. Gas pipes shall be installed within fire rated ducts and pipework shall be constructed from type B copper tube with silver soldered joints.
- (c) Emergency gas shut off device must be installed in the gas service to isolate the supply during emergency and must be linked to the mechanical system.

7.12 BUILDING SERVICES NOISE – HYDRAULIC SYSTEMS NOISE LEVELS

Maximum noise levels from hydraulic service runs (waste / rain water pipes, etc) shall not exceed the design average sound pressure level in all occupied spaces. "Occupied spaces" do not include toilets (or similar), store rooms, etc, but do include circulation spaces.

7.13 STANDARDS

Without limiting the D&C Contractor's obligation to comply with the Project Deed, the hydraulic services must comply with the following standards and codes of practice, guidelines, Authorities:

- (a) National Construction Code Series
- (b) Sydney Water (Water & Sewer)
- (c) City of Sydney Council (Stormwater)
- (d) Jemena (Natural Gas)
- (e) NSW Code of practice for plumbing
- (f) AS/NZ 3500 Plumbing and drainage
- (g) MP52 or AS5200 Watermark Certification Scheme (WMCS)

- (h) AS5601 Gas installation
- (i) AS 2200 Design charts for water supply and sewerage
- (j) Water Efficient Labelling and Standards (WELS) Scheme
- (k) AS 4072 Methods for fire tests on building materials, components and structures – Combustibility tests for materials