THE STAR

ELECTRICAL AND HYDRAULIC SERVICES MASTERPLAN REPORT

SEPTEMBER 2021



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Electrical and Hydraulic Services Masterplan Report

WSP

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Electrical & Hydraulic Services Masterplan Report

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1 EXECUTIVE SUMMARY

This report has been prepared on behalf of The Star Entertainment Group (The Star) in support of its Key Site Master Plan under the Pyrmont Place Strategy. The Master Plan ultimately seeks to inform updated planning controls related to 20-80 Pyrmont Street and 37-69 Union Street, Pyrmont to facilitate redevelopment of both sites and enable the Star's contribution to the Precinct as "a renowned and treasured cultural and entertainment precinct". In particular this report covers the works associated with the Electrical and Communications systems, as well as the Hydraulic systems for the new development.

The electrical infrastructure servicing the site will require expansion to accommodate the proposed development. Currently the site is served by 6 substations. To support the addition of the Southern Site (37-69 Union Street), with preliminary estimate of 3.5MVA, the Star is considering two options

- Option 1- New dedicated connection to Ausgrid Network or
- Option -2 Connection to existing Star site infrastructure

Both of these options will require upgrade of power supply from Ausgrid. The limitation in electrical capacity will need to be addressed to allow the Union street works to proceed. It is understood that The AUSGRID network has no spare capacity to accommodate any load increases from The Star. Early liaison with Ausgrid is required to establish a pathway for servicing the Southern Site.

The following infrastructure works are required to support the Southern Site developments under Option 2.

- Additional electrical capacity to support the Electrical load for the new development
- New cable access vertical to the primary electrical and communications node for MSB's 3 and 4.
- AUSGRID Switch Gear Upgrades for all substation 1
- Replacement of MSB's 4A and 4B.
- Additional outgoing circuit capacity to MSB 5 and transfer of load from MSB 4 to free up site substation capacity for the Southern Site.

The design principles associated with Electrical services will be aligned with the sustainability objectives for the development as part of The Star Entertainment Group's sustainable initiatives, commitments and policies. This includes:

- Supporting the 2030 net zero carbon emissions reduction target and the procurement of 100% renewable energy
- Achievement of a 5 Star Green Star rating for the development, consistent with TSEG corporate policy, including prioritization of building electrification and integration of onsite renewable electricity if feasible
- Supporting transition to low carbon transport options by integrating electric vehicle charging points, as part of the Pyrmont place strategy
- · Protection of electrical infrastructure, promotion of electrical resilience and system flexibility (more detail below)

The hydraulic systems servicing the site will require additional connections to support the development, including new cold water connections, new sewer drainage connections, as well as new gas connections. These modifications to existing city infrastructure are expected to be achievable. In addition, the redevelopment offers the chance to further integrate sustainability opportunities into the Star precinct through consideration of the following:

- o Rainwater capture and reuse
- Water efficient fixtures, fittings and appliances
- Use of seawater cooling system to avoid water consumption in the operation of cooling towers
- Recommissioning of the existing stormwater harvesting tank and grey water treatment plant for toilet flushing and irrigation

2 INTRODUCTION

2.1 THE PROJECT

This report has been prepared on behalf of The Star Entertainment Group (The Star) in support of its Key Site Master Plan under the Pyrmont Place Strategy.

The Master Plan is developed under the framework established under the Pyrmont Peninsula Place Strategy (PPPS), where The Star has been identified as one of four 'key sites'. The PPPS creates a 20-year vision and planning framework to support the NSW Government's vision to transform the Pyrmont Peninsula to "*be an innovative, creative and cultural precinct and an engine room of the Eastern Harbour CBD*" while meeting the aspirations of the business, industry, visitors, local and future residents.

The Master Plan ultimately seeks to inform updated planning controls related to 20-80 Pyrmont Street and 37-69 Union Street, Pyrmont to facilitate redevelopment of both sites and enable the Star's contribution to the Precinct as "a renowned and treasured cultural and entertainment precinct".

In particular this report covers the works associated with the Electrical and Communications systems, as well as the Hydraulic systems for the new development.

It should be acknowledged this report has been prepared based on the provided information in the PPPS and the technical consultant reports that accompany the document. Assumptions have had to be made in order to make a reasonable assessment of the precinct-wide matters related to Electrical and Communications systems, as well as the Hydraulic systems for the new development.

2.2 PYRMONT PENINSULA PLACE STRATEGY

The PPPS provides a 20-year framework that identifies areas that can accommodate growth in Darling Island, Blackwattle Bay, Tumbalong Park and Ultimo sub-precincts, while enabling more growth in the Pyrmont Village and Wentworth Park subprecincts. The PPPS is implemented in the statutory planning system by a Ministerial Direction that requires all land use and planning proposals to be consistent with the Place Strategy.

The first phase in implementing the PPPS is the preparation of master plans for each of the seven sub-precincts that make up the Peninsula (**Figure 1**). As a 'Key Site' located in the Darling Island sub-precinct, The Star has been identified to progress its own Master Plan for its 'Key Site' alongside the broader Precinct-wide master planning being undertaken by the Department, in consultation with the City of Sydney.



Figure 1 Pyrmont Peninsula Sub-Precincts



Darling Island A place of entertainment, tourism and

nnovation



A place of attraction and interaction



Pyrmont Village A place of history, innovation and culture



Figure 2

The Star Key Site

2.3 THE STAR

The Star is an ASX 100 listed company that owns and operates The Star Sydney, Treasury Brisbane and The Star Gold Coast. The Star Sydney is Sydney's leading entertainment, dining and tourism destination. More than 11 million people, including locals, domestic visitors and international tourists visit The Star annually, facilitated by a workforce of approximately 4,500 people (pre-COVID). As Sydney's only integrated resort, The Star Sydney focuses on the development of tourism and entertainment products across four key segments - accommodation, F&B, gaming and entertainment.

2.4 THE PROPOSAL

The Star Key Site Master Plan is proposing to rezone 20-80 Pyrmont Street and 37-69 Union Street, Pyrmont to establish new planning controls to enable redevelopment on the site to accommodate future mixed uses including retail, commercial uses, hotel and residential. The site is outlined in Figure 4.



Figure 3 Site Aerial Source: Nearmap/Ethos Urban

The rezoning and proposed planning controls have been informed by detailed site planning considerations as well as existing and future local context analysis. The proposed new controls that comprise amendments to the Sydney Local Environmental Plan 2012 (Sydney LEP 2012) and a Design Guide, respond to the objectives for The Star site Master Plan as listed in the PPPS as well as the Strategy's directions, big moves and place priorities.

It should be noted that subsequent development applications will be required in line with the relevant provisions of the Environmental Planning & Assessment Act 1979 to deliver the proposed developments.

The key development outcomes sought to be achieved for The Star site from the proposed Master Plan include:

Northern Site (20-80 Pyrmont Street)

- A new 27 storey six star hotel (capped at RL 110) on Pirrama Road (North Tower) comprising;
 - 6 storey podium that retains the existing ground level setback on The Star site
 - 21 storey tower with 1.5m street setback from podium and increased minimum 7m street setback to the north in line with wind advice and view sharing principles
 - Total gross floor area of 26,000m² (excluding through-site link)
 - New porte-cochere drop off servicing hotel
- Additional built form to Level 5 rooftop of the main Star site comprising:
 - A collection of indoor and outdoor spaces with complementary functions such as indoor/outdoor dining opportunities, recreational spaces, wellness spaces and hotel amenities, including an existing hotel pool
 - Total of approximately 3,000m² (additional to existing)
- Opening up of Pirrama Road frontage to reveal light rail and to provide improved connectivity to public realm and waterfront including:
 - Active uses such as retail, food and beverage and wellness uses at street level; and
 - Total GFA of approximately 200m² (additional to existing).
- New through-site link connecting Jones Bay Road and Pirrama Road
- Re-configured and expanded entry to the Lyric Theatre
- Façade upgrades to existing Astral Towers

Southern Site (37-69 Union Street)

- A new 37 storey mixed use building (capped at RL 140) on Union Street (South Tower) comprising:
 - 5 storey podium mixed use podium with a 3m ground level setback along the Pyrmont Bridge Road boundary to increase footpath width, comprising uses such as retail, residential and hotel amenities and/or dedicated hotel levels
 - 32 storey tower generally setback 5-7m from the podium, comprising uses such as retail, residential and hotel amenities and/or dedicated hotel levels and 2 plant levels
 - Total GFA of approximately 32,000m²

Public Realm

- Upgrades to corner of Edward Street and Union Street
- Upgrades to corner of Union Street and Pyrmont Street
- Improvements to public domain along Edward Street
- Improvements to public domain along Pirrama Road
- Upgrades to Union Street with potential for shared zone, including upgrades to walkway and cycleway

Once new planning controls are adopted, The Star will progress with the detailed design and planning of the future development on the site, including progressing with a design competition and securing development approval for the winning design.

2.5 GENERAL REQUIREMENTS

This report has been prepared with reference to the *General Requirements for Preparing Key Site Master Plans under the Pyrmont Peninsula Place Strategy* and the alignment review prepared by the Department of Planning, Industry and Environment (DPIE) dated 26 April 2021.

3 ELECTRICAL, ICT AND SECURITY

3.1 OVERVIEW OF EXISTING ELECTRICAL INFRASTRUCTURE

3.1.1 REFERENCE DOCUMENTS

The data in this report has been collected from the sources as listed below.

- The Star Masterplan Infrastructure report (authored by Umow Lai consultants, dated 07/12/2016)
- Dial before you dig plans
- Available As-built drawings

EXISTING ELECTRICAL INFRASTRUCUTRE 3.1.2

The current Star campus is serviced by multiple Ausgrid substations located in the site. The campus has the following substations:

- Ausgrid Substation 371 rated at 4500 KVA
- Ausgrid substation 387 4500 KVA
- Ausgrid substation 394 rated at 4500 KVA
- Ausgrid substation 402 rated at 4500 KVA
- Ausgrid substation 36041 rated at 4500 KVA
- Ausgrid substation 50102 rated at 4500 KVA

The above-mentioned substations service the site via various Main switchboards located around the site. There are six MSB groups which then services the site via approximately 380 distribution boards.

- The MSB grounds are as follows
- Group 1 MSB 1A1, 1B1 and 1B2
- Group 2 MSB 2A, 2B and 2C
- Group 3 MSB 3A1,3B1 and 3B2
- Group 4 MSB 4A and 4B
- Group 5 MSB 5
- Group 6 MSB 6A and 6B

The distribution board and their associated zoning have evolved from the original site development to the point where the Distribution board zoning is exceptionally complex. Whilst there are some general principles associated with which distribution zones are connected to which MSB groups.

The following figure illustrated a general existing single line diagram which illustrates the existing power distribution arrangement.

The existing AUSGRID network serving the site is at capacity. The requirements for additional capacity to support development needs is discussed below.

There are approximately 380 distribution boards across the site connected to the six MSB groups. The distribution board and their associated zoning have evolved from the original site development to the point where the Distribution board zoning is exceptionally complex. Whilst there are some general principles associated with which distribution zones are connected to which MSB groups, there are plenty of exceptions to these principles. This has the result of making management of the electrical system and fault finding overly complex and would have an accompanying impact on the cost of electrical maintenance. There is no easy short-term fix to this situation. The long-term solution is to redefine clear switchboard zone boundaries and then ensure all new works comply with these zones.



Several compliance issues were identified and upgrade works proposed as part of the Masterplan report works undertaken by Umow Lai. It is understood that some of these works may have been undertaken in 2018 as part of Sitewide infrastructure upgrade works. Review against work actually undertaken will be part of the next stage of works. The key items are listed below.

The following key issues have been identified within the existing electrical and communications systems.

- Spare Electrical Capacity to allow ongoing change and churn.
- New cable access pathways both horizontal and vertical to the primary electrical nodes. Particularly MSB's 1,2,3 and 4.
- Tidying up of distribution zones to remove the overall system complexity.
- Clear unambiguous distinction between Star electricity consumption and that of tenants by moving towards a user pays system.
- A maintenance strategy for all electrical plant which will allow the business to operate on a 24 x 7 basis but also allow access to plant maintenance.
- Correct legacy gaming machine circuit issue. Modification of the generator switchboards to reduce the prospective fault current.
- Additional communications data hubs and cabling capacity across the site.
- Easily accessible and implementable records and data management
- Replacement of MSB's 2A and 2B
- Replacement of MSB's 4A and 4B

- A clear long-term plan of MSB zoning to so that loads can be reallocated within the agreed zones as and when the opportunity arises.

The following table summarises the electrical and communications services upgrades required to address the above issues within the electrical infrastructure.

MAIN SWITCHBOARDS	Replacement of MSB's 2A and 2B with a full duplicated 2N
MAIN SWITCHBOARDS	Replacement of MSB's 4A and 4B with a full duplicated 2N
MAIN SWITCHBOARDS	Upgrade Power Factor Correction MSB's 1A1 2A 2B 4A 4B 5 6A AND 6B
MAIN SWITCHBOARDS	Extend MSB's to allow for additional outgoing circuit capacity
MAIN SWITCHBOARDS	New riser access to MSB's 1 and 2 and adjacent cable pathways
GENERATORS	Generator Acoustic Treatment
GENERATORS	Generator Load Assessment. (update ECOVIEW to record actual load)
GENERATORS	Generator Functional Map. Prepare for whole site.
GENERATORS	Modification of the generator switchboards to reduce the prospective fault current.
GENERATORS	New diesel fuel tanks, remove old tanks
UPS PACKAGE	Replacement of UPS systems 1, 2, 7
DATA HUB SUPPLY	Rearrange submains to data hubs to be full 2N
LIGHTNING PROTECTION	Lightning protection
SOLAR ARRAY	Solar Array
METERING	Embedded metering network
METERING	Cloud based metering system
METERING	Separation of Lyric power supply so that they pay for their own power.
METERING	Separation of tenant's power supplies so that they pay for their own power.
COMPLIANCE	Transfer of all escalators to essential supply
EARTH LEAKAGE	Upgrade all non-UPS circuits to Earth leakage Protection
COMMUNICATIONS	Horizontal cabling strategy
COMMUNICATIONS	Provision of 7 new 10 rack data hubs to serve new and existing gaming areas.
COMMUNICATIONS	Provision of new fibre links to new data hubs.

The status of these works is unknown at the time of writing this report. Further investigation and discussions with facilities is required to understand the current status of these works and hence the latest Electrical infrastructure.

3.2 EXISTING COMMUNCATIONS INFRASTRUCUTRE

Incoming Communications Links

The Star Sydney has two primary communications entry points. The entry points are physically separate with links to the two production data centres running via diverse paths.

The current arrangement is physically secure enough to serve the foreseeable needs of The Star.

There was an application submitted to relocate the entry to the product ion data centres 2 which was passing through a proposed site of the Ritz Carlton Hotel. The status of this relocation and the current path to PDC2 is unknown. Further liaison with facilities is required to establish this.

Production Data Centres

The Star Sydney has two Production Data Centres located as follows:

- PDC 1 is located on level 4 on southern portion of the site.
- PDC 2 / DRC is located at level 2 on the northern portion of the site in the location of the footprint of the proposed northern tower.

PDC 1 has space for 20 racks and has enough space to accommodate the expansion plans. A redundant data centre which is mainly redundancy is adjacent PDC 1. This space provides ample opportunity for expansion should it be required.

PDC 2 currently has 12 racks and is located in the footprint of the proposed Northern Tower. PDC 2 will need to be relocated clear of the footprint of the Northern Tower. Potential siting options are currently under review. Whichever option is selected the following criteria will be met with the new location.

- Space for 25 racks.
- Not below the high-water line.
- Fire rated room.
- Significant separation from PDC 1.

Data Hubs

There are currently 14 Data Hubs serving the site. Overall these are currently at greater than 80% capacity.

In addition to the 12 primary Data Hubs, there is in the order of another 50 data racks located in various cupboards, risers, plantrooms and other available spaces spread across the site. In most cases the singular racks are very lightly populated and have been installed to serve localised data circuits where the distance from the existing data hubs exceeds 90 metres. It is estimated these singular racks are spread throughout the facility are approximately only 25% full.

3.3.1 RELE	/ANT STANDAF	RDS APPLICABLE	
The following are the main standards and guidelines will be applicable throughout the project:			
\rightarrow NCC BCA 2019	\rightarrow NCC BCA 2019		
\rightarrow Local governmen	t and municipal counc	cil regulations	
\rightarrow Occupation / work	kplace health and safe	ety legislation	
\rightarrow NSW Service Rul	les and Installation rul	les	
\rightarrow Service Rules and	Regulations of the lo	ocal Supply Authority	
\rightarrow AS/NZS 3000 Ele	ectrical installations (k	known as the Australian/New Zealand Wiring Rules)	
\rightarrow AS/NZS 3008.1 H	Electrical Installations	- Selection of cables.ac	
\rightarrow AS/NZS 1680 Int	erior Lighting		
\rightarrow AS/NZS 2293 En	nergency Evacuation I	Lighting.	
\rightarrow AS/NZS 3439 Lo	w-voltage switchgear	and control gear assemblies	
\rightarrow AS 4674 Design,	Construction and Fit-	out of food premises	
\rightarrow The requirements	of the Australian Tele	ecommunications Authority	
\rightarrow Ausgrid Network	standards		
3.3.2 DESIG	OFFERINGE DO		
IIEM	REFERENCE DOC		
Electrical supply parameters	AS/NZS 3000:2007 – Wiring Rules	Electrical voltage 415/240V in accordance with SIR +10%/-6%.	
	Building Code of Australia – 2009		
	NSW Electricity		
	Distribution Service & Installation Rules		
	AUSGRID Codes		
	& Regulations		
Harmonics	AS/NZS 3000:2007 – Wiring Rules	Maximum total current harmonic distortion of 5% (THDi). This will be designed for at the point of common coupling for the facility.	
Meters	AS/NZS 3000:2007 – Wiring Rules	New metering shall be provided for outgoing supply	
Circuit fault impedance levels	AS/NZS 3000:2007 – Wiring Rules	Provide reactors and/or other modules/equipment to the energy distribution network to in accordance with supply authority requirements.	
Distribution boards	AS/NZS 3000:2007	Non-essential and Essential DB	
	– Wiring Rules		

PROPOSED NEW WORKS – ELECTRCAL

Bonding	A AS/NZS 3000:2007 – Wiring Rules	All metallic elements wil
	AS 3003	
Earthing systems		Sized in accordance with
		Shall be designed in acco
		M.E.N boards shall be pro
		Every submain to be prov
		Earth impedance in accor
		Ability to connect an add network.
Communications earthing System		Communications earthing
Electromagnetic Interference		Major submains cabling a EMI adjacent to patient a
Light and power Submain	AS 3000 Engineering services guidelines	Maximum demand as set same as the active conduc
Submains to	AS 3000	Maximum full connected
mechanical plant		Neutral sized the same as
Fire rated services	AS 3013	Fire rated to WS53W AS required.
Cable trays/ladders	AS 3000	Sized for all submain cab space minimum.
		Trays and ladders will be Submains Cables.
		Final sub circuits will run branch out from these trag
Final sub-circuits	AS 3000	General Power Circuits: 1
	AS 3008	General Indoor Lighting
	AS 3003	General Outdoor Lighting
		Specific Equipment and or reference documents.
System Voltage Drop	AS 3000	Maximum voltage drop o
	AS 3008	Generally, this will be dis
		Point of Supply to Main S
		Main Switchboard to Fina
		Final Distribution Boards
Riser accommodation	AS 3000	Existing riser R3 will be

3.3

be equipotential bonded to earth.

AS 3000.

- ordance with reference documents.
- covided for each individual building.
- vided with its own earthing conductor.
- rdance with AS 3000
- litional 20% earthing medium anywhere into the

g to ACIF/S008 and ACIF/S009.

and boards will be located to avoid high levels of areas.

t out in AS 3000 plus 20% spare. Neutral sized the ctors

l load plus 20% spare capacity.

s the active conductors

33013 and full size neutral where identified as

bles in accordance with AS 3008 plus 25% spare

provided to carry all overhead runs for Mains and

n on trays located above circulation spaces and us on catenary wires.

Minimum 2.5mm2 Cu.

Circuit: Minimum 1.5mm2 Cu.

g Circuit: Minimum 10mm2 Cu.

other installations: Will be in accordance with

of 7% from point of supply to final outlet

stributed through the network as follows:

Switchboard: 1 %

al Distribution Board: 1.5%

s to Final Outlets: 2.5%

used

Essential loads to be	All essential loads to connected to essential DB.
connected to standby	
power	
Non-essential loads	All non-essential loads will be connected to existing non-essential DB
UPS Electrical output	Electrical voltage 400/243V +10%/-6%.
supply parameters	

3.3.3 GENERAL - NEW DEVELOPMENT

The Star Key Site Master Plan is proposing to rezone 20-80 Pyrmont Street and 37-69 Union Street, Pyrmont to establish new planning controls to enable redevelopment on the site to accommodate future mixed uses including retail, commercial uses, hotel and residential. The site is outlined in Figure 4.



Figure 4 Site Aerial

Source: Nearmap/Ethos Urban

The rezoning and proposed planning controls have been informed by detailed site planning considerations as well as existing and future local context analysis. The proposed new controls that comprise amendments to the Sydney Local Environmental Plan 2012 (Sydney LEP 2012) and a Design Guide, respond to the objectives for The Star site Master Plan as listed in the PPPS as well as the Strategy's directions, big moves and place priorities.

It should be noted that subsequent development applications will be required in line with the relevant provisions of the Environmental Planning & Assessment Act 1979 to deliver the proposed developments.

The key development outcomes sought to be achieved for The Star site from the proposed Master Plan include:

Main Star Site

- A new hotel building at Pirrama Road (North Tower) comprising;
 - Total gross floor area of 19,938m2

Project No PS124755 Electrical and Hydraulic Services Masterplan Report The Star Entertainment Group

- New porte-cochere drop off servicing north tower
- Opening up of Pirrama Road frontage to reveal Light Rail and to provide improved connectivity to public realm and waterfront
- Additional built form to Level 5 to facilitate indoor/outdoor dining and events
- New through-site link connecting Jones Bay Road and Pirrama Road
- New Lyric Theatre entry

Union Street

- A new storey (RL 140) mixed use building on Union Street (South Tower) comprising;
 - Total gross floor area of 28,825m2

Public realm

- Upgrades to corner of Edward Street and Union Street
- Upgrades to corner of Union Street and Pyrmont Street
- Improvements to public domain along Edward Street
- Improvements to public domain along Pirrama Road
- Upgrades to Union Street with potential for shared zone, including upgrades to walkway and cycleway

3.3.4 MAIN STAR SITE – POWER SUPPLY ARRANGMENT

The main site works includes the building of a new Hotel building at Pirrama Road. The total preliminary maximum demand for the hotel equates to approximately 2 MVA phase. This has to be further verified as part of the design development

The following infrastructure works are required to support the new Hotel development developments.

- Additional Electrical Capacity to serve new areas and plant
- AUSGRID Switch Gear Upgrades substation 6.
- Relocation of MSB's 6A and 6B to make way for the Northern Tower.
- Relocation of PDC 2 to make way for the new Northern Tower.
- Relocation of the generator exhausts to make way for the Northern Tower.
- Replacement of UPS serving PDC 2.

The provision of the new Northern Tower will require the relocation of MSB's 6A and 6B and the Production Data Centre 2 and the existing generator exhaust flues. These will need to be relocated down clear of the proposed construction zone before the demolition for the new tower commences. Planning for these works is underway.

Mod 13 will require additional electrical capacity of 2.4 MW for the tower and ribbon lighting and power load.

The following table summarises the electrical and communications services upgrades required to address the above issues within the electrical infrastructure.

RELOCATE PDC 2	Relocation of PDC 2 to make way for the new Northern Tower.
TRIGEN	2 MW of Trigen
PDC 2 UPS	PDC 2 UPS replace
TELSTRA CABLES	Relocate Telstra Main incoming cables clear of tower
GEN EXHAUSTS	relocate generator exhausts for north tower
RELOCATE MSB 6A 6B	Relocation of MSB's 6A and 6B to make way for the Northern Tower.

3.3.5 MAIN SWITCH BOARDS (MSB'S)

The new hotel site will require dedicated main switchboards located within Main Switch Room which will be located at Basement or ground level. The location will be decided in the design development stage.

The main switchboard serving the hotel will have separate busbars for hotel house areas, hotel safety services and commercial retail / tenant services.

Service protective devices installed within the main switch boards will comply with NSW Service and Installation Rules

The Main Switchboards will be floor mounted, back/front connected, Form 3b, modular construction, IP42 rated enclosure. Withdrawable air circuit breakers will be used for circuits 1600A and above, molded case circuit breakers will be used for circuits less than 1600A.

Overall 25% spare circuit breaker spaces will be provided to each section of the Main Switchboard for the future connection of additional building loads. The main busbar will be rated to meet the incoming substation supply with the other busbars rated for 25% load current growth.

The Main Switchboards will be arranged to provide separately metered supplies to the Hotel and Commercial parts of the development with services arranged between the two main switchboards in accordance with the substation feeders (balanced site electrical load). Hotel services will be supplied from hotel dedicated busbars.

No rubber matting will be provided in front of the main switch boards.

3.3.6 EMF SHIELDING

It is envisaged that, subject to a design risk report (by others), Electromagnetic Interference (EMI) shielding of the substations and main Switch Rooms will be required to mitigate any risk associated with the emitted magnetic field in adjacent areas.

The electrical contractor will engage an EMF Consultant to undertake an EMF study for the following areas:

- Chamber Substation
- Main Switch Room

The electrical contractor will implement all EMF mitigation strategies outlined in the EMF study report.

POWER FACTOR CORRECTION AND ACTIVE HARMONIC FILTERS 3.3.7

Harmonic distortion equipment and power factor correction will be provided to the hotel section of the main switch board to mitigate / minimise / filter harmonics in compliance with the Authorities Electrical Distribution Code and to ensure healthy power distribution system. A minimum power factor of 0.95 lagging or better will be achieved at the hotel services Main Switchboard.

Units will standalone (separate to the main switchboard), have a 10-year design life and will be located within the main switch room or in a separate 2hr fire rated room.

3.3.8 STANDBY POWER GENERATION SYSTEM

The requirement and configuration of a standby power generation system for the Hotel tower to be further discussed with Star as part of design development.

A dedicated standby diesel generator system is proposed. The generator will provide generator backed power to both retail building areas and hotel areas and will be acoustically treated in accordance with the acoustic consultant's requirements.

The standby diesel generator system will provide backup power to the following during maintenance or failure of the supply authority power supply:

- -1 lift per rise (including 1 hotel passenger lift and the hotel goods lift)
- Safety services (100%) including fire pumps, fire indicator panels and smoke exhaust systems.
- House power and lighting (50%) includes the base building Fire Command Centre / Security Control room / Fire Pump room / Generator Room / Electrical Main Switch Room (to be confirmed as part of detailed design by the contractor). Emergency lighting associated with the generator backed lighting circuits will also be generator backed.
- Building managers room including the UPS system that serves the base building CCTV system and BMS.
- Hotel cold water booster pumps
- Mechanical equipment associated with the generator cooling system

A bulk fuel storage system will be provided at the Basement level in the above ground tank in accordance with AS 1940 requirements. Fuel transfer pumps will be installed adjacent to the tank chamber for the distribution of fuel to the day tanks located in the generator plant room. The generator fuel system will be sufficient to support the nominated loads for a minimum of 12 hours. A fuel fill point will be provided in a suitable location such as the loading dock entry.

UNINTERRUPTABLE POWER SUPPLY (UPS) 3.3.9

Uninterruptable Power Supply (UPS) systems will be provided for the hotel security services installation. The building management system (shared between the hotel and base building) will be connected to a UPS system with 60minutes battery backup.

3.3.10 SUBMAIN RETICULATION

All sub-mains cabling will originate from the Main Switchboards / Main Distribution Boards and utilise copper conductors. Nonessential services may be XLPE/PVC type cabling. Life safety services will be cabled in polymeric insulated fire rated copper cabling and be provided with additional mechanical protection as required by the NCC and AS/NZS.

Sub-mains cabling will be designed to allow for an additional 25% capacity over the calculated maximum demand capacity. Neutral conductor will be sized equal to the active conductors throughout the whole power distribution system.

Sub-mains cabling will rise vertically through the building and will generally be installed within shared electrical riser cupboards located on every floor. Riser cupboards will be constructed of non-combustible material and be smoke-sealed. Riser cupboards will be sized suitably so to be shared with rising vertical cabling and electrical distribution boards.

Horizontal reticulation of sub-mains will be by means of cable trays, conduit and catenaries located in corridor ceiling spaces or on the underside of slabs in the basement. Conduits used will typically be PVC type in line with standard local building practices.

Vertical and horizontal cable pathways will be sized for a 25% increase in the number of submain cables. Maximum voltage drop attributable to infrastructure will be in accordance with AS/NZS 3000.

All submains cabling from the main switchboard to hotel dedicated distribution boards will form part of the hotel scope of works.

RISER T-OFF BOARDS 3.3.11

Riser Tee-Off Boards will be provided at each level for the distribution of Hotel supplies, located within electrical riser cupboard. Boards will be of the Form 1 type and will contain suitably rated Circuit Breakers / Fuses to suit the load requirements.

DISTRIBUTION BOARDS 3.3.12

Distribution Boards will typically be Form 1 or 2, IP42 construction, surface mounted, front connected circuit breaker type, generally wall mounted in dedicated electrical plantrooms / riser cupboards on each floor. Moulded case circuit breakers will be used for circuits 100A and above, miniature circuit breakers will be used for circuits less than 100A.

Hotel house distribution boards will have minimum 10kA fault rating and hotel suite distribution boards will have a minimum fault fating of 6kA. Final sub-circuits shall have integral RCD protection (not exceeding 30mA) in accordance with AS3000. Circuit breakers will be selected to achieve discrimination where required.

Distribution boards will be split-chassis type to allow for separate metering of lighting, power and mechanical services in accordance with NCC Section J8.3 and include generator backed and non-generator backed sections where applicable.

HOTEL HOUSE DISTRIBUTION BOARDS 3.3.13

House Distribution Boards will generally be located within electrical riser cupboards and plantrooms. Separate distribution boards will be provided to high power consumption areas of the hotel such as the hotel communications room and level 5 restaurant. Each distribution board will be provided with a minimum of 25% spare capacity.

HOTEL FLOOR / SUITE DISTRIBUTION BOARDS 3.3.14

Each hotel floor will be provided with a distribution board located in the floor electrical cupboard. The distribution board will supply all lighting, power and mechanical services within the individual hotel suites as well as the common corridor areas. Onfloor circuiting / distribution will generally be as follows:

- Lighting circuits dedicated circuits for the lighting circuits in each hotel suite
- Mechanical circuits dedicate circuits for the mechanical services in each hotel suite
- Power circuits load centre type distribution board in each hotel suite for local distribution of room power circuits.

Each distribution board will be provided with a minimum of 25% spare capacity.

3.3.15 GENERAL LIGHTING AND POWER SUB-CIRCUIT CABLING

All sub-circuit cabling will be of minimum 2.5mm² V75 TPS type cabling. Power and lighting sub-circuits will be designed with a maximum circuit utilisation of 80%.

External sub-circuit cabling will be of minimum 4mm² V75 TPS cabling.

Sub-circuits will be run within ceiling voids and wall cavities where possible. All cabling will be concealed from view in front of house areas.

Horizontal reticulation of sub-circuits will be via cable tray, catenaries, or other suitable cable containment methods. Where cabling is required to reticulate within solid walls, cables will be chased and installed within conduits. Conduits used will typically be PVC type in line with standard local building practices.

All cable containment will be provided with 25% spare capacity.

3.3.16 GENERAL POWER AND POWER TO OTHER SERVICES

Power outlets will be provided throughout the hotel areas to suite nominated equipment loads and for general cleaning purposes.

Hotel suite power provisions will be as follows:

- Double socket outlet complete with USB charging (2.1A) adjacent to each bedside table
- Single socket outlet adjacent to one bedside table for an alarm clock (alarm clock by others)
- Double socket outlet for room desk / workstation

- Media hub complete with USB charging for room desk / workstation (refer to section 4.5 of this return brief for further information)
- Double socket outlet for room TV
- Double socket outlet at low level for ironing and general housekeeping use
- Power for kitchenette including:
 - Microwave (single socket outlet)
 - Fridge (single socket outlet)
 - Coffee machine and spare outlet (double socket outlet)
 - Electric Cooktop and associated range hoods (permanent connection, 15% of hotel suites only). To be provided with double pole above bench isolator.
 - Portable electric cooktop (double socket outlet, 35% of hotel suites only)

Hotel suite power provisions will be split into controlled and uncontrolled circuits. Controlled circuits will be enabled / disabled based on the hotel suite occupancy control system (refer to Section 3.17 of this return brief for further details). Power provisions shall generally be split as follows:

- Controlled Power

- Double socket outlet for room TV
- Double socket outlet at low level for ironing and general housekeeping use
- Microwave (single socket outlet)
- Coffee machine and spare outlet (double socket outlet)
- Electric Cooktop and associated range hoods (permanent connection, 15% of hotel suites only)
- Portable electric cooktop (double socket outlet, 35% of hotel suites only)

- Uncontrolled Power

- Double socket outlet complete with USB charging adjacent to each bedside table (2 off)
- Single socket outlet adjacent to one bedside table for an alarm clock (alarm clock by others)
- Double socket outlet for room desk / workstation
- Media hub complete with USB charging for room desk / workstation (refer to section 4.5 of this return brief for further information)
- Fridge (single socket outlet)

Final hotel suite power configuration to be developed further as part of the design development

OCCUPANCY CONTROL SYSTEM 3.3.17

An occupancy control system will be installed in each individual hotel suite to automatically control lighting, air conditioning and selected power circuits. Each hotel suite occupancy control system will operate independently, will be a standalone system and will not be integrated with the hotel's Property Management System (PMS). The system will comprise:

- Occupancy controller to be mounted in cupboard adjacent to hotel suite distribution board
- Passive Infrared (PIR) Sensor typically two per hotel suite (vestibule and bathroom), larger hotel suites will have three
- Hotel suite entry door reed switch
- Interface to hotel suite mechanical / air conditioning controller
- The system will operate as follows:

- When room occupancy is detected via the door reed switch / room PIR sensor, the occupancy controller will enable all room lighting circuits, selected power circuits and send a signal to the room air conditioning controller.
 - The individual lights and individual controlled power outlets within the room will be on / off depending on the status of the manually operated wall switches i.e. Any lights / power outlets that where left on when the previous guest exited the room will return to a on state and any lights / power outlets that were left off when the previous guest exited the room will return to an off state.
 - The room air condition will automatically turn on and operate based on the previous temperature settings.
- Guest manually turns on / off the lights using the wall mounted switches within the suite.
- Guest manually adjusts the temperature of the room air conditioning, turn on/off the air room conditioning using the wall mounted air conditioning control panel.
- When no occupancy has been detected for a period of 40 minutes (adjustable), the room occupancy controller will disable the room lighting and controlled power circuits. All room lighting and controlled power circuits will be forced off.
- When no occupancy has been detected for a period of 10 minutes (adjustable), the room occupancy controller will send a signal to the room air-conditioning controller which will turn off the air conditioning.

No blind control will be provided through the occupancy control system.

3.3.18 LIGHTING

The hotel lighting system shall be designed in accordance with AS1680 and in accordance with the architectural design intent. The main building areas are detailed in the table below (final arrangement to be confirmed as part of the detailed design and development):

AREA	Illumination Levels
Hotel Main Ground Floor Lobby	Specialist lighting design
Reception and Concierge	Lighting to suit the architectural / specialist lighting design concepts and to achieve a maintained illuminance of 160 lux. Task lighting for higher illumination levels is provided for specific areas. Vertical illuminance is a key consideration for visual comfort. Dimmable lighting controls allow for flexibility and lower illuminance levels at night to complement adjacent areas.
Restaurant, Bar, Grab and Go, Display Kitchen	Lighting to suit the architectural / specialist lighting design concepts and to achieve a maintained illuminance of 160 lux / 240 lux for food preparation tasks. Dimmable lighting controls allow for flexibility and lower illuminance levels at night and to complement adjacent areas.
Hotel floor lift lobbies	Lighting in accordance with the / specialist lighting design concepts to achieve an average of 40 - 80 lux at floor level. Dimmable lighting controls to allow for flexibility and lower illuminance levels to complement adjacent areas. Illuminated signage shall be provided as part of the architectural signage package. The electrical contractor shall provide power to the fixtures as required.
Hotel Floor Corridors	Lighting to suit the architectural / specialist lighting design concepts and to achieve an average of 40 lux at floor level. Dimmable lighting controls to allow for flexible lighting levels
Hotel Suites	Lighting in accordance with the / specialist lighting design concepts to achieve an average of 80 - 160 lux at floor level. Task lighting for higher illumination levels is provided for specific areas. Separate switching allows for variable lighting levels and scene control.

	Lighting integrated within joinery and lamps are provided as part of the arch is to be coordinated between specia package.
Staff Amenities	LED lighting to achieve an average of
Staff Pantry / Breakout Area	LED lighting to achieve an average of
Back of House Corridors	LED lighting to achieve an average of
Offices (including staff office, admin and sales office, manager's office and nousekeeping / engineering office)	High efficiency, low brightness, LED t an average of 500 lux at 700mm above
Storerooms (including luggage store, chemical store, nousekeeping store, restaurant store, dirty linen and waste room)	LED lights to achieve an average of 30
Plant Rooms (including comms room)	LED batten lights with diffusers to ach
Fire Stairs (base building)	LED batten lights with diffusers to ach

Where applicable, a task-based lighting approach will be implemented. Luminaires will generally be of LED lamp type with a 2700K-3000K colour temperature for hotel suites, hotel corridors and other ambient spaces. A 4000K colour temperature will be used in back of house and office type areas. Final colour temperatures to be confirmed as part of the detailed design.

All fixed wiring to be supported on either cable tray, cable basket or catenary wires.

3.3.19 LIGHTING CONTROL

An intelligent fully addressable, programable Clipsal DALI lighting control system will be provided for the hotel. All lights within the hotel area of works will be connected the DALI lighting control system except for the lights within the individual hotel suites which will be connected to the room occupancy control system (refer to section 3.17 of this return brief for further information). Lighting controllers will typically be installed within / adjacent to the hotel distribution boards where required.

A master lighting control panel will be provided

The lighting control philosophy will be as per following (final arrangement to be confirmed as part design development):

AREA	Lighting Control
Hotel Main Ground Floor	Timer scheduling for normal hours of
Lobby	control. Luminaires within the correspo
	detected for a period of 20minutes. Som

and bathroom mirrors, pendants and bed-side table rchitectural FF&E package. Joinery integrated lighting cialist lighting and architectural and interior design

200 lux at floor level.

300-500 lux at 700mm above finished floor level.

200-300 lux at floor level.

troffer luminaires and LED Downlights to achieve e finished floor level.

00 lux at floor level.

hieve an average of 200-300 lux at floor level.

hieve an average of 80lux at floor level.

operation. Motion sensor control for after-hours onding zone shall switch off when no presence is ne 24hour lighting shall be provided.

Reception and Concierge	Timer scheduling for normal and after hours operation. Pre-set lighting scenes to be determined with Hotel and lighting designer.				
	Proposed scenes are:				
	Morning				
	• Day-time				
	• Evening				
	• Night-time				
Restaurant, Bar, Grab and Go, Display Kitchen	Timer scheduling for normal and after hours operation. Pre-set lighting scenes to be determined with Hotel and lighting designer				
	Proposed scenes are:				
	• Breakfast				
	• Lunch				
	• Dinner				
	• Late night				
Hotel floor lift lobbies	Timer scheduling for normal and after hours operation. Pre-set lighting scenes to be determined with Hotel and lighting designer				
	Proposed scenes are:				
	• Day-time				
	• Night-time				
Hotel Floor Corridors	Timer scheduling for normal and after hours operation. Pre-set lighting scenes to be determined with Hotel and lighting designer				
	Proposed scenes are:				
	• Day-time				
	• Night-time				
Hotel Suites	Local on/off switches, no dimming, override by the room occupancy control system.				
Staff Amenities	Time scheduling for normal hours operation. Motion sensor control for after-hours control. Luminaires within the corresponding zone shall switch off when no presence is detected for a period of 20minutes. Some 24hour lighting will be provided.				
Staff Pantry / Breakout Area	Presence/Motion sensors shall be provided to enable automatic activation of lighting within the corresponding zone when presence is detected. Luminaires within the corresponding zone shall switch off when no presence is detected for a period of 20minutes.				
Back of House Corridors	Presence/Motion sensors shall be provided to enable automatic activation of lighting within the corresponding zone when presence is detected. Luminaires within the corresponding zone shall switch off when no presence is detected for a period of 20minutes. Some 24hour lighting will be provided.				
Offices (including staff office, admin and sales office, managers office and housekeeping / engineering	Presence/Motion sensors shall be provided to enable automatic activation of lighting within the corresponding zone when presence is detected. Luminaires within the				

office)	corresponding zone shall switch off whe
	20minutes.
Storerooms (including luggage	Presence/Motion sensors shall be provide
tore, chemical store,	within the corresponding zone when pre-
tore, dirty linen and waste	corresponding zone shall switch off whe
oom)	20minutes.
Plant Rooms (including comms	Local on/off switch.
oom)	
Fire Stairs (base building)	24 hr lighting and motion sensor-control
	lights are turned off a minimum of poir
External Signage	Time clock with manual override switc

3.3.20 EMERGENCY AND EXIT LIGHTING SYSTEMS

All hotel emergency and exit lights will be connected to the commercial base building computer monitoring system. The head end computer will be located in the base building main communications room. The system will be designed to the requirements of the Building Code of Australia (NCC) and AS 2293.

Where applicable, the main entrance, lobbies and lift lobbies, corridors etc. will utilise recessed 'spitfire' type luminaires and 'edge lit' type exit luminaires. The colour of the spitfire luminaire will match the architectural colour scheme within the area, either black or white.

Plant rooms, back of house areas etc. will use LED batten type emergency fittings and surface mounted surface mounted exit luminaires where required.

Each luminaire within the fire stairs will be provided complete with an emergency light.

Exit luminaries will incorporate LED lamps and use "running man style" green/white colour signage.

All emergency lights and exit signs will be self-contained type complete with 90 minutes battery backup end of life (in accordance with the NCC). Battery packs will be integral, lithium type with minimum 4-year design life.

EARTHING 3.3.21

Earthing systems will be provided in accordance with Australian Standards and Supply Authority requirements throughout the building. A clean earth system will be provided to the level 7 hotel communications room and the hotel communications cupboard on each hotel floor.

LIGHTNING PROTECTION SYSTEM AND SURGE PROTECTION 3.3.22

A lightning protection system will be provided in accordance with AS/NZS 1768 and AS/ACIF S009. Surge diversion will be installed at each main switchboard on the incoming supply as well as the incoming supply to each sub-distribution board serving external circuits. All copper communication cabling entering or exiting the buildings will also be surge protected.

The lighting protection system will be based on the Faraday cage principle, complete with air terminations, down conductors and an earth electrode system.

3.3.23 UNION STREET – POWER SUPPLY ARRANGMENT

The Union street works includes the building of a new mixed-use development on the Southern Site. The total preliminary maximum demand for the hotel equates to approximately 3.5 MVA phase. This has to be further verified as part of the design development.

en no presence is detected for a period of

ded to enable automatic activation of lighting esence is detected. Luminaires within the en no presence is detected for a period of

olled lighting. When motion sensor-controlled int 20lx safe movement lux level will be provided.

ch at the supplying distribution board.

The power supply to the Union Street building can be serviced by two options

- Option 1- New dedicated connection to Ausgrid Network or
- Option -2 Connection to existing Star site infrastructure

Both of these options will require upgrade of power supply from Ausgrid. The limitation in electrical capacity will need to be addressed to allow the Union street works to proceed. It is understood that The AUSGRID network has no spare capacity to accommodate any load increases from The Star. Early liaison with Ausgrid is required to establish as pathway for servicing the new Southern Site.

The following infrastructure works are required to support the Union street developments under Option 2.

- Additional electrical capacity to support the Electrical load for the new development
- New cable access vertical to the primary electrical and communications node for MSB's 3 and 4.
- AUSGRID Switch Gear Upgrades for all substation 1
- Replacement of MSB's 4A and 4B.
- Additional outgoing circuit capacity to MSB 5 and transfer of load from MSB 4 to free up site substation capacity for Union street

PROPOSED NEW WORKS – COMMUNICATIONS 3.4

3.4.1 LEAD IN SERVICES – MAIN STAR SITE AND UNION STREET BUILDINGS

The lead in services for the new sites will be provided by fibre links to the existing PDC.

The configuration and pathway for the fibre link to be developed as part of design development.

3.4.2 SERVICES DESIGN SCOPE

The communications services will be designed in accordance with Australian Standards and will include the following:

- Hotel Communications Room
- Communication equipment racks
- Cable support systems
- Copper voice network infrastructure
- Data network infrastructure for guests
- Data network infrastructure for hotel management
- Wireless Access Points (WAP) infrastructure
- Patch Leads
- Television Distribution System Infrastructure
- Audio Distribution System

The communication services scope of works will typically include the supply and installation of passive equipment only, all active equipment and software required for the communications system will be supplied and installed by Star's ICT.

PYRMONT PLACE STRATEGY 3.5

The key elements with regards to the public works related to Electrical are as follows

- Solutions for Electrical vehicle charger integration into Star Campus

Electrical charger location options

The location and the quantity of the Electrical charger options is to be further investigation in the design phase. The number of charger points will depend on the quantity percentage of Electrical charger options required with regards to the car park spaces

Power supply connection options

The configuration of the power supply will depend on the number of charger points and duration for charging options required. Power cabling will be required to be provided for the chargers from the Star site or the Councils network depending on the final agreement between Star and Council.

Options of using renewables for Electrical charger points is a preference and priority to meet sustainability and Low Carbon initiatives

3.6 INTEGRATION WITH SUSTAINABLITY STRATEGY

The design principles associated with Electrical services will be aligned with the sustainability objectives for the development as part of The Star Entertainment Group's sustainable initiatives, commitments and policies. This includes:

- Supporting the 2030 net zero carbon emissions reduction target and the procurement of 100% renewable energy
- Achievement of a 5 Star Green Star rating for the development, consistent with TSEG corporate policy, including prioritization of building electrification and integration of onsite renewable electricity if feasible
- Supporting transition to low carbon transport options by integrating electric vehicle charging points, as part of the Pyrmont place strategy
- Protection of electrical infrastructure, promotion of electrical resilience and system flexibility (more detail below)

The Star's Sustainable Design and Operational Standards ensure that all major refurbishments and new buildings implement climate mitigation and adaptation actions and initiatives for building resilience to future climate change across TSEG assets, business operations and the precincts within which they are located.

The following table lists elements of the climate mitigation and adaptation plan associated with Electrical services

Climate Mitigation & Adaptation Actions, section 8, The Star Sustainable Design & Operation Standards

INITIATIVE	DESCRIPTION	BENEFIT TO	ALIGNMENT WITH
TYPE		ORGANISATION	RATING TOOL
Mandatory	Assess projects in accordance with the Green Star	Improved awareness of	Green Star
	Communities Adaptation and Resilience Credit, including	climate risks.	Communities
	consideration of:	Improved preparation,	Adaptation and
	— Climate Adaptation;	communication, safety and	Resilience Credit
	— Community Resilience.	response to natural hazards	(Credit 04)
Voluntary	 Implement adaptation options to mitigate impacts of extreme heat, including: Consider renewable / alternative energy measures to reduce demand on energy during peak periods e.g. solar power Engage with the energy network provider to determine the redundancy of the local network during peak events and the prioritisation of return customers back onto the grid Installation of back-up power generation to accommodate energy supply continuity, particularly for sensitive tenants 	Improved resilience to extreme heat events. Improved capacity of staff, tenants, patrons, guests and the wider community to respond to extreme heat events.	Green Star Communities Adaptation and Resilience Credit (Credit 04)

INITIATIVE	DESCRIPTION	BENEFIT TO	ALIGNMENT WITH
TYPE		ORGANISATION	RATING TOOL
Voluntary	 Implement adaptation options to mitigate impacts of extreme rainfall and flooding, including: — Ensure all critical building infrastructure (i.e. substations, ICT servers, lift motors etc.) are not located in the basement 	Improved resilience to extreme rainfall and flood events. Improved capacity of staff, tenants, patrons, guests and the wider community to respond to extreme rainfall and flood events.	Green Star Communities Adaptation and Resilience Credit (Credit 04)

The requirements listed above will be further developed as part of the design development phase in consultation with all stakeholders.

4 HYDRAULIC SYSTEMS

4.1 HYDRAULIC SITE INFRASTRUCTURE - DESIGN STRATEGIES

The hydraulic infrastructure design objective for the Star development is to tie in with the "Big Move #4" as part of the Pyrmont Place Strategy by NSW DPIE. The key design strategy is to recycle water to create local drought-proof water supply for a cooler, greener precinct.

4.2 NORTHERN HOTEL TOWER

The North Tower will be sitting within the existing Star footprint and will have the opportunity to utilize the existing rainwater tank for reuse.

Key finding(s)		Key issue & opportunities		Constraints
The existing stormwater harvesting tank located on the northern part of the existing Star site is currently no longer in operation.	0	Opportunity for upgrade and reinstatement of existing stormwater harvesting tank for toilet flushing & landscape irrigation Direct the new stormwater pipe from North Tower to the stormwater harvesting tank	0	Potentially limited plant spatial for installation of stormwater filtration system and pumps next to the existing stormwater harvesting tank in the basement.

In case utilization of the existing stormwater harvesting tank is not achievable, a separate stormwater harvesting and recycle water system is recommended to collect the North Tower roof stormwater and reuse for toilet flush and landscape irrigation.

New authority utility connections are generally required to service the new development, refer to the table below.

Other finding(s)	Issue & opportunities			
The existing domestic cold water connection has no capacity for further development.	0	A new cold water connection from Sydney Water main is required to service the development.		
The existing sewer drain has no capacity for further connection.	0	A new sewer drainage connection to the existing Sydney Water sewer main is required.		
The existing Dissolved Air Flocculation (DAF) unit is currently running and has adequate capacity to service greasy waste from the North Tower. However, it is unlikely the greasy waste from North Tower can connect to the DAF as a result of extensive distance between North Tower and the DAF.	0	Install grease arrestors within the North Tower footprint to service the development only. OR, Install a new DAF unit near the North Tower to service a border area on the northern site.		
The existing gas meter and regulator set has inadequate capacity for the North Tower development.	0	Provide a new gas connection for the North Tower development only.		

4.3 SOUTHERN MIXED USE TOWER

The South Tower will be located at the corner of the Union Street and Edward Street. Potentially there is an opportunity to utilize the existing Grey Water Treatment Plant located on the existing Star basement.

There is a Grey Water Treatment Plant (GWTP) installed on the existing Star site. GWTP had been offline with several problems previously	 Potentially limited plant spatial for installation of stormwater filtration system and pumps next to the existing stormwater harvesting tank in the basement. Provide a linkage through the Union Street between the existing Star basement and the South Tower for the recycle water pipes

In case utilization of the existing grey water treatment plant is not achievable, a separate stormwater harvesting and recycled water system is recommended to collect the South Tower roof stormwater and reuse for toilet flush and landscape irrigation.

New authority utility connections are generally required to service the new development, refer to the table below.

Other finding(s)		
The existing domestic cold water connection has no capacity for further development.	0	A new cold required to
The existing sewer drain has no capacity for further connection.	0	A new sewe Water sewe
The existing Dissolved Air Flocculation (DAF) unit is currently running and has adequate capacity to service greasy waste from the South Tower.	0	It is benefic the South T Street is pro the existing
The existing gas meter and regulator set has inadequate capacity for the North Tower development.	0	Provide a no developmen

Issue & opportunities

water connection from Sydney Water main is service the development.

er drainage connection to the existing Sydney er main is required.

cial to utilize the DAF for the grease treatment of Tower trade waste if a linkage through the Union ovided to allow South Tower trade waste pipes to g Star basement.

new gas connection for the North Tower nt only.

4.4 INTEGRATION WITH SUSTAINABLITY STRATEGY

The design principles associated with Hydraulic services will be aligned with the sustainability objectives for the development as part of The Star Entertainment Group's sustainable initiatives, commitments and policies. This includes:

Achievement of a 5 Star Green Star rating for the development, consistent with TSEG corporate policy, including prioritization of building electrification and integration of onsite renewable electricity if feasible

The sustainability strategy for the master plan will include consideration of water efficiency initiatives, including

• Rainwater capture and reuse

-

- Water efficient fixtures, fittings and appliances
- Use of seawater cooling system to avoid water consumption in the operation of cooling towers
- Recommissioning of the existing stormwater harvesting tank and grey water treatment plant for toilet flushing and irrigation