THE STAR

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MOD 13
HYDRAULIC INFRASTRUCTURE MANAGEMENT PLAN

PREPARED BY UMOW LAI

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Date	Revision No.	Issue Description	Prepared By	Reviewed By	Approved By
27.03.17	A	Final for Comment	GJ	PJ	PJ
09.06.2017	B	Comments Incorporated	GJ	PJ	PJ
22.08.2017	C	Comments Incorporated	GJ	PJ	PJ
15.09.2017	D	Comments Incorporated	GJ	PJ	PJ
21.12.2017	E	Comments Incorporated	GJ	PJ	PJ
31.01.2018	E	Final Report Issue	GJ	PJ	PJ

THE STAR

1 EXECUTIVE SUMMARY

Star Entertainment Group Limited (SEGL) has commenced a five-year redevelopment journey to create a landmark, exemplar integrated resort. This proposed redevelopment will occur through the lodgement of two s75W modification applications to the original Major Project Approval (MP08_0098) with the Department of Planning and Environment (the Department).

Modification 14 (Mod 14) was determined in October 2017 and included approval for a range of upgrades to the existing site. These upgrades included the enclosure of the level 3 terrace to facilitate an expansion in gaming floor area and a new bar and restaurants, expansion of the level 3 pre-function space, changes to the Astral Hotel lobby and retail space, and alterations to internal vertical transportation, services and infrastructure, including the harbour heat rejection system.

Mod 13 is a modification to the development as approved under MP08_0098, up to and including Mod 14. This forms the basis for technical impact assessments.

Modification 13, proposes the development of a new Ritz-Carlton Hotel and Residential Tower in the northern portion of the site with associated podium treatment, as well as other transport, retail, food and beverage improvements across the site. It is **Modification 13** that is the subject of this report.

The purpose of this report is to make recommendations regarding available infrastructure and required upgrade works for the following hydraulic services;

- Water Supply
- Sewer Drainage
- Natural Gas Supply
- Stormwater

The proposed development has been assessed against all relevant standards/guidelines, including the following:

- Plumbing Code of Australia
- Relevant Australian Standards
- Sydney Water Regulations
- Jemena Natural Gas Regulations
- City of Sydney Stormwater Management Policy
- SEARs Application number MP08_0098 MOD 13, relevant clauses;

10. Infrastructure

- *Detail any infrastructure proposed to service the development and demonstrate that the site can be suitably serviced.*
- *Detail the existing infrastructure on site, and identify any possible impacts on infrastructure (particularly the light rail) arising from the construction of the proposed development.*
- *Where the proposed works affect existing infrastructure, the application should detail any mitigation works proposed, including service relocations.*
- *Prepare an Infrastructure Management Plan. The applicant shall provide information on the required water and waste water services, electricity and gas and any augmentation of Sydney Water and RMS and Light Rail infrastructure that may be required for the proposed development.*

This Hydraulic Infrastructure Management Plan has identified the following key findings/conclusions and recommendations:

- A new water main connection is proposed to meet the increased demand associated with the Mod 14 & Mod 13 developments. The proposed 150mm main connection will extend from the Pirrama Road 250mm SWC water main
- A new sewer main connection is proposed to meet the increased demand associated with the Modification 14 & 13 developments. The proposed 300mm sewer connection will extend from the Pirrama Road 375mm SWC sewer main.
- A new Natural Gas (NG) meter and regulator assembly will be required to accommodate the increased NG demand. Preliminary discussions with Jemena suggest that the required gas demand is available in the local network.
- The existing site stormwater infrastructure has adequate capacity to drain the proposed new build areas. The catchment area for the site will not change with the proposed development; therefore there will be no increased stormwater flows for the site.
- The existing disused northern stormwater harvesting tank is to be reinstated. New drainage from MOD 13 areas will be diverted where practical to the reinstated harvesting tank
- Install new rainwater pumps and filtration equipment at level B4 and interface with the existing site recycled flushing water distribution system
- New building area catchment will be directed to either the northern or southern collection systems where practical, and utilise the existing stormwater quality treatment devices.
- Any new groundwater collection systems will discharge collected groundwater to the stormwater outflow via the northern seawater conduit.
- Should any contamination of groundwater be observed during planning and construction appropriate treatment systems will be provided to the collection system.

2 SITE DESCRIPTION

2.1 SITE LOCATION AND DESCRIPTION

The subject site (the site) is located at 20-80 Pyrmont Street, Pyrmont, which is legally described as Lot 500 in DP1161507, Lot 301 in DP 873212 (SP56913), and Lot 302 in DP873212. The site also accommodates a light rail line (including 'The Star' light rail station) legally described as Lot 211 in DP 870336. The service road to the north of the site, comprising Lot 1 in DP 867854 and Lot 201 in DP 867855, is also part of the proposal under **Modification 13**.

The site is bounded by Pirrama Road to the north-east, Jones Bay Road to the north-west, Pyrmont Street to the south-west, Union Street to the south and Edward Street to the east. The location and configuration of the site is shown in Figure 1 below.

The site is leased by SEGL from the Independent Liquor and Gaming Authority (ILGA). SEGL is a leading operator of integrated resorts that appeal to both local and international visitors. SEGL is the operator of The Star Sydney (The Star), with a casino licence to operate a casino through to the year 2093.

The site has a total area of 39,206 m^2 (excluding Lot 1 in DP 867854 and Lot 201 in DP 867855 to the north), and is occupied by the existing integrated resort which includes a multi-storey entertainment facility, gaming areas, retail spaces, multiple restaurants and bars, the Sydney Lyric Theatre, 480 hotel rooms/serviced apartments across three towers, and basement parking.

Figure 1 *– Aerial Image of the Subject Site (base map source: maps.six.nsw.gov.au)*

2.2 LEGAL DESCRIPTION AND OWNERSHIP

The site comprises the following lots as shown in the **Table 1** below.

Table 1 – Legal Description and Ownership

Details	Uses	Ownership
Lot 211 in DP 870336	The Light Rail Corridor	Owned by Rail Corporation New South Wales
Lot 500 in DP 1161507	The Star site	Owned by the ILGA, leased by SEGL
Lot 301 in DP 873212	Astral Hotel	Owned by the ILGA, leased by SEGL
Lot 302 in DP 873212	Astral Residences divided into strata (Strata Plan - SP 56913);	Stratum owned by the ILGA hority, leased by SEGL
Lot 1 in DP 867854	Service road	Owned by the ILGA, leased by SEGL
Lot 201 in DP 867855	Service road	Owned by the ILGA, leased by SEGL

Figure 2 *– Legal Description of the site (base map source: maps.six.nsw.gov.au)*

3 DESCRIPTION OF MOD 13 IMPROVEMENTS

New Ritz-Carlton Hotel and Residential Tower

- Demolition of part of the existing building in the northern portion of the site, including part of the Pirrama Road façade and part of the Jones Bay Road façade.
- Construction of a new Tower, 237.0 metres AHD (approximate, 234 metres from Pirrama Road);
- Residential uses across 35 levels, comprising:
    - A residential vehicular drop off lobby on Level B2
    - A residential lobby on Level 00 to be accessed from Jones Bay Road;
    - Residential communal space on Level 07 to be accessed via Level 08; and
    - 204 residential apartments located from Levels 05 to 06 and from Levels 08 to 38, featuring one-bedroom, two-bedroom and three-bedroom unit types (Note – no Level 13)
- Hotel uses across 31 levels, comprising:
    - A hotel arrival lobby on Level B2 to be accessed from the new Ritz-Carlton porte-cochere along Pirrama Road;
    - A hotel Sky Lobby for guest check-in on Level 39 and 40, featuring a restaurant, bar and lounge;
    - 220 hotel rooms located from Level 42 to 58 and from Level 60 to 61
    - A hotel spa and gym on Level 07
    - A VIP link to the Sovereign Room on Level 04 and 04 Mezzanine
    - A Ritz-Carlton Club lounge and terrace on Level 59
    - Hotel staff end-of-trip facilities on Level B3
    - Hotel staff arrival point on Level 00
    - Hotel back-of-house and plant on Level B2, 02, 03, 05, 41 and 42
- A Neighbourhood Centre consisting of the following proposed uses including street level cafe, library, learning / innovation hub, multipurpose function centre, practice rooms (functional use to be finalised in conjunction with a neighbourhood panel)
- A new car-parking stacker system below the new porte-cochere of the Ritz-Carlton Hotel, with a total capacity of 221 spaces, to serve the new hotel and apartments
- Vertical transport associated with the tower and podium; and
- A new drop-off / pick up area (short-term parking) on Jones Bay Road for the proposed apartments.

Level 07

- A 'Ribbon' at Level 07 connecting the new Hotel and Residential Tower to the existing building along Pirrama Road, comprising:
    - Two pools and associated pool decks (one for the new Hotel, one for The Star); and
    - Two food and beverage premises with associated store rooms and facilities;
- Lift access from the Level 05 Terrace to Level 07;
- Residential communal open space associated with the new residential apartments, comprising pool and landscaped terrace at the base of the Tower adjacent to Jones Bay Road;
- Gym and associated change rooms and facilities for the residents;

- Gym and associated change rooms and facilities for hotel guests; and
- Landscaping treatments.

Level 05 Sky Terrace

- Three food and beverage outlets with external areas;
- Completion of the Vertical Transportation drum to connect with Level 05 Sky Terrace;
- Designated event spaces on the Terrace; and
- Landscaping treatment.

Level 05 Astral Hotel Pool and Spa Recreational Facility Upgrade

- New pool deck, pool, spa, gym and amenities upgrade for Astral Hotel and Residences.

Tower to Sovereign Link by Escalator and Lift

- Link from the Tower (across Level 04 and Level 04 Mezzanine) to the Sovereign Resort and MUEF at Level 03, connected via Lift G4, Lift VIP 1 and escalators.
- Extension of the lift service to stop at Level 00, 01 and 05 in addition to Level 3, 4 and 4M.

Level 03 Sovereign Column Façade Treatment along Pirrama Road

- New glazed detail to enclose exposed Level 03 Sovereign columns along the Pirrama Road façade.

Various reconfiguration works around Vertical Drum Level 00 to L5

- Revolving door at L00 main entrance landing Pirrama Road end
- Sliding door at L00 landing at stairs from Light Rail
- Reconfiguring of existing L1 and 2 void edge
- New escalators from L2 to L3 due to revised landing at Level 3
- Infill of L2 atrium void to main entrance at Pirrama Road

Façade Integration Works

- Upgrades to the Pirrama Road and Jones Bay Road façades to integrate the new Ritz Carlton Hotel and Residential Tower with the existing building.

Infrastructure Upgrades

- A new plant room located within the podium over Levels 03, 04, 05 and 06 of the proposed Hotel and Residential Tower;
- Relocation of the current Level 03 cooling towers (adjacent to the MUEF) to the Level 09 plant room above the Level 06 plantroom adjacent to the Astral Hotel;
- New capstone microturbine units and associated flues in the proposed plant room at Level 03 between the Darling Hotel and the Astral Residence Tower;
- New capstone microturbine units and associated flues in the new Level 03 plant room at the base of the Tower;
- Relocation of the existing main switch-room to the new plant room on Level 02, south of the demolition cut line;

- Relocation of the existing data recovery centre to the new plant room on Level B1 of the Darling Hotel;
- Relocation of diesel generator flues to the side of the new Level 09 plantroom, adjacent to Astral Hotel

Level B2 Transport Interchange

- Upgrades to the Event Centre Loading Dock;
- Entry into Basement car stacker for the Tower apartments and Ritz-Carlton Hotel;
- New commuter bike parking and hire bike system;
- Upgrade of finishes to light rail station surrounds (but not within Light Rail corridor) and removal of existing wall barrier to the Pirrama Road frontage;
- Upgraded taxi-rank arrangements;
- Designated Star coach parking along Service Road in front of Light Rail station; and
- Realignment of kerbs and line-marking.
- Note – no works within the Light Rail corridor

Transport Improvements – Other Locations

- Reconfiguration of existing median strips on Jones Bay Road and addition of new median strip on Pyrmont Street, with associated line-marking to enable a new right-hand turning lane into the Astral Hotel Porte-Cochere;
- New Pyrmont Street carpark entry and exit, associated line marking, changes to internal circulation, and reconstruction of the pedestrian footpath along Pyrmont Street; and
- Relocation of existing feeder taxi-rank from Jones Bay Road to the Level B2 transport interchange.

Site Wide Landscape and Public Domain Upgrades

- Upgrades to street frontages along Pirrama Road (for the Hotel Porte Cochere) and Jones Bay Road (for the residential entry);
- Upgrades to street frontage to Pyrmont Street, due to new car parking entry; and
- Upgrade to the entry forecourt of SELS building at the corner of Jones Bay Road and Pyrmont Street. (Note: no works within SELS building is proposed)

Level 00 - Restaurant Street

- Creation of a new destination Restaurant Street by:
    - Incorporating existing Balla & Black Food and Beverage premises on Level 00; and
    - Converting existing retail shops into new Food and Beverage tenancies

Pirrama Road and Jones Bay Road - Food and Beverage tenancies

- A revised food and beverage tenancy at the existing Pizzaperta outlet along Pirrama Road;
- A new food & beverage tenancy at the Marquee street entry; and
- A small café outlet adjacent to the residential lift lobby at Jones Bay Road.
- A new food & beverage tenancy accessed off existing walkway from Jones Bay Road

Food and Beverage – Other Locations

- Reconfiguration of Harvest Buffet, including new escalators from Level 00 Food Court to Level 01; and
- Refurbishment of Bistro 80 into the interim Century tenancy. (Note: The Century tenancy post construction is proposed to be at the Jones Bay end of L00 – Restaurant Street

Darling Hotel Corners

- Upgrade of the corner plaza at the Union/Edward Street property entry to accommodate:
  - A new food and Beverage premises on Level 01 and 02;
  - A new entry foyer leading to the Food Court;
  - A relocated awning enclosure at street level;
- Upgrade of the corner plaza at the Union/Pyrmont Street property entry to accommodate:
  - A new awning enclosure at for the existing café;
  - New revolving door at entry to Darling Hotel
  - Eight (8) luxury display cases at Darling Hotel car park entry; and
  - Two car display areas at Darling Hotel car park entry.

Site-Wide Acoustic Strategy

- A site-wide acoustic monitoring strategy applied to assess impact of potential noise generating sources in Mod13.

Site-Wide Lighting Strategy

- A site-wide lighting strategy integrating and improving the existing lighting across the precinct, with new lighting the proposed Tower, Podium and Ribbon, including:
  - Internal lighting of Hotel and Residential spaces;
  - Illuminated highlights at the Sky Lobby and Club Lounge levels;
  - Integrated lighting on the eastern and western vertical façade slots and angled roof profile;
  - Podium external illumination from awnings, and under retail and lobby colonnades;
  - Landscape lighting on Level 07 open terraces and pool decks;
  - Feature lighting accentuating the wing-like profile of the Ribbon and vertical element;
  - Internal and external lighting to Food and Beverage outlet at Union/Edward Street corner;
  - Façade LED lighting to the heritage SELS Building

Special Lighting Events

- Approval for fifty-three (53) Special Lighting Events per year for the use of permanent installation of moving projector lights on the rooftop of the Astral Hotel

Signage Upgrades

- Consolidation of existing signage approvals and new signage, including:
  - Approved signs
  - Wayfinding signs;
  - Business identification (including for Food and Beverage outlets); and
  - Signage on the Tower and Podium.

Stormwater upgrades

- Stormwater upgrade works, including increased pit inlets and pipe capacities at the low points along Pyrmont Street and Edward Street.

4 WATER SUPPLY

4.1 EXISTING WATER CONNECTIONS

The Star is provided with domestic and fire fighting water supply from the 250mm water main that is located in Jones Bay Road.

The site is currently supplied with a 150mm connection from the 250mm Sydney Water main in Jones Bay Road which is then divided into 2 separately metered services for the Astral Hotel & Apartments and the Casino.

The Darling Hotel has a separate 150mm metered water service connection off the 200mm Sydney Water main in Edward Street.

The existing mains connections feature appropriate backflow prevention.

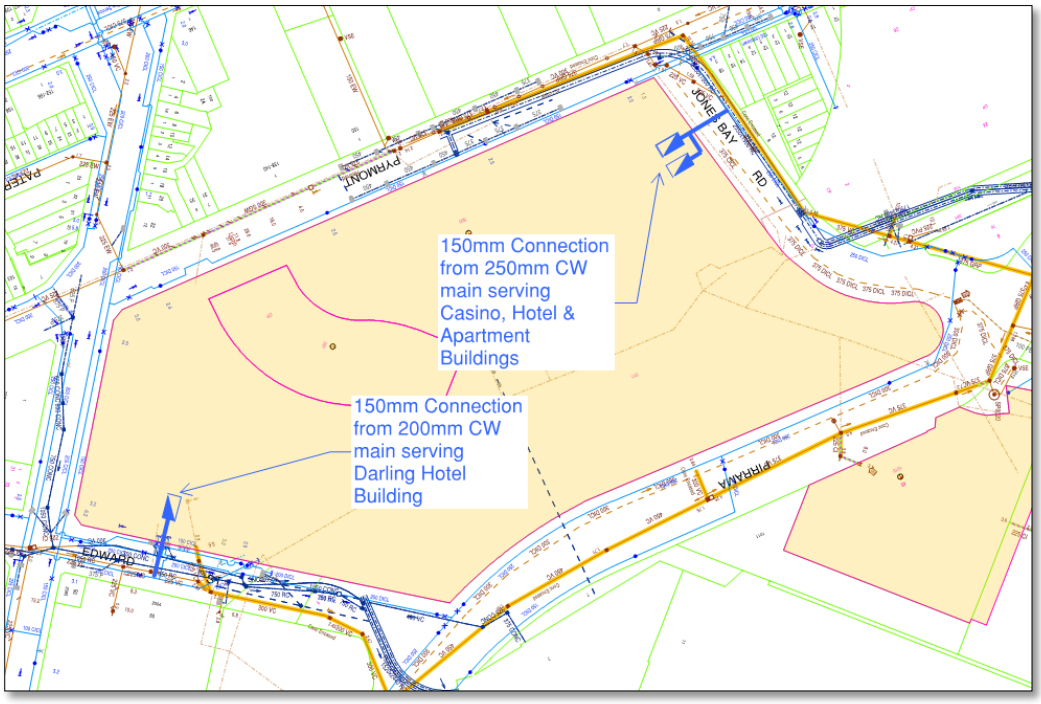


Figure 3 *Existing Connections to Authority Water Mains*

4.2 PROPOSED DEMAND

The capacity of the existing 150mm connection to Jones Bay Road main is 30 l/s.

The existing peak demand for the water main connection is approximately at 29l/sec which is within the existing capacity of 30l/sec. The existing average daily consumption from the Jones Bay Road main is 2,800 KL.

The increased domestic cold water peak demand and average daily consumption figures for both the Mod 13 & Mod 14 developments is summarised in the table below;

Demand	Existing Site Demand	Existing + Mod 14 Demand	Existing + Mod 14 + Mod 13 Demand
Peak Demand	29 l/s	34 l/s	45 l/s
Avg. Daily Consumption	2,800 KL	3,600 KL	4,100 KL

***Table 1** – Site Maximum Probable Water Demand*

4.3 PROPOSED INFRASTRUCTURE WORKS

A new water main connection is proposed to meet the increased demand associated with the Mod 14 & Mod 13 developments. The proposed 150mm main connection will extend from the Pirrama Road 250mm SWC water main.

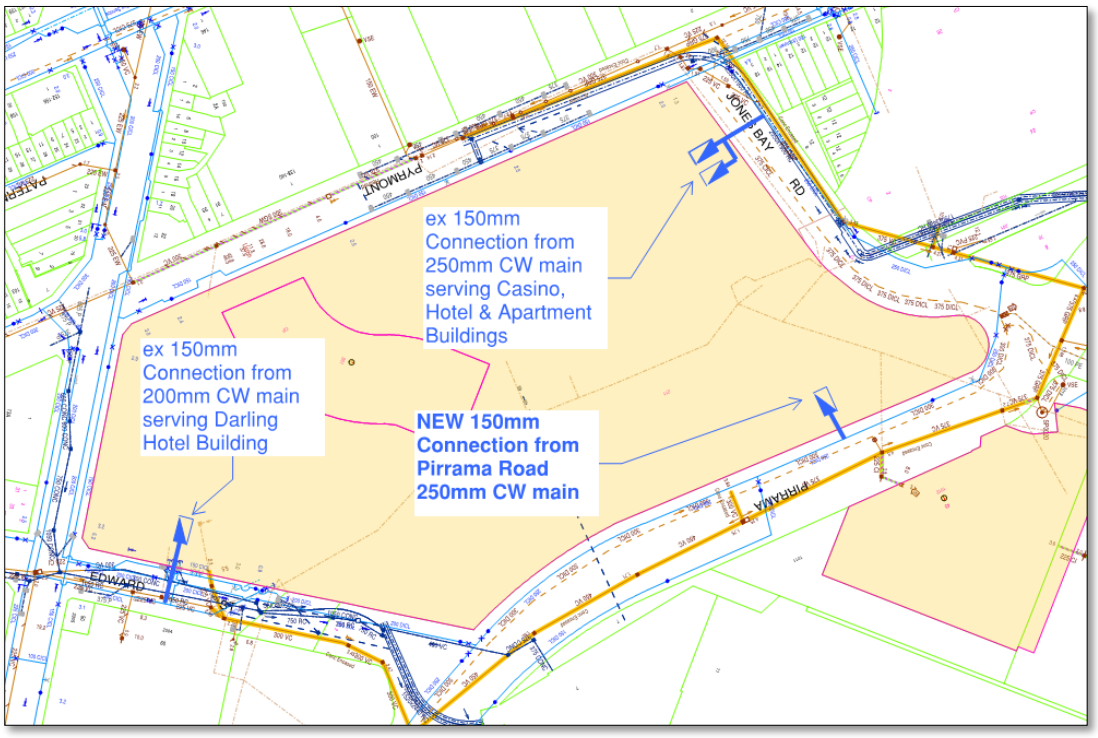


***Figure 4** Proposed Connection to Authority Water Mains*

A pre Section 73 ***Feasibility Letter*** request has been lodged with Sydney Water stating the above increase in water demand with respect to the capacity of the existing Pirrama Road and Jones Bay Road Sydney Water Corporation's water mains.

Sydney Water has responded with a Feasibility Letter. In summary, Sydney Water's response suggests that there is adequate capacity in the local network. The feasibility letter states;

Water

The following information is provided to assist in planning the servicing needs of the development, based on information supplied with this application:

- A Preliminary Water servicing investigation was based on a supply being sourced from either the 150mm main in Pyrmont Road, the 200mm main in Edward St, and the 250mm main in Pirrama Road. Based on the Building Heights the proposed development will require a connection to either the 200 or 250mm main.

5 SEWER DRAINAGE

5.1 EXISTING SEWER CONNECTIONS

The site features three sewer discharge points, connecting via gravity to Sydney Water Corporation's sewer mains in Pirrama Road, Edward Street and Pyrmont Road.

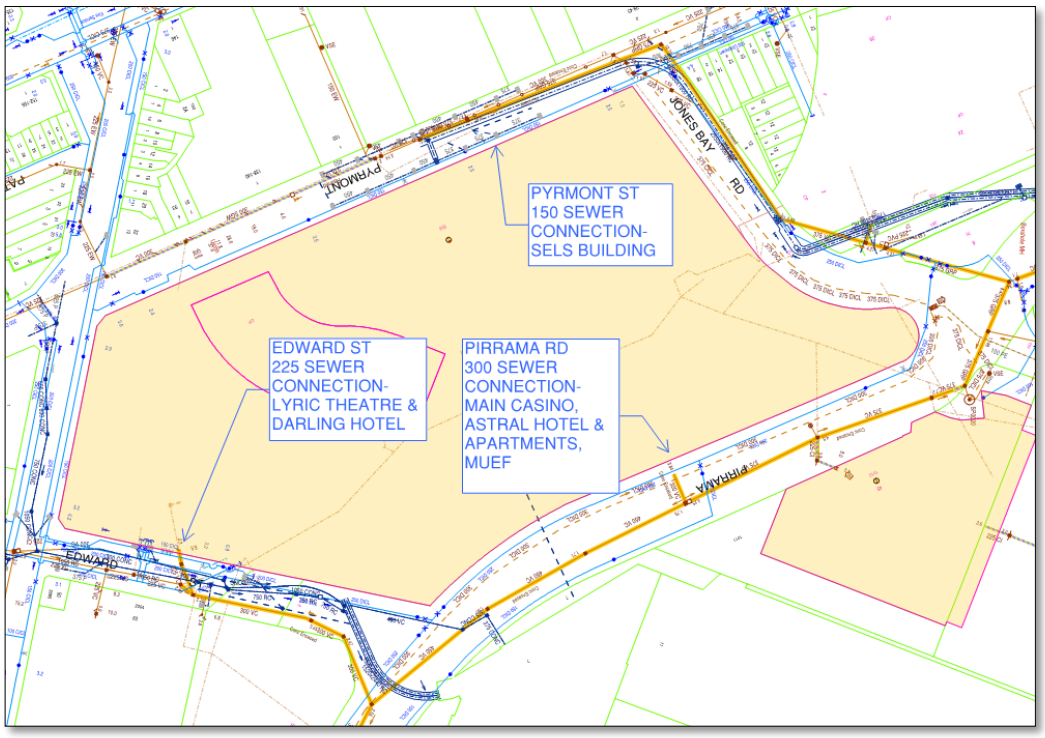


Figure 5 *Existing Sewer Main Connections*

5.1.1 Edward Street Sewer Connection

The 225mm connection to the Edward Street sewer main drains the Darling Hotel, Lyric Theatre, DAF Grease Waste Treatment Plant, Apartments and a section of the retail component of the Casino.

The 225mm Edward Street SWC sewer stub connection has a capacity of 1,600 EP. The total connected load is currently 1,355 EP.

5.1.2 Pirrama Road Sewer Connection

The main existing sewer outfall from The Star which drains the majority of the Star including gaming areas, restaurants, Astral hotel and entertainment facility is via an 225mm internal sanitary drain to a 300mm sewer stub. The connection to the sewer stub is 1 metre within the property boundary and connects to the 375mm Sydney Water Corporation's sewer main that is located centrally on the Pirrama Road frontage.

The 300mm Pirrama Road SWC sewer stub connection has a capacity of 3,200 EP. The total connected load is currently 3,015 EP

5.1.3 Pyrmont Street Sewer Connection

The 150mm sewer connection to the 300mm Pyrmont St Sewer receives a relatively small loading from the SELS heritage building.

5.2 PROPOSED SEWER DEMAND

The expansion of The Star will introduce a higher demand on the main sewer infrastructure connections as a result of the Mod 14 & Mod 13 developments.

The below diagram indicates the increased load on existing sewer connections;

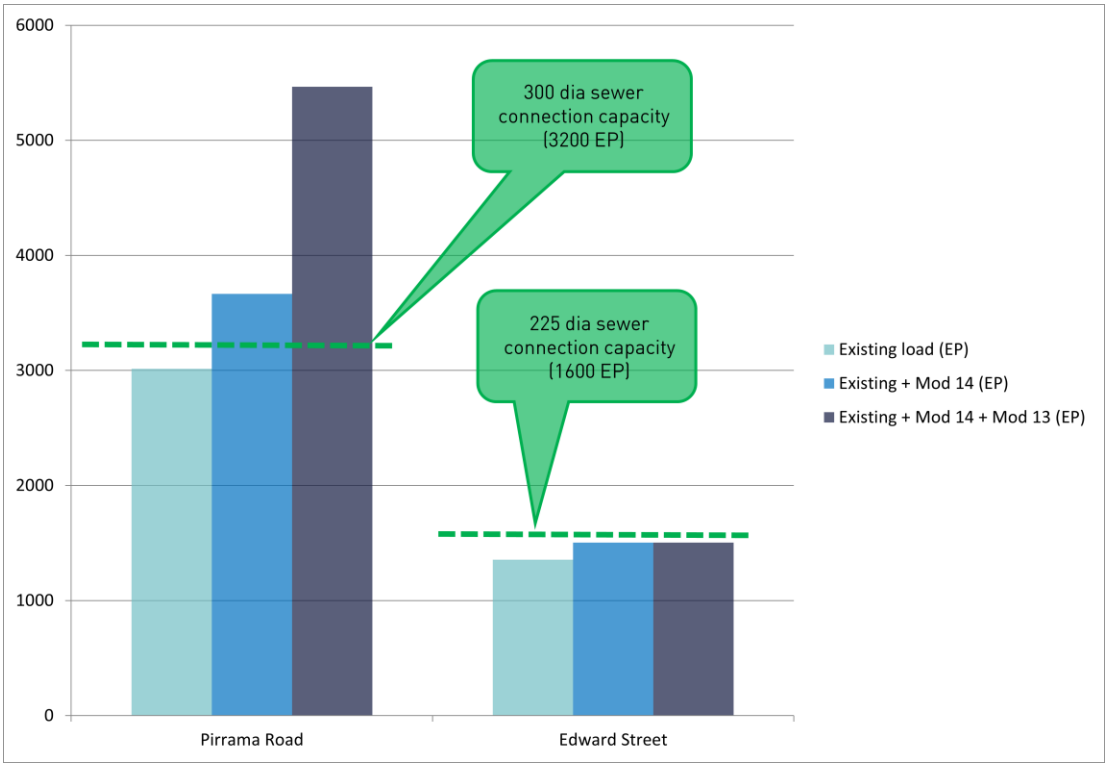


Figure 6 *Projected Sewer Flow Demand*

5.3 PROPOSED INFRASTRUCTURE WORKS

A new sewer main connection is proposed to meet the increased demand associated with the Modification 14 & 13 developments. The proposed 300mm sewer connection will extend from the Pirrama Road 375mm SWC sewer main.

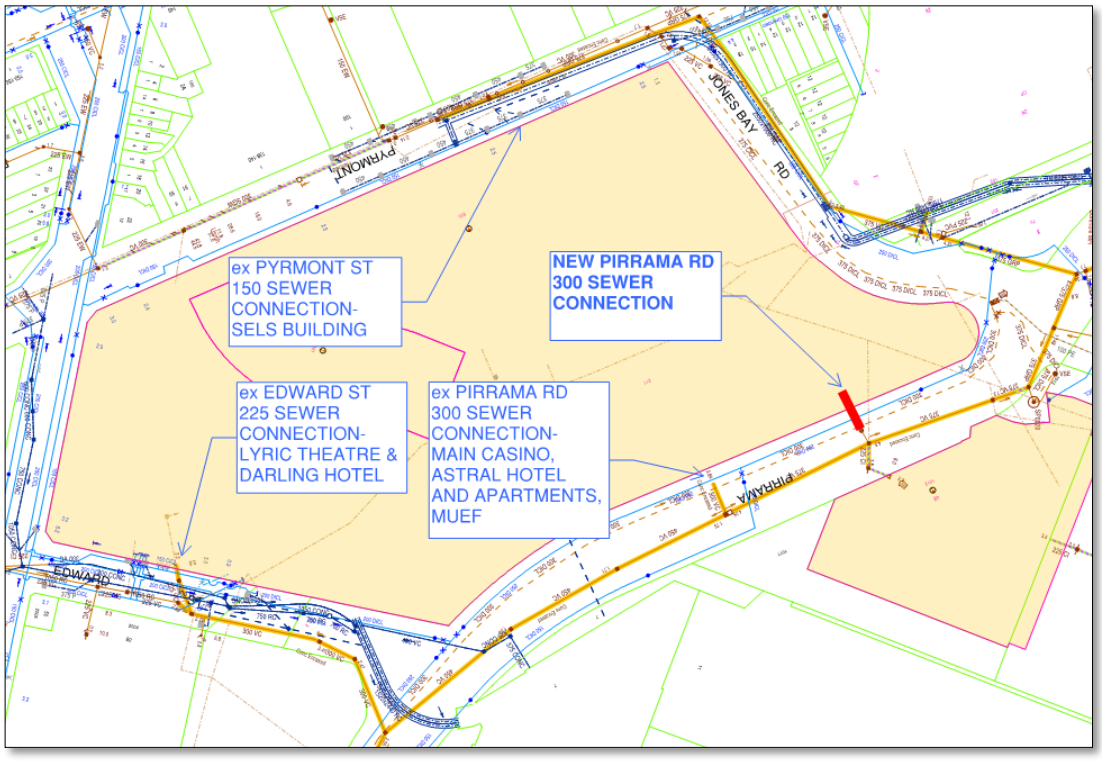


Figure 7 *Proposed Sewer Main Connection*

A Pre Section 73 ***Feasibility Letter*** request has been lodged with Sydney Water stating the above increase in sewer outflow demand with respect to the capacity of the existing 375mm Sydney Water Corporation's sewer main. The Feasibility Letter response is attached in Appendix B.

In summary, Sydney Water's response states;

Sewer

- A preliminary study shows that the wastewater gravity system has uncommitted spare capacity for the anticipated additional sewage load. The downstream pumping station has capacity but the dry weather storage is limited.

This response confirms that the existing 375 main has capacity for the proposed additional load; however there may be an associated infrastructure charge to increase the capacity of the downstream pumping station.

6 NATURAL GAS SUPPLY

6.1 EXISTING GAS CONNECTION

A 150mm Secondary - 1050Kpa high pressure gas main exists in Pirrama & Edward Street that currently supplies The Star with natural gas, as indicated below;

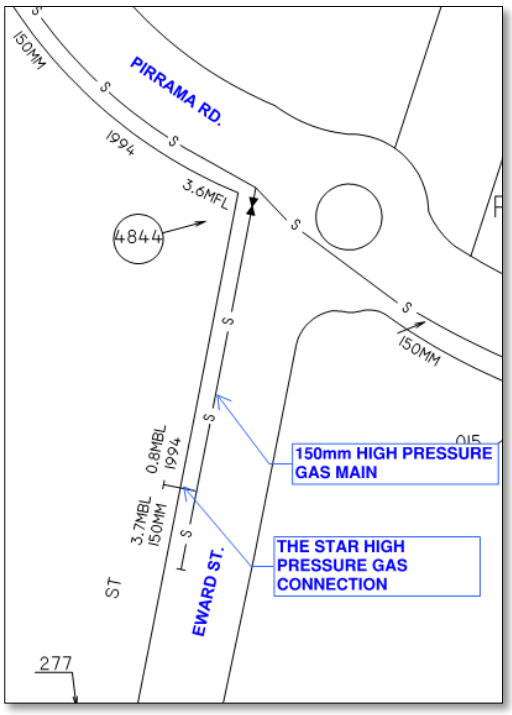


Figure 8 *Edward Street Gas Main and Connection point*

The Star has a single high pressure connection from the Edward Street main.

The gas is regulated down from 1050 kPa to 300kPa and reticulated through The Star. The gas pressure is further regulated at each kitchen and other points to 7kPa using double diaphragm regulators.

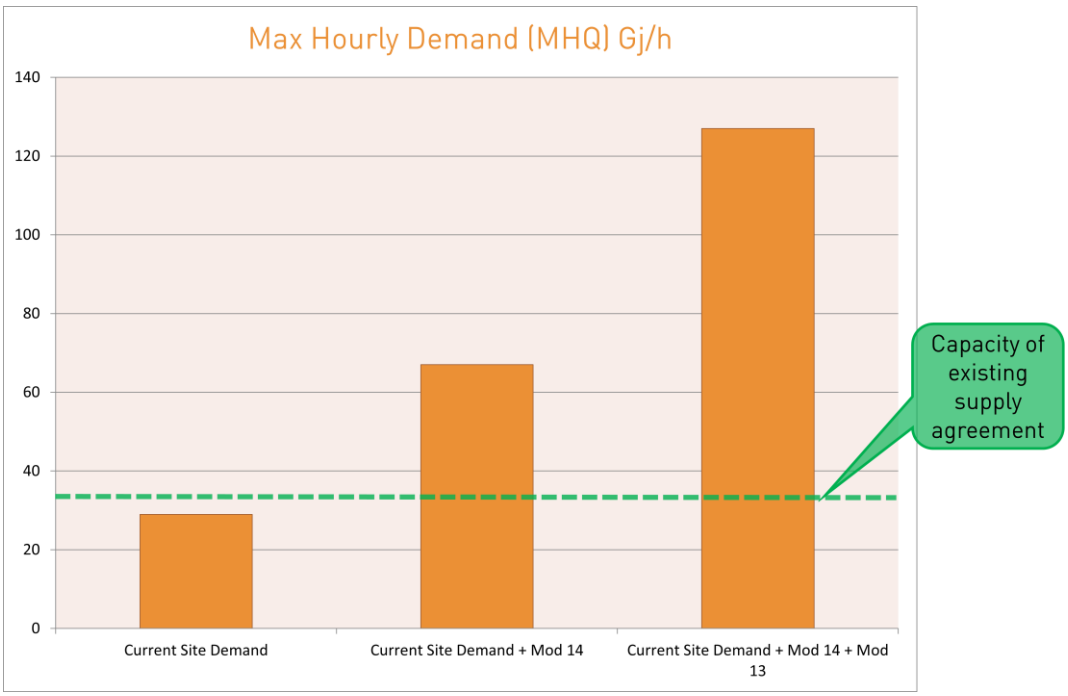
6.2 NATURAL GAS DEMAND

The existing gas supply to The Star is summarised below by the current **Supply Agreement Energy Australia August 2013**

CMHQ (GJ)	36	Contracted Max Hourly Quantity
CMDQ (GJ)	506	Contracted Max Daily Quantity
ACQ (GJ)	105,000	Contracted Max Annual Quantity

The existing MHQ demand for the site is approximately 29 GJ which is within the existing contracted MHQ capacity of 36 GJ.

The below diagram indicates the proposed demand associated with the Mod 13 & Mod 14 developments;



6.3 PROPOSED INFRASTRUCTURE WORKS

A new meter and regulator assembly will be required to accommodate the increased NG demand.

Discussions with Jemena have commenced regarding increased gas supply capacity. Jemena have indicated that the increased demand is available. A formal application is to be lodged on confirmation of when increased demands will be required.

7 STORMWATER

7.1 EXISTING STORMWATER INFRASTRUCTURE

The total catchment area of The Star is 39,206m^2 .The Star features three major stormwater discharge points from the site including two existing seawater cooling conduits that formed part of the former Pyrmont Power Station. These cooling conduits are now being utilised as stormwater culverts and are under the control of Sydney Water Corporation. The three major catchment areas for the site are;

7.1.1 Northern Seawater Conduit

The northern seawater conduit collects the stormwater discharge from approximately 30% of the site, or 11,815m^2. Of this catchment, 26% of the site, or 10,150m^2 is directed to a 225,000 litre stormwater harvesting tank. The stormwater harvesting tank is currently not operational for rainwater reuse. The tank is currently configured to act as a silt and oil arrestor.

7.1.2 Southern Seawater Conduit

The southern seawater conduit collects the stormwater discharge from approximately 55% of the site, or 21,720m^2. The internal stormwater drainage system incorporates silt arrestors prior to connection to the seawater conduit.

7.1.3 Edward Street Stormwater Main

The Edward Street stormwater connection collects the stormwater from approximately 15% of the site, or 5,671m^2. This area of The Star contains the Darling Hotel. This catchment drains to the stormwater main in Edward Street via a rainwater harvesting tank. This stormwater harvesting tank is used to supply recycled water to the Darling Hotel toilet flushing. The Edward street stormwater harvesting tank is configured to act as a silt and oil arrestor.

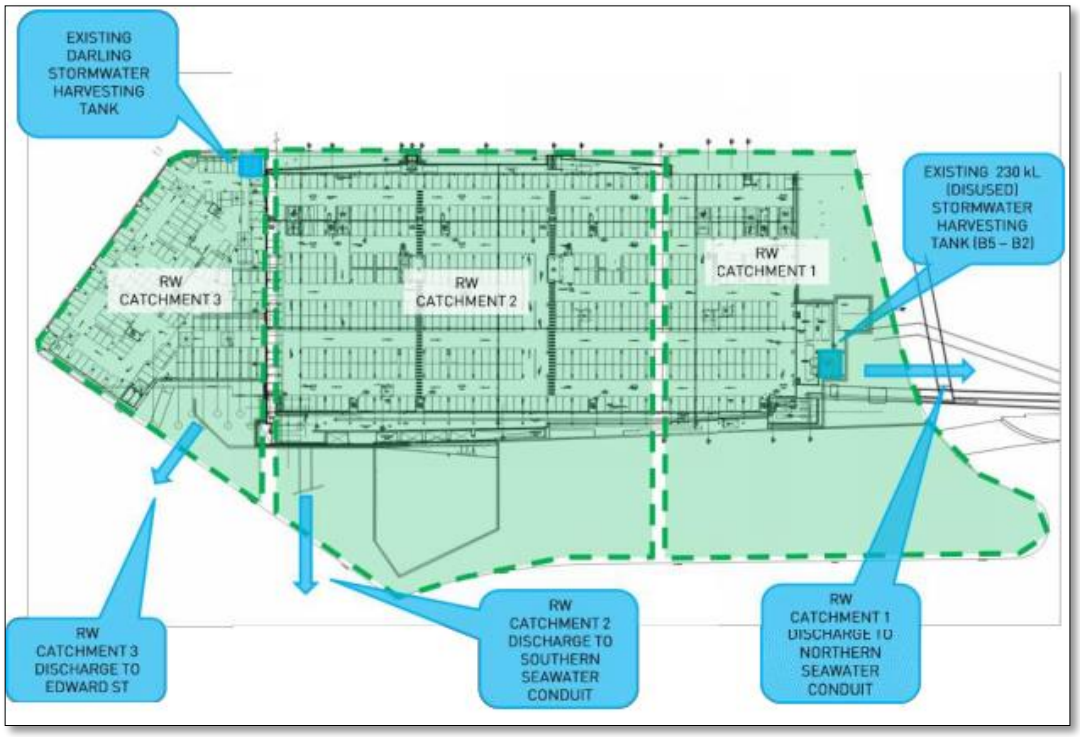


Figure 9 *Site Rainwater Catchment Zones and Points of Discharge*

Stormwater Infrastructure augmentation works have been recommended in the ***MOD 13 Flood Impact Assessment Report***. The proposed Stormwater works will address local flooding and overland flow issues around the site.

7.2 STORMWATER DESIGN CONSIDERATIONS

7.2.1 Demand Assessment

The catchment area for the site will not change with the proposed development; therefore there will be no increased stormwater flows for the site. Flow rates for the three existing catchment areas are;

Catchment Zone	Catchment Area	ARI 20yr 5 Min 206 mm/hr	ARI 100yr 5 min 266 mm/hr
Northern Seawater Conduit	11,815m^2	676 l/s	872 l/s
Southern Seawater Conduit	21,720m^2	1,243 l/s	1,604 l/s
Edward Street	5,671m^2	325 l/s	419 l/s

The existing site stormwater infrastructure has adequate capacity to drain the proposed new build areas.

7.2.2 Design Criteria

The internal Stormwater drainage system will be designed to the following criteria;

- To the installation requirements of Australian/New Zealand Standard 3500 - Plumbing and Drainage;
- Designed to a 1 in 100 ARI storm intensity of 5 minutes using the rational method of the Australian Rainfall & Runoff and the Experimental Building Station – Department of Housing and Construction – design notes.
- Overflows to be provide to all new roof and podium areas to cater for the blockage of the stormwater drainage system;
- New main distribution pipework shall be sized with a spare capacity of 30%;
- Pipework maintenance access to be avoided from high access areas and sensitive gaming areas;
- Pipework to be acoustically lagged in noise sensitive areas;
- New pipework shall be constructed from High Density Polyethylene (HDPE);
- All new rainwater outlets shall be of bronze construction and incorporate a puddle flange and membrane clamp;
- Maintenance access to be provided without the need for destruction of building elements.

7.2.3 Stormwater Discharge Quality Treatment

The Northern and Edward Street catchments feature silt arrestors that are incorporated into the harvesting tanks. The southern discharge features silt arrestors prior to discharge to the seawater conduit.

All carpark drainage is collected via a two separate stormwater pump systems. One in the Edward street catchment and the other services the rest of the carpark. Each features an oil separator at the collection sump.

New building area catchment will be directed to either the northern or southern collection systems, and utilise the existing stormwater quality treatment devices.

The new carpark excavation will be provided with a collection sump and pump out. This will also feature a silt arrestor and oil separation device.

7.2.4 Proposed Stormwater Infrastructure Works

The following Internal stormwater infrastructure works are proposed;

- Audit internal pipework for material faults and replace where required;
- Modify the access to the existing loading dock stormwater tank so that access is gained from Level B2;
- Desludge, clean, repair and reline and recommission the existing Northern stormwater harvesting tank for use;
- Direct new and modify existing stormwater drainage from reconfigured areas to discharge to Northern stormwater harvesting tank where practical;
- Install new rainwater pumps and filtration equipment at level B4 and interface with the existing site recycled flushing water distribution system

Due to the increased harvesting and reuse of rainwater catchment, the total volume of runoff from the site will be reduced, resulting in a positive environmental impact on the existing development and surrounding locality.

7.3 GROUNDWATER CONSIDERATIONS

The existing site features a subsoil drainage collection system which reticulates around the perimeter and below each lowest slab level. The existing basement extends 5 levels below ground floor. The subsoil drainage system discharges to two carpark drainage collection and pump out sumps. Collection is then pumped to the gravity stormwater drainage system within level B1.

The Mod 13 works include a new carpark excavation approximately 10 levels below ground level, to be located in the North West portion of the site. The excavation will be separated from the main building basement by the light rail and bus tunnels.

The JK Geotechnics report; ***Geotechnical Assessment Proposed DHW Tower,*** provides details of the process required to determine the most suitable dewatering strategies for both construction phase and the final built solution for the proposed basement excavation.

Any new groundwater collection systems will discharge collected groundwater to the stormwater outflow via the northern seawater conduit.

Should any contamination of groundwater be observed during planning and construction appropriate treatment systems will be provided to the collection system.

Any new groundwater collection system would be designed to the following criteria;

- Dual submersible pumps installed within the sub-soil collection well to transfer water up to the gravity stormwater drainage system.
- Pumps provided on a duty / standby arrangement where each pump is sized for 100% of the required duty, allowing full redundancy in the event of a single pump failure.
- The sub-soil drainage pump well would incorporate an oil and silt arrestor.

8 CONCLUSION

The proposed Hydraulic Infrastructure will be designed and constructed in accordance with;

- Plumbing Code of Australia
- Relevant Australian Standards
- Sydney Water Regulations
- Jemena Natural Gas Regulations
- City of Sydney Stormwater Management Policy

This Hydraulic Infrastructure Management Plan addresses the SEARs Application, number MP08_0098 MOD 13, relevant clauses including;

- *The applicant shall provide information on the required water and waste water services, electricity and gas and any augmentation of Sydney Water infrastructure that may be required for the proposed development.*

This Hydraulic Infrastructure Management Plan has identified the following key findings/conclusions and recommendations:

- A new water main connection is proposed to meet the increased demand associated with the Mod 14 & Mod 13 developments. The proposed 150mm main connection will extend from the Pirrama Road 250mm SWC water main
- A new sewer main connection is proposed to meet the increased demand associated with the Modification 14 & 13 developments. The proposed 300mm sewer connection will extend from the Pirrama Road 375mm SWC sewer main.
- A new Natural Gas (NG) meter and regulator assembly will be required to accommodate the increased NG demand. Preliminary discussions with Jemena suggests that the required gas demand is available in the local network.
- The existing site stormwater infrastructure has adequate capacity to drain the proposed new build areas. The catchment area for the site will not change with the proposed development; therefore there will be no increased stormwater flows for the site.
- The existing disused northern stormwater harvesting tank is to be reinstated. New drainage from MOD 13 areas will be diverted where practical to the reinstated harvesting tank
- Install new rainwater pumps and filtration equipment at level B4 and interface with the existing site recycled flushing water distribution system
- New building area catchment will be directed to either the northern or southern collection systems, and utilise the existing stormwater quality treatment devices.
- Any new groundwater collection systems will discharge collected groundwater to the stormwater outflow via the northern seawater conduit.
- Should any contamination of groundwater be observed during planning and construction appropriate treatment systems will be provided to the collection system.

In conclusion, the proposed hydraulic infrastructure works will facilitate positive environmental outcomes for the existing site and surrounding environment by reducing water stormwater runoff from the site and reusing more captured rainwater within the site.

APPENDIX A – SYDNEY WATER FEASABILITY LETTER

Case Number: 151098

3 March 2016

Paul Jacobsen
c/- MGP BUILDING & INFRASTRUCTURE SERVICES PTY LTD

FEASIBILITY LETTER

Developer:	**Paul Jacobsen**
Your reference:	**SY073856.s73**
Development:	**No. 80 SP 56913 Pyrmont Street, Pyrmont**
Development Description:	**Proposed upgrade to The Star. The new building features, gaming areas, dining, retail, serviced apartment/hotel. Please note that this includes 2 new proposed hotels/serviced apartment towers.**
Your application date:	**5 February 2016**

Dear Applicant

This Feasibility Letter (Letter) is a guide only. It provides general information about what Sydney Water's requirements could be if you applied to us for a Section 73 Certificate (Certificate) for your proposed development. **The information is accurate at today's date only.**

If you obtain development consent for that development from your consent authority (this is usually your local Council) they will require you to apply to us for a Section 73 Certificate. You will need to submit a new application (and pay another application fee) to us for that Certificate by using your current or another Water Servicing Coordinator (Coordinator).

Sydney Water will then send you either a:

- Notice of Requirements (Notice) and Developer Works Deed (Deed) or
- Certificate.

These documents will be the definitive statement of Sydney Water's requirements.

There may be changes in Sydney Water's requirements between the issue dates of this Letter and the Notice or Certificate. The changes may be:

- if you change your proposed development eg the development description or the plan/ site layout, after today, the requirements in this Letter could change when you submit

your new application; and

- if you decide to do your development in stages then you must submit a new application (and pay another application fee) for each stage.

Water

The following information is provided to assist in planning the servicing needs of the development, based on information supplied with this application:

- A Preliminary Water servicing investigation was based on a supply being sourced from either the 150mm main in Pyrmont Road, the 200mm main in Edward St, and the 250mm main in Pirrama Road. Based on the Building Heights the proposed development will require a connection to either the 200 or 250mm main.

Sewer

- A preliminary study shows that the wastewater gravity system has uncommitted spare capacity for the anticipated additional sewage load. The downstream pumping station has capacity but the dry weather storage is limited.

General Advice

- A more detailed investigation is required with the final development details and the analysis can be performed when the Section 73 application is lodged. The developer needs to engage a Hydraulic Consultant to study full impacts to our existing water and sewer system and any augmentation required.

- More information about the Section 73 application process is available on our web page in the Land Development Manual.

- As part of the Section 73 Application, you will need to get approval for your building plans and you will need to ensure your development satisfies Sydney Water's 'Multi-Level Individual Metering' requirements. In this regard, you must comply at all times and in respects with the requirements of Sydney Water's "Multi-level Individual Metering Guide".

OTHER THINGS YOU MAY NEED TO DO

Shown below are other things you need to do that are NOT a requirement for the Certificate. They may well be a requirement of Sydney Water in the future because of the impact of your development on our assets. You must read them before you go any further.

Disused Sewerage Service Sealing

Please do not forget that you must pay to disconnect all disused private sewerage services and

seal them at the point of connection to a Sydney Water sewer main. This work must meet Sydney Water's standards in the Plumbing Code of Australia (the Code) and be done by a licensed drainer. The licensed drainer must arrange for an inspection of the work by a NSW Fair Trading Plumbing Inspection Assurance Services (PIAS) officer. After that officer has looked at the work, the drainer can issue the Certificate of Compliance. The Code requires this.

Soffit Requirements

Please be aware that floor levels must be able to meet Sydney Water's soffit requirements for property connection and drainage.

Requirements for Business Customers for Commercial and Industrial Property Developments

If this property is to be developed for Industrial or Commercial operations, it may need to meet the following requirements:

Trade Wastewater Requirements

If this development is going to generate trade wastewater, the property owner must submit an application requesting permission to discharge trade wastewater to Sydney Water's sewerage system. You must wait for approval of this permit before any business activities can commence.

The permit application should be emailed to Sydney Water's Business Customer Services at businesscustomers@sydneywater.com.au

It is illegal to discharge Trade Wastewater into the Sydney Water sewerage system without permission.

A **Boundary Trap** is required for all developments that discharge trade wastewater where arrestors and special units are installed for trade wastewater pre-treatment.

If the property development is for Industrial operations, the wastewater may discharge into a sewerage area that is subject to wastewater reuse. Find out from Business Customer Services if this is applicable to your development.

Backflow Prevention Requirements

Backflow is when there is unintentional flow of water in the wrong direction from a potentially polluted source into the drinking water supply.

All properties connected to Sydney Water's supply must install a testable **Backflow Prevention Containment Device** appropriate to the property's hazard rating. Property with a high or medium hazard rating must have the backflow prevention containment device tested annually. Properties identified as having a low hazard rating must install a non-testable device, as a minimum.

Separate hydrant and sprinkler fire services on non-residential properties, require the installation of a testable double check detector assembly. The device is to be located at the boundary of the

property.

Before you install a backflow prevention device:

1. Get your hydraulic consultant or plumber to check the available water pressure versus the property's required pressure and flow requirements.
2. Conduct a site assessment to confirm the hazard rating of the property and its services. Contact PIAS at NSW Fair Trading on **1300 889 099**.

For installation you will need to engage a licensed plumber with backflow accreditation who can be found on the Sydney Water website:
http://www.sydneywater.com.au/Plumbing/BackflowPrevention/

Water Efficiency Recommendations

Water is our most precious resource and every customer can play a role in its conservation. By working together with Sydney Water, business customers are able to reduce their water consumption. This will help your business save money, improve productivity and protect the environment.

Some water efficiency measures that can be easily implemented in your business are:

- Install water efficiency fixtures to help increase your water efficiency, refer to WELS (Water Efficiency Labelling and Standards (WELS) Scheme, http:// www.waterrating.gov.au/
- Consider installing rainwater tanks to capture rainwater runoff, and reusing it, where cost effective. Refer to http://www.sydneywater.com.au/Water4Life/InYourBusiness/ RWTCalculator.cfm
- Install water-monitoring devices on your meter to identify water usage patterns and leaks.
- Develop a water efficiency plan for your business.

It is cheaper to install water efficiency appliances while you are developing than retrofitting them later.

Contingency Plan Recommendations

Under Sydney Water's customer contract Sydney Water aims to provide Business Customers with a continuous supply of clean water at a minimum pressure of 15meters head at the main tap. This is equivalent to 146.8kpa or 21.29psi to meet reasonable business usage needs.

Sometimes Sydney Water may need to interrupt, postpone or limit the supply of water services to your property for maintenance or other reasons. These interruptions can be planned or unplanned.

Water supply is critical to some businesses and Sydney Water will treat vulnerable customers, such as hospitals, as a high priority.

Have you thought about a **contingency plan** for your business? Your Business Customer Representative will help you to develop a plan that is tailored to your business and minimises productivity losses in the event of a water service disruption.

For further information please visit the Sydney Water website at: http:// www.sydneywater.com.au/OurSystemsandOperations/TradeWaste/ or contact Business Customer Services on **1300 985 227** or businesscustomers@sydneywater.com.au

Fire-fighting

Definition of fire-fighting systems is the responsibility of the developer and is not part of the Section 73 process. It is recommended that a consultant should advise the developer regarding the fire-fighting flow of the development and the ability of Sydney Water's system to provide that flow in an emergency. Sydney Water's Operating Licence directs that Sydney Water's mains are only required to provide domestic supply at a minimum pressure of 15 m head.

A report supplying modelled pressures called the Statement of Available pressure can be purchased through Sydney Water Tap in™ and may be of some assistance when defining the fire-fighting system. The Statement of Available pressure, may advise flow limits that relate to system capacity or diameter of the main and pressure limits according to pressure management initiatives. If mains are required for fire-fighting purposes, the mains shall be arranged through the water main extension process and not the Section 73 process.

Private Water Services Connection and Metering

To provide domestic water to the total development you will need to connect to the Sydney Water main. You must lodge an application for this connection at Sydney Water Tap inTM. We will then tell you about any requirements you need to meet. Visit www.sydneywater.com.au > Plumbing, building & developing > Building > Sydney Water Tap inTM to find out more.

Visit www.sydneywater.com.au > Plumbing, building & developing > Plumbing > Meters & metered standpipes to find out more about our metering requirements for your development.

Disused Water Service Sealing

You must pay to disconnect all disused private water services and seal them at the point of connection to a Sydney Water water main. This work must meet Sydney Water's standards in the Plumbing Code of Australia (the Code) and be done by a licensed plumber. The licensed plumber must arrange for an inspection of the work by a NSW Fair Trading Plumbing Inspection Assurance Services (PIAS) officer. After that officer has looked at the work, the drainer can issue the Certificate of Compliance. The Code requires this.

Other fees and requirements

The requirements in this Notice relate to your Certificate application only. Sydney Water may be involved with other aspects of your development and there may be other fees or requirements. These include:

- plumbing and drainage inspection costs;
- the installation of backflow prevention devices;
- trade waste requirements;
- large water connections and

- council fire-fighting requirements. (It will help you to know what the fire-fighting requirements are for your development as soon as possible. Your hydraulic consultant can help you here.)

No warranties or assurances can be given about the suitability of this document or any of its provisions for any specific transaction. It does not constitute an approval from Sydney Water and to the extent that it is able, Sydney Water limits its liability to the reissue of this Letter or the return of your application fee. You should rely on your own independent professional advice.

END