Project Star

Star City Casino, Sydney

for

Sydney Harbour Casino Properties Pty Ltd

Hydraulic Services Report

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1. Executive Summary

The sewer, stormwater, water and gas infrastructure for the Pyrmont area was upgraded in the mid 1990's and in particular the Star City and Switching Station sites.

The proposed development will include water saving measures such as blackwater treatment, stormwater harvesting and water efficient faucets that will reduce the overall demand on the public infrastructure.

The existing sewer drainage, stormwater drainage, water and gas service utility infrastructure has adequate capacity to serve the proposed project.

2. General

2.1 Introduction

Steve Paul and Partners has been commissioned by Sydney Harbour Casino Properties Pty Ltd to prepare a Hydraulic Services Report for the Project Star at the Star City Casino complex.

The proposed project consists of two elements. The first element of the project consists of a newly constructed Hotel, extended Casino area, and Basement Car Parking on the formerly known "Switching Station Site" (Lot 121 – DP828957). The second element consists of an expansion of the existing casino to create an expanded Ballroom at Level 3 and outdoor terraced areas from the Level 3 Podium to Pirrama Road Level. The casino element shall also establish Pirrama road as the main casino entrance. It shall also include an expansion and modification of the retail facilities.

It is proposed that the two sites are to be amalgamated into a single site with the intent being that the new Project Star Hotel is a separate strata title within the total development.

The purpose and scope of this report includes:-

- Assessment of existing infrastructure to identify the proposed connections for stormwater drainage, sewer drainage, domestic water, fire main water supply and natural gas.
- Provide a stormwater concept plan that nominates the catchment area and corresponding stormwater flows for the new-build areas of the new Star Hotel and the extended areas of the existing Casino to identify strategies for the management of stormwater drainage throughout the development ;
- Nominate the proposed methods of stormwater pollution control / treatment that are contained within the site prior to discharge to the authorities infrastructure;
- Provide recommendation for water usage minimisation to reduce the impact on the authorities' infrastructure and overall water consumption.

2.2 Location

The proposed development site for the Project Star Hotel has a total area of 4,756m^2, and is located on the north-west corner of the intersection of Union Street and Edward Street, Pyrmont (Lot121 – DP828957). The existing Star City Casino that will undergo proposed refurbishment and expansion with the existing site is located on Lot 200 – DP 867855 and is bounded by Pyrmont Street, Jones Bay Road and Pirrama Road, Pyrmont.

3. Stormwater Drainage

3.1 Existing Stormwater Infrastructure – Existing Casino Site

The stormwater mains within the Pyrmont area were upgraded by City West, now known as Sydney Harbour Foreshore Authority, as part of City West's charter to develop the Pyrmont area. This infrastructure upgrade that was performed in the mid 1990's provided the backbone infrastructure for the development of Pyrmont and resulted in stormwater mains capable of draining 1 in 100 storm events (Q100). It should be noted that it was the primary backbone mains that had the capacity for the Q100 with minor branch mains to some street collections pits not being upgraded and requiring separate and individual consideration of their capability. Localised flooding was particularly evident at the Casino Entrance in Pyrmont Street, where localised flooding occurs at the low point in Pyrmont Street, but this was overcome by raising the level of the Porte-Cochere.

The Star City Casino site currently discharges to the 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, all as indicated in Appendix A – Sydney Water Main Diagrams.

The northern seawater conduit collects the stormwater discharge from approximately 35% of the Star City Casino site (11,815m2) with 10,150 m2 being discharged via a 230,000 litre stormwater harvesting tank. The existing stormwater harvesting tank has been configured so that it also acts as a silt and oil arrestor.

The southern seawater conduit collects the stormwater discharge from the remaining 65% of the Star City Casino site (21,720m2). The internal stormwater drainage system incorporates silt arrestors prior to connection to the seawater conduit as indicated on Stormwater Concept drawing SW-102.

The existing stormwater infrastructure has adequate capacity to serve the expanded floor and terraced areas of the proposed project.

3.2 Existing Stormwater Infrastructure – Star Hotel (Former Switching Station Site)

As previously mentioned, the stormwater drainage infrastructure was upgraded to cater for a Q100 storm. The Switching Station Site was provided with a new 600mm stormwater main as part of the City West upgrade. The Sydney Water diagrams do not show the 600mm stormwater main. However, we can confirm its installation in accordance with Appendix B – Switching Station Stormwater Mains. The 600mm stormwater main drains to the southern seawater conduit via a 1,050 & 750 mm stormwater mains.

The above-mentioned 600mm stormwater main was installed at the time the Casino was in construction and an easement was created based on the "As-Installed" survey to determine its horizontal and vertical alignment. This easement is reflected in Appendix C – DP 867855.

The 600mm reinforced concrete stormwater main has adequate capacity to drain the Star Hotel project with a capacity of 820 litres/sec. The total Q100 discharge for the Star Hotel element of the project has been calculated at 357 litres/sec. This discharge shall be via a stormwater harvesting tank which shall reduce the total annual discharge to the Sydney Water stormwater infrastructure.

The existing stormwater infrastructure has adequate capacity to serve the proposed Star Hotel element of the project.

3.3 Stormwater Detention

As result of the City West upgrade of the stormwater backbone to cater for a 1 in 100 year storm event, stormwater detention would not be required for the Star Hotel and Casino extension works. Initial discussions with Sydney Water Corporation have confirmed that stormwater detention is not required. A pre-submission Section 73 Application has been lodged with Sydney Water Corporation.

3.4 Stormwater Drainage Concept

The proposed stormwater concept is indicated on Drawings SW-100 to SW-108 (Appendix D) and generally contains the following conceptual elements:-

- The existing stormwater infrastructure has adequate capacity to drain the proposed site;
- The stormwater drainage systems shall be designed for a 1 in 100 – 5 min storm event in accordance with AS3500 and the Australian Rainfall and Runoff publication;
- Overflows shall be provided to all roof and terraced areas;
- The new-build areas in the existing Casino would connect to the existing stormwater that is located within the area below;
- There will be no increased stormwater flows from the Casino Refurbishment / Extension element of the project;
- A 600mm stormwater drain that crosses the carpark will be diverted into the Star Hotel stormwater harvesting tank. This will provide an additional area of 8,950m2 that will drain via the proposed additional stormwater harvesting tank;
- Stormwater harvesting is proposed for the Star Hotel element of the project and would be supplemented from the intercepted existing 600 mm stormwater drain;
- Syphonic drainage is proposed for the Star Hotel upper roof and convention stormwater drainage for the lower roofs and terraces;
- The Star Hotel stormwater harvesting tank would be configured to form the function of an oil and silt arrestor;
- Two 600mm overflows would be provided from the new stormwater harvesting tank, with one overflow connecting back into the existing casino stormwater connection. The second 600mm overflow would connect to the 600mm stormwater main that was provided to drain the Switching Station Site;
- A gross pollution trap would be incorporated into the new overflow connection;

3.5 Basement Drainage

A basement drainage system will be required for the Star Hotel element of the development to cater for minor areas of the development that are unable to be drained by gravity, sub-soil drainage provisions required for the below ground basement, and seepage water ingress to the perimeter of basement levels.

The basement drainage system will consist of a pipework network to collect and transfer water to the sub-soil collection well. Dual submersible pumps shall be installed within the sub-soil collection well to transfer water up to the gravity stormwater drainage system. Pumps shall be 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.

3.6 Stormwater Pollution Control

All stormwater discharged from the site will pass through a pollution control device. The devices will consist of stormwater harvesting tank that will be configured to act as a silt and oil arrestor. The car park drainage / sub-soil system shall also be fitted with an oil separator and silt arrestor prior to discharging into the internal stormwater drainage system.

3.7 Overland Flow Path

The site is located higher than the surrounding sites, and is surrounded by roadways that generally fall away from the site. As previously mentioned there is localised flooding in Pyrmont Street and the levels of the Porte-Cochere and Pyrmont Street entrances are set above the Q100 water level. The Star Hotel site is provided with a natural 1 in 100 flood path along Union and Edward Streets. As such overland flow will not be a factor requiring further consideration on this development.

4. Sewer Drainage

4.1 Existing Sewer Infrastructure – Existing Casino Site

The existing Star City Casino drains via a 300mm sewer connection to the 375mm Sydney Water sewer main that is located centrally on the Pirrama Road frontage and a 225mm sewer connection that drains to a 300mmm sewer main in Edward Street as indicated in Appendix A – Sydney Water Mains Diagrams.

The 225mm sewer connection drains the Lyric Theatre, DAF Grease Waste Treatment Plant, Apartments and a section of the retail component of the Casino. The capacity of the 225mm sewer connection is 4,500 fixture units (FU) - the total connected load for this connection is 2,090 FU. This results in a spare capacity of 2,410 FU. It should be noted that this sewer connection was not part of the original master plan to drain the Casino site and was added due to difficulties encountered by draining the remote southern sections of the Casino. This additional sewer connection resulted in the 300mm sewer connection having spare capacity.

The 300mm sewer connection drains the remainder of the Star City Casino, with the exception of the SELS Heritage Building that drains to Pyrmont Street. The capacity of the 300mm sewer connection is 11,400 FU with the total connected load for this connection being 7,188 FU. This results in a spare capacity of 4,212 FU.

The existing sewer connections have more than adequate capacity to drain the proposed extension / refurbishment elements of the project.

4.2 Existing Sewer Infrastructure – Star Hotel (Former Switching Station Site)

As previously mentioned, the infrastructure was upgraded in the mid 1990's as part of City West's charter for developing the Pyrmont area. The Switching Station Site was provided with a new 225mm sewer main, as part of the infrastructure upgrade, as indicated on Appendix A – Sydney Water Mains Diagrams.

The 225mm sewer main has a capacity of 4,500 FU and the expected sewer discharge without consideration of a Blackwater Treatment Plant (refer "Water Management" section of this report) for recycled water is 2,110 FU. This results in a spare capacity of 2,390 FU.

The existing Sydney Water sewer connection has more than adequate capacity to drain the proposed Star Hotel

element of the project.

5. Water Services

The existing Star City Casino is provided with domestic and fire fighting water supply from the 250mm water main that is located in Jones Bay Road as indicated on Appendix A – Sydney Water Mains Diagrams.

The Star Hotel site is bounded by the existing Star Casino site, Union and Edward Streets. A 200mm water main is available for connection in Edward Street.

As later described in this report, a Pre-submission Section 73 Application has been made to determine Sydney Water Corporation's connection requirements.

At the time the Star City Casino was constructed, there was adequate pressure and flows within the newly constructed water mains. The above water mains were constructed as part of City West's infrastructure upgrade in the mid 1990's for the Pyrmont area.

It is proposed that the Star Hotel would be fed from a new independent connection from the 200mm Edward Street water main.

The water mains that feed Star City Casino and the front of the Star Hotel site are considered of adequate capacity to serve the proposed project.

6. Section 73 Application

A Pre-submission Section 73 Application has been made to Sydney Water's Service Officer.

As part of the original Star City Casino project, Sydney Water allowed connection to the water mains that surrounded the site and a sewer connection was provided in a central position along the Pirrama Road frontage. These connections were in line with the City West's infrastructure upgrade for the development of the two sites.

Sydney Water Corporation levied Section 73 charges for the Star City Casino development but these levies were subsequently returned to the Developer following a decision by the Independent Pricing Tribunal, which ruled that as the sewer and water mains infrastructure upgrade received funding from the federally-funded "Building Better City Fund", Sydney Water could not charge the respective Developers for the infrastructure upgrade.

When development approval is received a further Section 73 Application shall be made to determine Sydney Water's requirements for the project.

7. Gas Service

A 150mm Secondary - 1050Kpa high pressure gas main exists in Pirrama & Edward Street that currently supplies Star City Casino with natural gas, as indicated in Appendix E – Gas Main Diagram.

It is proposed that Star Hotel will be fed from the existing high pressure service, with a separate new gas regulator

and meter assembly being installed within the existing gas meter room that is located on the Edward Street frontage.

Discussion with Alinta has indicated that the existing connection has adequate capacity for the project.

8. Water Management

8.1 Stormwater Harvesting

A stormwater harvesting and recycled water system is proposed for the development. The recycled water from the system is being considered for cooling tower water supply, toilet flushing, urinal flushing and landscape irrigation.

The stormwater harvesting tank will be located within the car park and will receive rainwater run-off from the Star Hotel and intercepted section of the existing Star Casino stormwater drainage that currently discharges to the southern seawater conduit, as indicated in Appendix D – Stormwater Concept Plans.

Water shall be treated to Grade A+ quality for irrigation and flushing. This treatment would consist of multi-medium filtration with ionization for disinfection. Cooling tower make-up supply shall be further treated using slip stream reverse osmosis treatment to provide a greater level of mineral removal.

Overflows shall be provided from the stormwater harvesting tank to connect to the exiting stormwater connection for the water that is being intercepted from the existing Star City Casino stormwater drainage system and to the 600mm existing stormwater main for the Star Hotel.

8.2 Blackwater Treatment Plant

A blackwater treatment plant is also being considered to supplement the stormwater harvesting / recycled water system. The system would consist of a Membrane Bio-Reactor (MBR) biological system which will be configured to reduce total nitrogen through intermittent aeration. Aerobic treatment will occur in an aeration tank fitted with fine pore aerators. The membranes will be located in a single cell outside the biological system, Membrane Operating Systems (MOS). The membranes in the MOS will be completely isolated from the biological system, to enable a clean, maintenance-friendly and odour-free membrane cleaning process.

The filtrate from the MOS will be further treated with chlorine dosing or equal approved alternative. The treated water will be monitored for authority compliance and will not be delivered for re-use if outside the water quality specifications. The treated water will flow to a break tank where it will be either transferred to a toilet flushing holding tank or be further treated for cooling tower make-up.

A further treatment train will be used to supply ultra-pure water for cooling tower top-up. A Reverse Osmosis (RO) plant with pre-treatment and post-treatment will be located in the B1 Level plant room. The RO plant will guarantee low Total Dissolved Solids (TDS) water supply to the cooling tower (as this will be the primary source of water), and guarantee the virus log reductions required to manage possible health concerns of the building occupants.

8.3 Water Efficient Tapware

Potable cold water consumption for the proposed development can be further reduced via the installation of water more efficient fixtures and tapware. Fixtures and tapware selections for the proposed development will be selected to meet the following criteria;

- WELS 4 Star rated toilets, having an average volume per flush not more than 3.3 litres.
- WELS 5 Star rated urinals, having an average volume per flush not more than 1.0 litre.
- WELS 5 star rated tapware, having a flow rate of not more than 6.0 litres per minute.
- WELS 3 star rated showers, having a flow rate of not more than 9.0 litres per minute.

Appendices

Appendix A – Sydney Water Mains Diagrams

Appendix B – Switching Station Site Stormwater Mains

Appendix C – DP 867855

Appendix D – Stormwater Concept Plans

Appendix E – Gas Mains Diagram

Appendix A
Sydney Water Mains Diagrams

Appendix B
Switching Station Site Stormwater Mains

Appendix C
DP 867855

Appendix D
Stormwater Concept Plans

Appendix E
Gas Mains Diagram