RobertBirdGroup

# Preliminary Integrated Water Management Plan

# 1 Alfred Street, Sydney

**Prepared For: Crone Partners**

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# 1.0 Introduction

This preliminary Integrated Water Management Plan (preliminary IWMP) has been prepared in support of the Stage 1 DA for 1 Alfred Street, Sydney, and responds where possible to the Secretary's Environmental Assessment Requirements (SEAR) Item 13 – **Water, Drainage, Stormwater and Groundwater** as relevant for the Stage 1 building envelopes. SEAR Item13 includes the following items:

- Prepare an Integrated Water Management Plan, detailing stormwater and wastewater management, including any re-use and disposal requirements, demonstration of water sensitive urban design and any water conservation measures, and identification of any appropriate water quality management measures.
- Provide information on the required water and waste water services and any augmentation of Sydney Water infrastructure that may be required for the proposed development.
- Undertake an assessment of the potential impacts on water quality of the
- Tank Stream and assess the site in terms of the Aquifer Interference Policy.
- Assess impacts on surface and ground water quality and hydrology including proposed management, mitigation and monitoring measures.
- Assess the potential impact of the development on groundwater flow paths, discharge flows, levels and quantity.
- Identification of any water licensing requirements or other approvals required under the Water Act 1912 or Water Management Act 2000 or Protection of the Environment Operations Act 1997.
- Include a suitable water quality monitoring program and Groundwater Monitoring Plan (including groundwater level, quality, quantity and flow).
- Consideration of any impacts on groundwater dependent ecosystems.

This preliminary IWMP addresses the relevant water management considerations within the following sections:

- Stormwater quantity management including flood protection;
- Stormwater quality management;
- Groundwater considerations;
- Erosion and sediment control during construction; and,
- Water and wastewater.

At this stage, no design coordination has been undertaken on services or water cycle management proposals and therefore the report at this stage is a high level review of the detail that is to be developed into an Integrated Water Management Plan (IWMP) in future design phases.

Inputs from the Building Services, Geotechnical, Flood and Environmental Engineers and Specialists will be required to develop the IWMP.

# 2.0 Site Overview

1 Alfred Street (Goldfield House), 19-31 Pitt Street (Fairfax House), and 31A Pitt Street (The Rugby Club), Sydney is proposed for a Mixed Use Hotel, Residential, Club and Retail Development.

The site is approximately 0.39 ha and is bounded by Pitt Street, Alfred Street, George Street, 174 George Street and Rugby Place.


**Figure 2.1 – Site Locality Plan**

# 3.0 Stormwater Quantity Management

## 3.1 Codes and Specifications

The stormwater design of the project is to be carried out in accordance with the relevant Sydney City Council requirements, national design guidelines and Australian Standard Codes of Practice, including:

- City of Sydney Development Control Plan (DCP), 2012 and specifically the following documents
  - City Area Catchment Flood Study Final Report October 2014
  - Section 3 General Provisions
- AS3500.3 National Plumbing and Drainage Code Part 3: Stormwater Drainage;
- Australian Rainfall and Runoff (1997 Edition) Volumes 1 and 2.

## 3.2 Design Criteria

The proposed stormwater management design criteria are summarised in the following table:

| STORMWATER MANAGEMENT CRITERIA | |
|---|---|
| **Item** | **Control or Design Criteria** |
| Minor Design Storm – network design | 5 AEP (ARI 20year) event are conveyed by a minor drainage system, including all pipes and associated components.(Section 3 Clause 3.7.2) |
| Major Design Storm – overland flow | Storm events above 5% AEP (ARI 20year) and up to 1% AEP (ARI 100year) are conveyed by a major drainage system, the overland flow paths assessed by flood engineer (Section 3 Clause 3.7.2) |
| Determining Flow Rate – Hydrology and Hydraulics | DRAINS modelling to design and analyse piped stormwater drainage system with rational method according to Australian Rainfall & Runoff (AR&R). |
| Pipe Sizes and Velocities | Minimum pipe size must be ø375mm from Council's Public Works Design Package, where the line receives runoff from paved or unpaved areas within the property.<br>The minimum pipe velocity should be 0.6m/s and a maximum of 6.0m/s. |
| Pit Blockage Factor | The site-specific flood study is to assume the 'worst case scenario; conditions for blockage s to pipes such that:<br>(a) Kerb inlets are assumed to be 50% blocked<br>(b) Sag pits are assumed to 100% blocked<br>(ref Section 3 Clause 3.7.1) |
| Overland Flow Paths | The design of the internal overland flow paths must consider the velocity-depth hazard.<br>For this project, depth x velocity values should not exceed 0.4 $m^2/s$ in the 1% AEP (100yr ARI) event for reasons of pedestrian safety. External roadways are major overland flow paths exceed these values (refer Section 3.3) |

**Table 3.1 – Stormwater Management Design Criteria**

In accordance with CoS DCP General Provisions Section 3.7.2, a Local Drainage Management Plan is to be prepared in future design stages. The plan shall include assessment of opportunities for stormwater detention and/or retention.

## 3.3 Flood Information

The City Area Catchment Flood Study Final Report October 2014 prepared by BMT WBM identifies Pitt Street as having a long history of flooding incidents including numerous occasions "where the water level reached a depth of at least 300 mm which exceeded the kerb level and flooded adjacent shops. "

The BMT WBM report notes that "modelling shows that Circular Quay is susceptible to flooding. Upstream overland flows, mainly from Pitt Street, flow rapidly in a northern direction towards Circular Quay and Sydney Harbour, Alfred Street is relatively flat and upstream flows spread out at this location before flowing under the Cahill Expressway. "


**Figure 4.1 Flooding Map of Circular Quay (BMT WBM Report Figure 5-11)**

Pitt Street in rare storm events is a floodway. "It acts as the primary overland flow path for most of the Sydney City Area catchment. In the 1% AEP (100 yr ARI) design event, approximately 20 m3/s is conveyed along Pitt Street at a depth of up to 0.5 m and velocity of 2.5 m/s. These flooding characteristics represent a significant risk to pedestrians, motorists and property along the majority of Pitt Street within this catchment from Park Street in the south to Alfred Street/ Circular Quay in the north."

Flood map A-27 from the report indicates that the Provisional Hydraulic Hazard is in the range of between 'medium hazard' along the footpaths, and 'high hazard' within the roadway of Pitt Street adjacent to the development in the 10% AEP (10yr ARI) event. Flood map A-29 indicates that in the 1% AEP (100yr ARI) event, the Provisional Hydraulic Hazard is high for the full width of Pitt Street.

Provisional Hazard Categories as defined by the NSW Government's Floodplain Development Manual (NSW Government, 2005) defines flood hazard categories as follows:

- High hazard – possible danger to personal safety; evacuation by trucks is difficult; able-bodied adults would have difficulty in wading to safety; potential for significant structural damage to buildings; and

- Low hazard – should it be necessary' trucks could evacuate people and their possessions; able-bodied adults would have little difficulty in wading to safety.

Flood protection levels are to be established in future design stages, including setting of retail ground floor levels, basement entry levels, and emergency response procedures for occupants and the general public. Requirements are to be in accordance with City of Sydney DCPs and the NSW Floodplain Development Manual.

# 4.0 Stormwater Quality Management

## 4.1 Water Quality Objectives

The WSUD design for the Public Domain will be in accordance with the City of Sydney DCP 2012.

The target pollutant reductions are summarised in Table 3.1.

| Stormwater Quality Management Targets | |
|---|---|
| **Pollutant** | **Target Reduction** |
| Total Suspended Solids (TSS) | 85% |
| Total Phosphorous (TP) | 65% |
| Total Nitrogen (TN) | 45% |
| Gross Pollutants (>5mm) | 90% |

**Table 3.1 – Water Quality Pollutant Reduction Targets**
**(City of Sydney DCP 2012 Section 3 General Provisions Clause 3.7.2)**

In accordance with the City of Sydney WSUD policy, water sensitive urban design is to be applied in at least 10% of opportunities presented by renewal of streets and open spaces.

To achieve the target water quality criteria, it is proposed to integrate WSUD measures within the development. Measures such as bio-retention, litter baskets, and/or GPTs, shall be investigated and coordinated with landscape designs, and ultimately modelled using MUSIC software to demonstrate targets are achieved or exceeded.

# 5.0 Groundwater

The proposed design and construction of the development is to be in accordance with the requirements of the NSW Aquifer Interference Policy. The Water Management Act 2000 defines an aquifer interference activity as that which involves any of the following:

- the penetration of an aquifer;
- the interference with water in an aquifer;
- the obstruction of the flow of water in an aquifer;
- the taking of water from an aquifer in the course of carrying out mining or any other activity prescribed by the regulations; and
- the disposal of water taken from an aquifer in the course of carrying out mining or any other activity prescribed by the regulations.

No groundwater investigations or impact assessments have yet been conducted for the proposed development. Groundwater investigation and assessments are to be undertaken in future design stages including the following:

- An assessment of the proposed impact on water quality of the tank stream and the Aquifer Interference Policy will occur prior to works commencing;
- Assess impacts on surface and ground water quality and hydrology including proposed management, mitigation and monitoring measures.
- Assess the potential impact of the development on groundwater flow paths, discharge flows, levels and quantity
- A ‘suitable water quality monitoring program’ and Groundwater Monitoring Plan will be provided at the Stage 2 DA for the basement; and
- Consideration of any impacts on groundwater dependent ecosystems will be undertaken as part of the Stage 2 DA.

# 6.0 Erosion and Sediment Control

In order to maintain the quality of stormwater discharge from the site during the construction stage, an erosion and sediment control plan is to be prepared. Surface water management measures shall be in accordance with the Landcom guidelines – Managing Urban Stormwater Runoff: Soils and Construction ("Blue Book") and the CoS DCP.

Potential erosion and sediment control measures for the development may include, but not be limited to, the following:

- Settling tanks/basins;
- Surface water collection systems i.e. drains to collect construction site runoff and convey flows to control and treatment systems ;
- Shaker grid and was down areas at vehicle entry points; and,
- Sediment protection devices on existing and proposed inlet pits.

# 7.0 Water and Wastewater Management

Opportunities exist for reducing the demand and load on local water and wastewater infrastructure that contribute to improving water cycle management. Several options for consideration by the design team are provided below for further investigation in design development stages.

## 7.1 Potable Water Demand Reduction

The following potable water demand reduction strategies could be considered:

- Selection of water efficient fixtures;
- Systems design to include for recirculation of test fire water;
- Rainwater harvesting and re-use as toilet flushing and irrigation;
- Installation of smart meters (to Sydney Water standards); and,
- Selection of drought tolerant landscape elements that require low irrigation water demand.

## 7.2 Wastewater Load Reduction

The following wastewater load reduction strategies could be considered:

- Greywater recycling and reuse;
- Specification of low infiltration network fittings to reduce groundwater infiltration; and,
- Selection of water efficient fixtures that contribute to wastewater loads;

## 7.3 Water Licensing

Water licensing and approval requirements will be subject to the proposed water management systems adopted. No water licensing requirements have yet been identified. The requirements, and approvals for such, shall be addressed in future stages in accordance with the *Water Act 1912 or Water Management Act 2000 or Protection of the Environment Operations Act 1997*.

## 7.4 Water and Wastewater Services Augmentation

Water and waste water services, including any augmentation of Sydney Water infrastructure that may be required for the proposed development, is to be addressed by the Building Services Engineer in the future design phases.

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