PROPOSED MIXED USE DEVELOPMENT

AT

160 OXFORD STREET, PADDINGTON

INTEGRATED WATER MANAGEMENT REPORT

REVISION A

DECEMBER 2025

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APPLICATION DETAILS

Property Address: 160 Oxford Street, Paddington

Proposal: Mixed Use Development

REPORT CERTIFICATION

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DOCUMENT CONTROL

REVISION	ISSUE DATE	ISSUED TO	ISSUED FOR
A	15th December, 2025	COUNCIL	APPROVAL

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1. INTRODUCTION

Mance Arraj Engineering Pty Ltd has been engaged to undertake an integrated water management study for the proposed of redevelopment of 160 Oxford Street, Paddington.

1.1 OBJECTIVES

Woollahra Council Development Control Plan (DCP) adopts stormwater management policy in accordance with Chapter E2 of the DCP, which aims to manage and maintains the impacts of development to provide the community with a safe and reliable stormwater network. As part of this policy the development application must demonstrate that the proposed development must consider:

1. The ecologically sustainable stormwater management and the use of water sensitive urban design,
2. To maintain the existing natural drainage patterns, and
3. To ensure that adequate provision has been made for the disposal of stormwater from land proposed to be developed.
4. To ensure the controlled release of stormwater to public stormwater systems without adversely impacting on adjoining or downstream properties
5. To protect Sydney harbour and its waterways from stormwater pollution
6. To minimise flood risk and damage to people and property by setting appropriate development controls
7. To ensure that flood levels are not increased by the development
8. To minimise the risk and impacts relating to excavation, subterranean buildings and dewatering works.

1.2 THE EXISTING SITE

The development site is comprised of the following properties known as Lot 1 DP 70235, Lots 1-5 in DP 263685 and SP 13018 known as No 142-160 Oxford Street, No 13 Gipps Street and No 6 Shadforth Street, Paddington. The site is irregular in shape with a site area of 2173m^2. Although, No 13 Gipps Street is a part of the amalgamation of these properties, it not being proposed as part of the area to be redeveloped. Therefore, the total site area considered for this assessment has excluded No 13 Gipps Street property. The site situated north of Oxford Street, south

of Gipps Street, west of Shadforth Street and is surrounded by residential and commercial properties.

The existing comprises of a three-storey brick building, two storey semi attached brick building, two storey cottage and a two-storey residence.

According to the detailed site survey the site's elevation ranges from RL.52.84m (north near Gipps St) to RL.54.75m AHD (east near Shadforth St) and RL.51.55m AHD (south near Oxford St). The site slopes from north-east to south-west at a gradient of approximately 4.4%.

The location of the subject site is shown in Figure 1 below:

Figure 1 - Aerial Photo, Development Site known as No. 160 Oxford St, Paddington

1.3 THE PROPOSED DEVELOPMENT

The development application proposes to demolish all existing structures, except for the residence at No 13 Gipps St which is to remain undeveloped and as such is excluded from the MUSIC modelling. The development proposes to construct a new mixed-use development containing a four-level basement carparking, retail shops along ground floor and residential apartments above.

2. STORMWATER QUANTITY MANAGEMENT

According to the Woollahra Council Stormwater Management Policy the proposed stormwater management intends to reduce and mitigate the peak stormwater flow from a development site and allow the controlled release of stormwater to the public stormwater system for all storm events up to and including the 1% Annual Exceedance Probability (AEP) through On-Site Detention (OSD).

According to Section E2.2.4 of Woollahra Council's DCP the development is required to provide OSD storage at a rate of 20m^3 per 1000m^2. Since, the area being redevelopment is 2022m^2 the required OSD volume is then 40.44m^3.

Section E2.2.4 also allows for rainwater storage to be provided at a rate of 1.5 times the required OSD volume, therefore, this approach has been elected as provides benefits to the reuse of stormwater run-off and improved water quality discharged from the site. Accordingly, a minimum of 60.7kL rainwater tank has been provided in lieu of On-Site Detention.

3. STORMWATER QUALITY MANAGEMENT

3.1 WATER QUALITY

Changes in urbanisation, particularly population growth and increasing urban density, have created a dramatic increase in the area of impervious surfaces within a typical urbanised catchment. The high proportion of sealed areas greatly affects both the quality and quantity of water infiltrating the soil and, as most of this rainfall is converted into run-off it is then directed into our urban waterways. Run-off carries a range of pollutants into waterways and, although concentrations may be diluted during a run-off event, the total loads can affect the environmental quality of downstream aquatic habitats. The types of pollutants that can be found in stormwater runoff are sediments, nutrients, oxygen-demanding substances, pH (acidity), micro-organisms, toxic organics, heavy metals, litter, soil and increased water temperature. It is recognised that a large component of this is contributed by run-off from roads; however, the traditional forms of stormwater management allow the unimpeded transport of pollutants from private developments into waterways. The guiding philosophy of water sensitive urban design is centred on achieving sustainable urban water management solutions for urban developments.

As organic waste breaks down in a waterway a number of natural compounds such as nitrogen and phosphorus, which are essential to plant and animal life, are released. In their natural state, Australian soils and waterways are generally low in nutrient content, and consequently, the organisms living in Australian waterways have adapted to low nutrient conditions. Fertilisers such as blood and bone, superphosphate, seaweed and animal manure are used widely on private gardens and on the many parks and golf courses that are close to waterways which drain to the stormwater systems within a Council. Stormwater runoff from these areas contributes phosphorus and nitrogen to our waterways.

As such in order to limit the amount of nutrients that run-off from the sites it is important to intercept these nutrients.

This section of the report addresses the long term impacts of the development on water quality and quantity. For short term effects (i.e. during the construction phase) water quality control is achieved by implementing the Sedimentation & Erosion Control measures in accordance with the submitted drawings.

3.2 WATER QUALITY CONTROL MEASURES

There are number of measures that can reduce pollutant loadings, however, each different type has its own effectiveness in reducing pollutant loadings that depends on land use type, topography and the target control.

The adopted Treatment Train will provide the most efficient and manageable measures, suited to the subject development setting, surrounded by residential environmentally sensitive areas.

The proposed development complies with a minimum percentage reduction of post development average annual load of pollutants in accordance with the Water Sensitive Urban Design Technical Guidelines for and the following table (as per the Woollahra Council's DCP – Chapter E2):

PARAMETER	% POST DEVELOPMENT ANNUAL LOAD REDUCTION TARGET
Gross Pollutants	90%
Total Suspended Solids	85%
Total Phosphorus	65%
Total Nitrogen	45%

Table 3.2 – Water Quality Reduction Targets

3.2.1 RAINWATER TANK

Rainwater tanks collect run-off from roof areas and can provide a supplementary source of non-potable water in urban areas. They provide temporary storage of flows that can reduce peak flow rates and retain rainfall on-site. Tanks also provide some treatment through settlement of suspended soils. They can be a water source for non-water quality sensitive uses like watering gardens and flushing toilets, and a relatively small tank can be used for this purpose domestically. A rainwater tank is one of the most appropriate WSUD elements for residential or commercial developments to meet the stormwater management requirements.

The development will provide a 61kL rainwater tank located beneath lower ground level beneath the retail spaces. The rainwater tank will collect from the roof areas only and water harvested will be used for all external non-potable uses including landscaping.

3.2.2 ENVIROPOD BY OCEAN PROTECT WITH 200 MICRON POLYESTER FILTER

It is proposed to provide Enviropod inserts to the grated inlet pits on the site as a means of capturing gross pollutants and some fine sediments. The enviropod inserts work in the following manner: - As Stormwater enters the storm grate, it falls into the screening bag. Trash, debris and other pollutants larger than the screening bag aperture are captured and retained. If the bag becomes full overflows will be able to occur at the top of the frame assembly.

3.2.3 STORMFILTERS BY OCEAN PROTECT

The final treatment of the stormwater run-off will be carried out by Stormfilter cartridges manufactured by Ocean Protect that have been placed within proposed cast in-situ 3.88m x 1.75m concrete tank. The Stormfilter tank is fitted with 13 x 460mm high PhosphoSorb (Psorb) filtration cartridges. These are designed to filter fine sediments, oil and grease, metals, organics and nutrients. Each Psorb cartridge consists of the PhosphoSorb media, which is a lightweight media built from a Perlite-base that removes total phosphorus (TP) by absorbing dissolved-P and filtering particulate-P simultaneously.

3.2.4 STRATEGY EFFECTIVENESS

The effectiveness of the proposed water quality measures has been assessed using numerical modelling. The results were assessed against the established Council requirements to determine the effectiveness of the proposed strategy.

3.2.5 MUSIC MODELLING

The water quality model adopted for this project is the MUSIC (Model for Urban Stormwater Improvement Conceptualisation) water quality numerical model developed by the MUSIC Development Team of the Cooperative Research Centre for Catchment Hydrology (CRCCH). MUSIC provides the ability to simulate quantity and quality of run-off from catchments ranging from a single house block up too many square kilometres, and the effect of a wide range of treatment facilities on the quantity and quality of runoff downstream.

The MUSIC model was generated using the rainfall data and Storm filter nodes prepared by Ocean Protect.

Catchment characteristics were defined using a combination of roof areas and non-roof catchments with varying imperviousness ratios to replicate the catchment for the development condition.

The MUSIC model layout is shown in Appendix A of this report.

3.2.6 RESULTS

The results of the MUSIC modelling are summarised in the Table 3.2.5 below.

The total pollutant loads from the development are expressed in kilograms per year. The reduction rate is expressed as a percentage and compares the resulting pollution from the post developed site to that of the predevelopment (with no water quality controls).

PARAMETER	POST-DEVELOPMENT WITHOUT TREATMENT (KG/YR)	POST-DEVELOPMENT WITH TREATMENT (KG/YR	REDUCTION %	TARGET
Gross Pollutants	46.8	1.68	**96.4**	90%
Total Suspended Solids	188	24.3	**87.1**	85%
Total Phosphorus	0.471	0.103	**78**	65%
Total Nitrogen	4.62	1.96	**57.6**	45%

Table 3.2.6 – Summary of MUSIC Model Results

In all instances, the proposed water quality control measures enabled achievement of the required water quality TARGETS.

Therefore, by implementing the proposed treatment measures within the proposed development there will be no detrimental effect on the quality of stormwater running off from the site.

3.3 CONCLUSION

Should no action be taken in providing a satisfactory level of water quality management on newly developed sites, our natural creeks and waterways will be inundated with the growth of algae which can become a major factor in destroying the existing native and aquatic life that currently exists. For this reason, it is important to ensure that satisfactory reductions are achieved.

From the modelling in MUSIC of the proposed enviropod, rainwater tank and storm filter cartridges within the proposed development it has been found that the results achieve, and exceed the Council set reduction targets.

The key strategies that are therefore proposed to be adopted for this development include the following:

1. A pipe network system to collect minor storm runoff from surface areas which will minimise nuisance flooding;

2. Enviropods provided by Ocean Protect with 200 micron polyester material shall be fitted to all pits nominated in the design plans collecting surface flows from the driveway areas.

3. A total volume of 61kL shall be provided on the site to capture a large portion of the roof area. The collected water shall be utilised for irrigation.

4. Installation of 13 x 460mm PhosphoSorb Cartridge Stormfilter units by Ocean Protect. This will remove the majority of the gross pollutants, total suspended solids and nutrients to meet the water quality targets.

4. MAINTENANCE

Appropriate maintenance is essential for the long-term viability and effectiveness of the treatment devices to be installed.

4.1 POST CONSTRUCTION MAINTENANCE

Immediately following the construction period and following a significant rain period an inspection of the treatment devices shall be undertaken to ensure that builder's rubble and heavy sedimentation from the construction works has not excessively contaminated the devices. Any builder's rubble or heavy sedimentation shall be removed immediately if found during the initial inspection.

The duration of post construction maintenance for the proposed system is expected to be approximately six months. This period will ensure that turf and landscaping throughout the site is well established and if necessary, any sediment accumulation from post construction run-off from the site is removed as required.

4.2 LONG TERM MAINTENANCE

Long term maintenance is required to ensure the ongoing function of the treatment devices.

Enviropods:- Visual inspections, on a regular basis, of the Enviropods and cleaning as necessary will ensure untreated overflows, due to blocking of filter material, does not occur. Replacement of the filter material will be necessary should it be found to be deteriorating or damaged.

Stormfilter:- Based on information obtained from the manufacturer of the Stormfilter (Ocean Protect), it is recommended that maintenance be undertaken on the stormfilter on an annual basis. Maintenance of the Stormfilter involves inspection, cleanout and, if necessary, replacement of the cartridges contained within the chamber. It is therefore recommended that the future owners to arrange with Ocean Protect for regular maintenance.

5. APPENDIX A
MUSIC MODEL LAYOUT