| | |
|---|---|
| **Address:** | **6 The Corso & 46-50 East Esplanade, Manly** |
| **Works:** | **Demolition, Re-Building and Amalgamation with the new and existing lots, with Heritage Façade retention of both Street Frontages** |
| **DA No:** | **TBC** |
| **Date:** | **05 September 2019** |
| **Re:** | **Construction Methodology Plan** |
| **Compiled By:** | **Harrison Tanke & Duncan Blackhall** |
| **For:** | **Aspiring Properties** |

| Revision | Description | Date |
|---|---|---|
| 01 | Issue for DA submission | 05.09.2019 |

**GENERAL**

## 1 INTRODUCTION

This Construction Methodology Plan (CMP) has been prepared to address methodology of construction works associated with the proposed development in accordance with Development Application TBC and relevant standards. The CMP will outline procedures that are intended to be implemented to manage construction activities ensuring that unacceptable high levels of environmental or community disturbance do not occur throughout the duration of the works.

The location plan below depicts the site.


*Figure 1 - Location Plan*

## 1.1 OBJECTIVES

The objectives of the CMP are to address the following items within Sections 2 – 7 of the plan.

a) Site Safety Issues
b) Method of access to and from the site by construction plant and vehicles.
c) Provisions to ensure traffic flow to public roads surrounding the site are maintained at all times.
d) How access to neighbouring properties will be maintained at all times.
e) The proposed method of pedestrian management.
f) The proposed order in which works on the site will be undertaken, and the method statements on how various stages of demolition and construction will be undertaken.
g) The proposed manner in which adjoining property owners will be kept advised of the timeframes for completion of each phase development / construction process.
h) The proposed method of loading and unloading construction plant and equipment, building materials and erection of any part of the structure within the site.
i) The proposed area within the site to be used for storage of construction and waste materials.
j) Waste Management

## 1.2 REFERENCES

- Local Council Regulations;
- Relevant Australian Standards;
  - AS1742.3
  - AS1742.10
  - AS2601 – Demolition
- Environment Protection Legislation
- Clean Waters Act 1970;
- Clean Air Act 1961;
- Waste Minimisation Act 1995 (NSW);

## 1.3 CONSULTATION

The planning and implementation of the construction works will be completed in consultation with the following statutory authorities where applicable:

- Northern Beaches Council

- Sydney Water
- Ausgrid
- Roads & Maritime Services (RMS)
- Work Cover Authority;

### 1.4 CONSTRUCTION HOURS AND SITE CONTACT

**Working Hours: Subject to DA Conditions**

- The intended hours of work for construction subject to DA Conditions:

7am – 7pm Monday to Friday

7am – 5pm Saturdays

- Site Contact: TBA

### 1.5 SUMMARY OF WORKS

The subject site is located at 46-48, and 50 East Esplanade and No. 6 The Corso, Manly.

The site currently consists of 3 separate lots all owned by Aspiring Properties. The existing Lots currently operate as a mix of uses being retail, commercial and education for ICMS college. There is no parking located within this site.

The proposed design by Wolski Coppin Architects is for the demolition of the existing structures whilst retaining the façade and construction of new levels with mixed uses of Commercial and Retail as well as amalgamating the new works with the existing in-operation lots at 46-48 East Esplanade.

NSW Land and Property Information describes the subject site as Lot 1 of DP971762, Lot 1 of DP80202, Lot 10 of DP1207797.

**General**

Generally the majority of the works will be carried out within “hoarding zones” that are separated from the building occupants and general public by “A” class hoardings, “B” class hoardings and fencing.

### 1.6 SAFETY

Safety is the highest priority on the project. The Project Site Specific Safety Plan will be formulated for the project which lists the specific safety procedures for the project.

This document is always on site and is regularly updated with:

- High Risk Construction Work Safe Work Method Statements.

- Site Inspections.
- Site Inductions
- Roles and Responsibilities
- Other approved safety documentation

The Project Site Specific Safety Plan is updated and revised as necessary as the project progresses to suit the current onsite conditions.

The Project Site Specific Safety Plan sets out the procedures for the management of safety on the project and is supplemented by a number of specific safety forms and procedures that are part of the Safety Management System.

# 2 PEDESTRIAN AND TRAFFIC METHODOLOGY DURING CONSTRUCTION WORKS

## 2.1 TRAFFIC MANAGEMENT

Traffic Management during the construction phase is detailed below.

- Applications for temporary lane closures to be submitted to Northern Beaches Council Council (NBC)
- Applications for temporary road closures to be submitted to Northern Beaches Council (NBC).
- State Transit Authority must be notified if bus zone is required.
- Applications for temporary works to be submitted to the Northern Beaches Council (NBC).
- Applications and liaising with RMS if required.
- Application for a works zone to each site frontage to be submitted to Northern Beaches Council (NBC). The propose zone is approx.. 12m long (6 The Corso) & 6m Long (Eat Esplanade) and is proposed for 7.00am – 6.00pm Monday's to Friday's and Saturday - 8am to 1pm (No demolition work).
- A detailed Traffic Management Plan will be completed by and accredited professional prior to any works commencing on site
- *NOTE: A comprehensive Construction and Traffic Management Plan is to be prepared prior to commencement of works on site and endorsed by Council. This document is the be prepared by a qualified traffic engineer.*

### 2.1.1 PROPOSED INGRESS AND EGRESS ROUTES TO THE SITE FOR CONSTRUCTION VEHICLES & DELIVERIES WILL BE:

- Construction vehicles will access the site via;
    1. East Esplanade in an east bound direction and then veer left into the proposed works zone

2. ‘The Corso’ in a south bound direction, reversing, from the corner between ‘Whistler Street’ and ‘The Corso’, before leaving site in a forward direction to the road at the same location.

- All construction vehicles entering and exiting the works zone will be control by accredited traffic control personnel in accordance with the approved construction traffic management plan
- Refer to plan in Figure 2 for the Corso below for vehicle movement to site.


*Figure 2 : Vehicular Access (Option 1)*


*Figure 2 : Vehicular Access (Option 2)*

2.1.2 Work Zone

- The Work Zone is indicated on the Site Establishment Plans.

Waste Bin Delivery Access and Removal to/from site;

- Waste bins will be within the construction zone located in the hoarded areas on 'The Corso' and on the East Esplanade, road. Traffic controllers will manage all construction vehicles entering and exiting the site. A construction waste management plan will be prepared in accordance with council requirements.

Workers travelling to work

- Workers will be encouraged to use public transport to and from site as manly ferry Wharf and adjacent Bus Stops, in close proximity to the site.
- Trades people requiring vehicles to get to work which contain their plant and equipment will load off their materials within the works zone and will then leave the works zone immediately after the drop-off.

The proposed method for access and egress to the site will be established at conception and altered as the works progress.

- Access from ‘The Corso’ and ‘East Esplanade’ will be utilised in accordance with the Construction Traffic Management Plan (CTMP) and the builder pending Site Establishment Plans.
- Only vehicles that may enter ‘The Corso’ works zone directly are those vehicles approved by the CTMP and in line with pavement support structure (protecting in-ground services) design loads. All of these vehicles will be able to manoeuvre within the pavement support structure and exit in a forward motion.
- RMS accredited traffic controllers will be on hand to manage pedestrians when vehicles enter or exit the site work zones.

East Esplanade - Disruption of traffic flows

- Peak hours for traffic are Morning from 7:30am – 9:30am Monday - Friday
- Peak hours for traffic are Afternoon from 3:00pm – 7:00pm Monday - Friday
- Traffic controllers will not unreasonably disrupt traffic for vehicles entering and exiting the construction zone.
- Works will be coordinated outside peak hours where possible to minimise traffic flow disruption.
- There will be no disruption to the traffic flows during peak hours to the adjoining carpark and properties.
- Any disruption to traffic flows out of peak hours will be minimized through the use of qualified traffic flows.

The Corso - Disruption of traffic flows

- Peak hours for pedestrian traffic are Morning from 7:30am – 9:30am Monday - Friday
- Peak hours for pedestrian traffic are Afternoon from 3:00pm – 7:00pm Monday – Friday
- Note that the Peak Traffic times will vary during weekends, holiday periods and summer.
- Traffic controllers will manage pedestrian traffic for vehicles entering and exiting the construction zone, with an estimate disruption of 7 minutes per skip change. Pedestrians will be directed around the maneuverer with minimal delay to there journey.
- Works will be coordinated outside peak hours to minimise traffic flow disruption.
- There will be no disruption to the traffic flows during peak hours to the adjoining carpark and properties.

- Any disruption to traffic flows out of peak hours will be minimized through the use of qualified traffic flows.

2.1.3 Preferred construction demolition access

- 6 ‘The Corso’

***(After demolition almost all construction activities will coordinated via the East Esplanade work zone)***

2.1.4 Through traffic is to be maintained at all times

- When traffic has to be disrupted the relevant parties will be informed.

2.1.5 Traffic Control Method

- Traffic Management Plan will be developed to depict the site traffic control measures and methods, for implementation.

2.1.6 Access routes through council area and vehicle movements

- Main roads will be used to access the site, the most direct routes will be used, refer to Figure 2.
- Out of hours works permits will be sought to load and unload after hours when there are less pedestrians and vehicles on the street. These will be applied for as required.

2.1.7 Method for loading and unloading materials and equipment

- Traffic controllers will be used at all times to stop adjacent pedestrians and vehicles
- Trucks: Flat bed, Forklift or Crane Truck (HIAB Type or similar)
- Bins: Appropriate truck

2.1.13 Information to local residents and advertising as required

- The public liaison officer will make the relevant parties aware in a reasonable time of any disruptive activities.
- A community engagement strategy is to be prepared in coordination with council and followed by the construction team for the duration of the works.

2.1.14 Method of demolition and construction

- Refer to Section 3

## 2.2 SITE ESTABLISHMENT

The site establishment plans are shown within Appendix 1.

The plans show the proposed position of hoardings, site amenities, site access and exit routes and driveways and other general site establishment items.

The site establishment will be setup to ensure there is no impact to the day to day operations of the existing hotel and carpark. Access to will be maintained at all times.

The hoarding types and locations are summarised below:

| Street | Type |
|---|---|
| East Esplanade | Hoarding Class B |
| 6 'The Corso' | Hoarding Class A (During Demolition) |
| 6 'The Corso' | Hoarding Class A & B (During Construction) |

## 2.3 PEDESTRIAN TRAFFIC

Pedestrian movement during the construction phase will not be affected and limited during the Demolition phase. Pedestrian management considerations are detailed below, also in the attached 'Construction Traffic Management Plan' and pending Site Establishment Plan. It includes the following;

- Protection for pedestrians will be as per statutory requirements with perimeter security fencing and A (& B) Class Hoardings at required areas.
- Traffic controllers for construction vehicles entering and leaving the site in a forward direction;

## 2.4 CONSULTATION

Consultation shall be undertaken with the following statutory authorities;

- Northern Beaches Council
- Roads and Maritime Services (RMS)
- State Transit Authority (STA)
- NSW Police

# 3 DEMOLITION AND EXCAVATION

The following is a summary of the construction methodologies for the project;

1) <u>Hoardings & Scaffolding</u>

- Hoardings will be required for the works as depicted within Site Plan Appendix 1.

2) Existing Services

- Each existing service affected by the construction work will be disconnected, capped off, removed, Structurally 'bridged (& so protected) altered or redirected, as necessary for the completion of the works. Any redirection or capping of any services required will not affect any surrounding property.

3) Recycling

For recycling information refer to Appendix 2

# 4 STORM AND WASTE WATER MANAGEMENT PLAN METHODOLOGY DURING CONSTRUCTION

## 4.1 INTRODUCTION

The site is contained within the building envelope care will be taken at all time to ensure that debris will not fall be transferred onto roadways where they can be swept up.

## 4.2 SCOPE

- Storm water – The stormwater management philosophy is detailed in the attached "Stormwater management Plan" in Appendix 2.

## 4.3 REFERENCES

- All relevant local council regulations;
- Environmental Protection Legislation;
- Clean Waters Act 1970;

## 4.4 CONSULTATION

The following organizations and their regulations and guidelines will be consulted in the preparation of the storm and wastewater management plan:

- Environmental Protection Authority;
- Local Municipal Council;
- NSW Department of Land and Water Conservation;

# 5 WASTE MANAGEMENT METHODOLOGY DURING CONSTRUCTION

This is fully documented in the Waste Management Plan in Appendix 2.

The waste management information will be collated monthly as part of project internal procedures. A copy of the information will be forwarded to PDS Group on a monthly basis for information and distribution as required.

## 5.1 PURPOSE

To ensure that resources are conserved and waste is processed responsibly by minimizing waste generation and maximizing recycling of materials.

## 5.2 SCOPE

To address the waste management procedures for the demolition and construction activities to be undertaken during the proposed development of 6 'The Corso' 46-50 East Esplanade, Sydney.

## 5.3 MAJOR MEASURES

i) Materials Selection & Ordering;

- Selection of all materials will be undertaken by architectural designers;
- Materials requirements are to be accurately calculated to minimize waste from over ordering;
- Materials ordering process is to aim at minimisation of materials packaging;
- Material Safety Data Sheets (MSDS) are to accompany all materials delivered to site, where required, to ensure that safe handling and storage procedures are implemented;

ii) Waste Recycling

- Waste generation from construction activities on site will be minimized, reused or recycled where applicable;
- Recyclable materials are to be specified wherever practical;
- Dedicated and secure containers will be provided on site by an approved waste handling company for non-recyclable waste;
- Where practical, dedicated and secure recycling containers will be provided on site by an approved waste handling company, manufactures, or specialist recycling organizations for the following materials;
    - Steel
    - Timber
    - Paper/Cardboard
    - Glass
    - Concrete/Brick/General Rubbish
    - Doors, Windows, fittings
    - Plasterboard

iii) Location of Waste

- All waste will be contained within the site within the appropriate containers and will be transported off site.

# 6 AIR QUALITY MANAGEMENT METHODOLOGY DURING CONSTRUCTION

## 6.1 PURPOSE

To ensure that demolition and construction activities do not lead to the generation of unacceptably high levels of dust or other air pollution.

## 6.2 SCOPE

To establish air quality management systems and procedures to be implemented during construction activities undertaken during the proposed development 6 ‘The Corso’ 46-50 East Esplanade, Sydney

## 6.3 MAJOR MEASURES

- All construction plant, equipment and vehicles are to be properly maintained and operated so as to alleviate excessive exhaust emissions;
- Waste loads leaving the site are to be covered at all times;
- All dust generating construction activities are to cease during high wind conditions unless such operations can be controlled by containing wind from the site with hoardings.
- The burning of waste materials and the lighting of fires will be strictly prohibited on the site at all times;
- Continual visual monitoring of the site will be undertaken by site management to ensure that works do not generate unacceptably high levels of dust;
- Wherever practical, materials and processes that are non-toxic will be employed to minimize possible harmful affects to air quality;
- Wherever practical any ozone depleting gases in building services installations will be removed prior to deconstruction works;

# 7 NOISE MANAGEMENT METHODOLOGY DURING CONSTRUCTION

## 7.1 PURPOSE

To allow the neighbouring buildings the continued enjoyment of their space

To ensure that construction activities do not lead to the generation of unacceptably high levels of noise.

## 7.2 SCOPE

To establish a noise management procedure to be implemented during construction activities to be undertaken in the proposed development of 6 'The Corso' 46-50 East Esplanade, Sydney

## 7.3 MAJOR MEASURES

**Working Hours: Subject to DA Conditions**

- The intended hours of work for construction subject to DA Conditions:

7am – 6pm Monday to Friday

7am – 5pm Saturdays

**Standards**

- The maximum noise levels of all deconstruction and construction plant and equipment is to generally comply with EPA requirements;
- Noise levels to comply with Local Council Statutory regulations.

**Management**

**Site Induction**

- The project site manager will ensure that all employees and sub-contractors are advised of the procedures under the 'Noise Management Methodology' during each Site Specific Safety Induction prior to commencement of work on the site.
- The Site Induction will:
- Explain employee's responsibilities as outlined in the 'Noise Management Methodology.
- Highlight the sensitivity of the issue of power tool noise to adjoining residents.
- Explain the restrictions of the usage of any equipment or device on site.
- Notify approved hours of work.

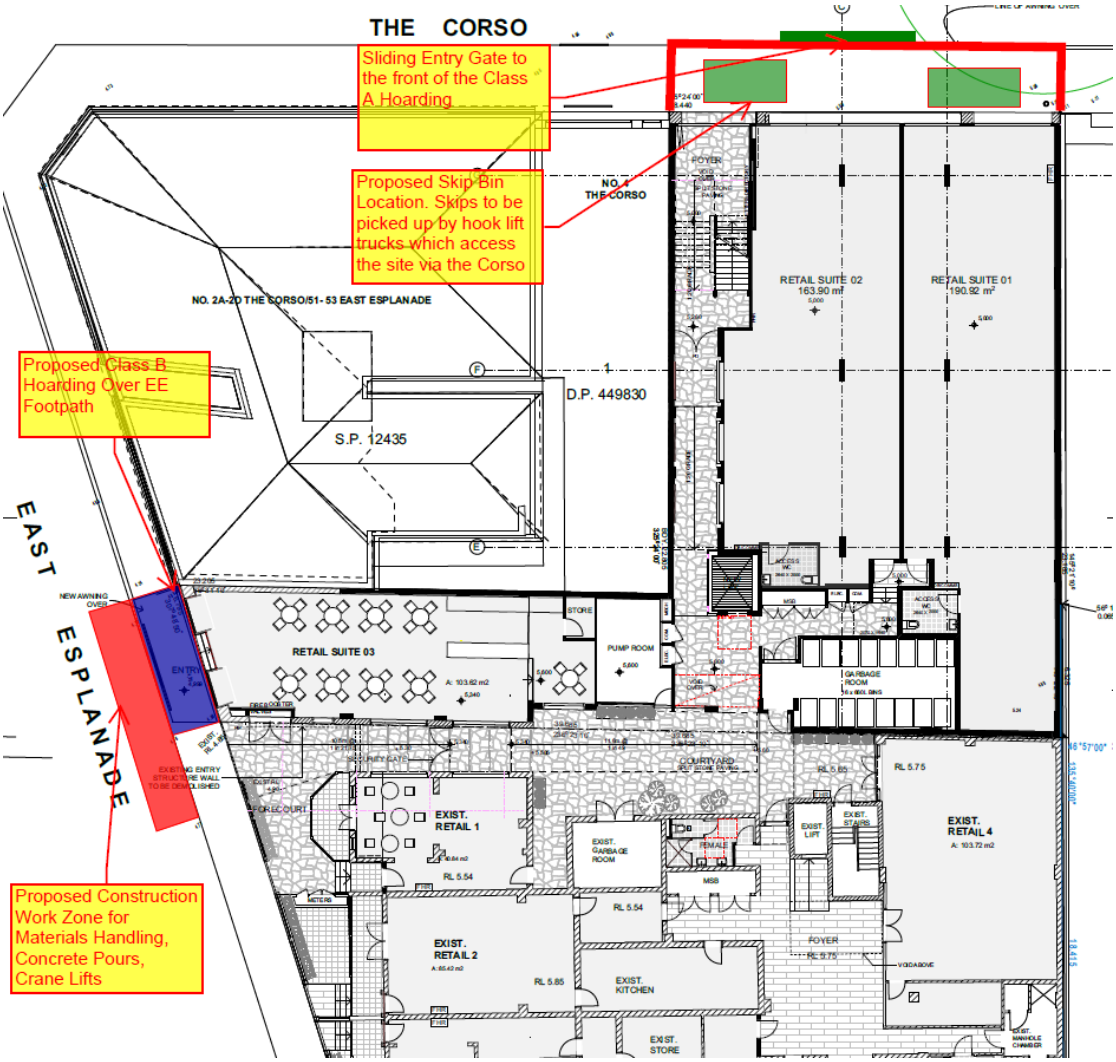
**Communication**

- A site contact phone number will be issued via the site contact signage displayed on the site hoardings to surrounding neighbours so they can immediately discuss any concerns they may have regarding noise associated with construction activities on site.
- Any unavoidable upcoming noisy works will be reported by the project manager to PDS Group and Aspiring Properties so that appropriate notices can be given to local businesses.

**Practical Measures to reduce the impact of noisy works on the building occupants and surrounding properties**

- Saw cutting of existing floor finishes along with the use of small electric “jack hammers” will be utilised to remove the existing floor finishes rather than using large plant and equipment. Saw cutting is a higher frequency noise than hammering and cause less vibration to the structure and thus cause less noise impact. This information will be provided to the proposed demolition contactors so that they can prepare a methodology for the demolition works.
- Where parts of the structure which the structural engineer specifies to be demolished with sections of the structure being retained for the new works, these works will be conducted using concrete pulverisers rather than concrete hammering / breaker, saw cutting will again be utilised where possible in consultation with the structural engineers. To minimise this impact on the building occupants and neighbouring properties this work will be coordinated in accordance with a noise management plan which will be developed prior to works commencing and will identify noise minimisation techniques.
- It is noted that noisy works be conducted and completed behind the existing Heritage façades, that will remain throughout construction. This will minimise and contain noise to within the site.
- Other techniques to minimise noise will be to unbolt and remove sections of the structure where connections allow it. This will also minimise any need to use hammering to undertake the works.

# Appendix 1: Site Establishment



# Appendix 2:  Construction Waste Management Plan

# 6 The Corso & 50 East Esplanade & 46-48 East Esplanade, Manly

# Operational, Construction and Demolition Waste Management Plan

SEPTEMBER 2019

**WASTE AUDIT AND CONSULTANCY SERVICES**
Level 21 / 133 Castlereagh Street
Sydney, NSW 2000

Telephone (02) 9199 4521
**www.wasteaudit.com.au**

This report contains confidential information. It has been compiled by Waste Audit and Consultancy Services (Aust) Pty Ltd on behalf of PDS Group for the 6 The Corso & 50 East Esplanade & 46-48 East Esplanade, Manly development.

This Waste Management Plan is not a substitute for legal advice on the relevant environmental legislation, which applies to PDS Group, its contractors or other bodies. Accordingly, Waste Audit and Consultancy Services (Aust) Pty Ltd will not be liable for any loss or damage that may arise out of this project, other than loss or damage caused as a direct result of Waste Audit and Consultancy Services (Aust) Pty Ltd's negligence.

# Table of contents

# 1 Project Overview

## 1.1 Introduction

This Operational, Construction and Demolition Waste Management Plan (WMP) has been prepared on behalf of PDS Group for the 6 The Corso & 50 East Esplanade & 46-48 East Esplanade, Manly development.

The development essentially consists of:

- Retail premises (defined as food & beverage for the purpose of waste volume calculations)
- Commercial premises
- Café

This Plan has been developed with consideration of Northern Beaches Council's requirements (*Manly Development Control Plan 2013 – Part 3.8 Waste Management* and *Waste Management Guidelines Chapter 5 – On-going waste management for non-residential developments*), as well as consideration of the waste generation rates as detailed in the City of Sydney "*Guidelines for Waste Management in New Developments*".

## 1.2 Waste Management Guidance

Waste audit and management strategies are recommended for new developments to provide support for the building design and promote strong sustainability outcomes for the building. All recommended waste management plans will comply with council codes and any statutory requirements. The waste management plan has three key objectives:

1. ***Ensure waste is managed to reduce the amount of waste and recyclables to land fill*** by assisting staff to segregate appropriate materials that can be recycled; displaying signage to remind and encourage recycling practices; and through placement of recycling and waste bins to reinforce these messages.
2. ***Recover, reuse and recycle*** generated waste wherever possible.
3. ***Compliance*** with all relevant legislation, codes and policies.

The Demolition Waste Management Plan has been developed to ensure that all waste resulting from demolition activities is managed in an effective, safe and environmentally aware manner. Specifically,

- To minimise the generation of waste to landfill
- To maximise waste material avoidance and reuse on site
- To ensure that where practicable, an efficient recycling procedure is applied to waste materials

- To raise awareness among employees and subcontractors of their waste management responsibilities

Management strategies reflect current best-practice requirements, and relevant Sections of the *Protection of the Environment Operations Act 1997* and the NSW Environment Protection Authority *Waste Classification Guidelines, Part 1: Classifying Waste*, as well as consideration of industry best practice for this type of development.

In particular, there will be compliance with *Australian Standard AS2601: The demolition of structures.* This in summary requires that the demolition of structures:

- sets out requirements for the planned demolition of buildings and certain other structures so that the risk of injury to workers, other site personnel and the public, and the risk of damage to adjacent property and the immediate environment is minimised;
- covers the methods and safety procedures applicable to demolition work in general as well as procedures for some types of structures;
- deals with manual and mechanical demolition techniques including those employing specialised earth-moving type machinery;
- includes informative appendices covering some contractual considerations, a checklist for contractors and qualifications for site personnel;
- safety and health issues are addressed under the headings of:

- Health and safety of the public - covering general requirements, lighting, falling materials, fencing, hoardings and warning notices, scaffolding, overhead protection for footpaths, and hazardous materials and conditions;
- Safety and health of site personnel - covering general safety, personal protective clothing and equipment, cutting and welding, fire protection, first aid, amenities, removal of hazardous material and electrical safety;
- Protection of adjoining buildings and protection of immediate environment - covering requirements relating to access and egress, damage and structural integrity, vibration and concussion, weatherproofing, burning, dust control, noise control, protection of public roads and protection of sewers and water courses; and protection of the site.

Section 143 of the Protection of the Environment Operations Act 1997 requires waste to be transported to a place that can lawfully accept it. It will be the responsibility of the site developers to ensure all contractors clearly specify where all wastes are to be transported, the capacity of the nominated facilities to receive/manage the waste and to ensure that reports on management aspects (types, quantities and disposal pathways) are provided.

**Note:** The testing and classification of any excavated material is not covered in this report.

Should any contaminated soil (or other materials be identified), then a management plan will be, if necessary prepared for those materials.

# 2 Waste Management

## 2.1 Waste Streams

Based on the development profile (as per Section 1), the following are the waste streams that would be expected on a regular basis:

- Comingled recycling (eg., cardboard/paper, glass and plastic containers); and
- General waste

There would also be other waste streams such as toner cartridges, e-waste, unwanted furniture, confidential documents, maintenance waste and other, materials generated in small quantities or on an *ad-hoc* basis. Systems for these will be implemented within the buildings of this development, with appropriate storage space as required.

Commercial (office areas), may also need a bin for confidential documents. These will be determined by each tenant and located within the tenancy.

## 2.2 Waste Generation Estimates

Calculations for the types and quantities of waste that will be generated have been based on Northern Beaches Council's requirements, as well as data from similar developments as determined by audits conducted by Waste Audit & Consultancy.

The following tables provide the estimates of the waste and recycling generation for each aspect of the development per week. These estimates have taken into account criteria such as number of patrons, staff levels and operational hours/days. In addition, the estimated footprint for the required number of bins, an allowance of 30% has been made to allow for bin movement.

**Waste/recycling generation**

| | L/week |
|---|---|
| General Waste | 4,982 |
| Commingled Recycling | 1,969 |
| Paper/Cardboard Recycling | 2,954 |
| **Total** | **9,905** |

Note: The weights and volumes are based on correct segregation of waste and recyclables.

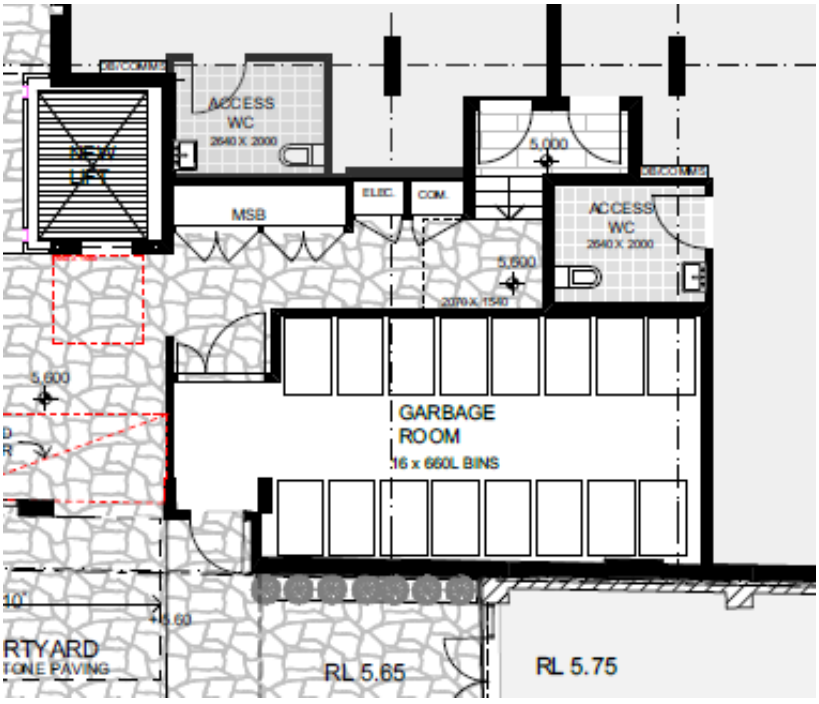
The following table show the recommended collection schedule and required bin numbers (with associated footprint):

| Waste Stream | Bin Size (MGB) | No. of Bins | Clearance Frequency /week | Capacity (weekly) (L) | Volume / week (L) | Footprint per bin (m2) | Total Footprint |
|---|---|---|---|---|---|---|---|
| General Waste | 660 | 3 | 3 | 5,940 | 4,982 | 0.98 | 2.94 |
| Commingled Recycling | 660 | 1 | 3 | 1,980 | 1,969 | 0.98 | 0.98 |
| Paper/Cardboard Recycling | 660 | 2 | 3 | 3,960 | 2,954 | 0.98 | 2.0 |
| **TOTAL** | | **6** | | **11,880** | **9,905** | | **5.9** |

The footprint for these bin numbers as above is 5.9 $m^2$ – (allowing an additional 30% for bin movement equates to a footprint of 7.9 $m^2$), for these bins.

## 2.3 Waste Management Storage

The waste storage areas that will be provided for the 660 litre MGB's are located as per the following diagrams.




This area is adequate for the number of bins required the development.

In addition, these bin storage areas will have signage placed on the walls adjacent to where the bins are located to provide a reminder to all using the facilities as to correct segregation of waste/recyclables.

The waste areas will be accessed by cleaning staff only.

The waste and recycling bins will be colour coded and clearly signed. Each stream will be located in a designated area. This will assist in easy identification of correct bins by those with authorised access.

**Photographs 1 & 2 - Examples of colour coding for the bin store**

The waste room will contain the following to minimise odours, deter vermin, protect surrounding areas, and make it a user-friendly and safe area:

- Have a practical layout, be free of obstructions.
- Have a floor area capable of storing the required number of bins
- Be graded and drained to an approved drainage system.
- Be serviced by an easily accessible water tap.
- Have smooth rounded corners at the floor and wall intersections.
- Be capable of being kept clean and tidy at all times.
- Be in accordance with the BCA, relevant Australian Standards and legislation

Occupational Health and Safety issues such as slippery floors in waste rooms and the weight of the waste and recycling receptacles will need to be monitored. Cleaners will monitor the bin storage area and all spills will be attended to immediately by cleaners.

Signage will be a crucial element of the waste management system. Appendix A contains examples of signage. These are the type of signs that should be used throughout the buildings and waste storage area. Other signs can be accessed from the NSW EPA website at: http://www.epa.nsw.gov.au/wastetools/signs-posters-symbols.htm.

## 2.4 Public Place Recycling

With public open spaces, consideration needs to be taken regarding the feasibility of providing public place recycling (PPR).

Simple, colour-coded and consistent representation of common recycling and waste streams makes it easier for people to know how and what to recycle - whether at work, school or a public event. Introducing a public recycling system has environmental, social and financial benefits including:

- Responding to community expectations to 'Do the Right Thing'.
- Reducing the amount of waste sent to landfill and recovering valuable resources to be made into new products.
- Financial benefits over time as materials are diverted from landfill and into recycling.
- Contributing to triple bottom line reporting.

It is important that general waste and recycling bins are always located together in order to make recycling as accessible as general waste disposal. Recycling bins should never be located on their own in isolation from a general waste bin as patrons are likely to contaminate the recycling bin with general waste if there is no other option to dispose their general waste.

The implementation of organics recycling bins is not recommended in public places due to the high levels of contamination commonly observed in such systems.

All bins should be clearly signed and appropriately colour-coded to ensure the streams are readily identifiable. Signage for PPR should be:

- Colour-coded: red for general waste and yellow for recycling
- Large and easily viewed from all angles: this may mean that signs are placed on all sides of the bin or above the bin.
- Simple: don't use jargon (words such as PET, comingled, HDPE and even the recycling triangle can be confusing as this symbol can appear on a number of items that are not necessarily recyclable.
- Unambiguous and uses visual imagery

All public domain waste and recycling bins will be managed and collected by the appointed waste contractor as part of their existing waste and recycling operations.

The following are some examples of public place recycling bins that could be used within the development. Contacting providers of these type of bins will enable the development to obtain bins that are "fit for purpose" as well as integrating into the development design.


RECYCLING
LANDFILL

## 2.5 Waste Management Servicing

A private contractor (TBA) will be used for the collection of wastes and recyclables. This is planned to be a three times per week service. However, additional services can be arranged as required.

The appointed contractor will be responsible for collecting waste/recycling bins from the garbage room and then returning them immediately following servicing so as to ensure that no bins are left in public places for any period of time.

## 2.6 Operational System

The following summarises the recommended waste and recycling systems that will be implemented. These recommendations are based on Council requirements and systems implemented for similar developments (ie., types of tenants).

To ensure that the proposed management actions continue, as specified, inclusion of the requirement to transport waste/recycling bins from the waste storage areas the collection locations and then removing them back to the storage rooms on the same day as they are serviced, will be contained within all operational procedures.

To ensure that wastes and recyclables are managed correctly (ie., deposited into the correct container):

- Tenants (and their staff) will be advised as to correct segregation by information conveyed via newsletters, signage and staff advising, regarding the waste collection systems including how to use the system, which items are appropriate for each stream and collection regimes.
- To assist, all tenancies (and classrooms if utilised), will be provided with separate bins for waste and recyclables. These bins should have a capacity of 30 litres for general waste and 15 litres for recyclables (ie., 2 days' worth of generation). These bins will be clearly signed as to the type of materials to be deposited into them. Note some may have larger bins provided depending on volumes of waste/recyclables generated.
- Tenants will be encouraged to maximise the separation of general waste and mixed recyclables to aid the proper disposal of all materials.
- Bins would be transported via the Courtyard Garbage room to East Esplanade for collection. Timing would be coordinated with the contractor once appointed. Bins would be collected from the garbage room and returned immediately upon emptying.
- Cleaners employed by the development will be responsible for transporting waste/recyclables from tenancies and when and if necessary assisting in the transport of bins to the appointed contractor's vehicle and returning the bins to the garbage room.

In keeping with best practice sustainability programs, all waste areas; reuse areas and waste and recycling bins will be clearly differentiated through appropriate signage and colour coding to Australia Standards to reflect the materials contained.

# 3 Demolition & Construction Waste Management Principles

## 3.1 Introduction

This Plan details the management of waste during the demolition and construction phases of the development.

The aim of this Plan is to ensure that all waste resulting from demolition and construction activities are managed in an effective, safe and environmentally aware manner. Specifically,

- To minimise the generation of waste to landfill
- To maximise waste material avoidance and reuse on site
- To ensure that where practicable, an efficient recycling procedure is applied to waste materials
- To raise awareness among employees and subcontractors of their waste management responsibilities

This Plan has been developed with reference to Camden Council's requirements and relevant Sections of the *Protection of the Environment Operations Act 1997* and the NSW Environment Protection Authority *Waste Classification Guidelines, Part 1: Classifying Waste*, as well as consideration of industry best-practice for this type of development.

## 3.2 Waste Management Principles

The following waste hierarchy will be used as a guiding principle:

### Avoid and Reduce

Minimise the production of waste materials in the construction process by:

- Assessing and taking into consideration the resultant waste from different demolition, design and construction options
- Purchasing materials that will result in less waste, which have minimal packaging, are pre-cut or fabricated.
- Not over ordering products and materials

### Reuse

Ensure that where ever possible, materials are reused either on site or offsite.

- Identify all waste products that can be reused
- Put systems in place to separate and store reusable items
- Identify the potential applications for reuse both onsite and offsite and facilitate reuse

### Recycling

Identify all recyclable waste products to be produced on site.

- Provide systems for separating and stockpiling of recyclables
- Provide clear signage to ensure recyclable materials are separated
- Process the material for recycling either onsite or offsite

Note: In some instances, it may be more economical to send the unsorted waste to specialised waste contractors who will separate and recycle materials at an offsite location.

### Disposal

Waste products which cannot be reused or recycled will be removed and disposed of. The following will need to be considered:

- Ensure the chosen waste disposal contractor complies with regulatory requirements
- Implement regular collection of bins

Section 143 of the Protection of the Environment Operations Act 1997 requires waste to be transported to a place that can lawfully accept it. It will be the responsibility of the site developers to ensure all contractors clearly specify where all wastes are to be transported, the capacity of the nominated facilities to receive/manage the waste and to ensure that reports on management aspects (types, quantities and disposal pathways) are provided.

## 3.3 Liquid Waste

Liquid waste may be produced on site for environmental control measures such as:

- Site and vehicle cleaning
- Dust control waste

The following measures will be taken to minimise the impact of liquid waste:

- Ensure water is used in moderation and no taps are left continuously running
- Use any grey water produced on site for irrigation or for dust suppression
- Only discharge clean water into storm water

## 3.4 Stormwater Pollution Prevention

All actions will be undertaken to avoid pollution entering stormwater drains and for litter generation. The following will be initiated:

i. Prior to commencement of any works a Safe Work Method Statement will be completed and reviewed to determine potential for stormwater pollution and/or litter generation

ii. The proponent (contractor), will need to develop a management strategy to manage the potential for these issues to be realised

iii. Site inspections will be conducted during the working day to monitor potential for stormwater pollution generation and where identified, works will cease until appropriate controls are implemented

iv. Waste water and storm water will be managed and disposed of in accordance with Water Authority requirements.

## 3.5 Litter Management

i. Daily site inspections will be conducted to identify litter, remedy the situation and investigate the cause so as to reduce the potential for the issue to occur in the future.

ii. Sufficient quantities of bins (and/or bin space), will be made available so as to avoid dumping of materials outside bins

iii. All waste/recycling bins will have covers so as to ensure that wastes cannot be blown out during windy conditions. This will also apply to relevant stocks of materials to be used in construction.

iv. Personnel will be allocated the role of litter management in that they will periodically inspect the site and surrounds for litter and if identified collect and dispose of it.

## 3.6 Records

Records will be kept of all wastes and recyclables generated and either used on site, or transported off–site during the demolition and construction stages of the development.

It will be a condition of appointment that all waste/recycling contractors involved in the demolition and/or construction stages provide these records, and that they also contain details of the facilities that the materials are transported to.

These records will be made available to Council on request.

## 3.7 Waste/recyclables storage (on-site)

All waste and recycling materials will be stored in bins provided by the appointed contractor(s). These bins will be appropriately coloured and signed to indicate what materials are to be deposited into them and located so as to maximise the recovery of reusable/recyclable materials.

As construction activities progress, the designated bins will be moved so as to maximise the collection of materials that will be diverted from landfill. This will also involve relocating signage advising as to correct waste management.

## 3.8 Waste/recyclables treatment (on-site)

There will be no treatment of wastes or recyclables on-site except for possible removal of contaminants prior to forwarding to off-site recyclers.

# 4 Demolition Materials

The table below details the different waste streams expected in the demolition phase. The relevant disposal/recycling facilities have not been detailed as the waste contractor and sub-contractors have not yet been appointed for the project.

All waste contractors/sub-contractors will be required to detail all intended disposal facilities to ensure that legislative and safety requirements are met, the guiding principles of the waste hierarchy are upheld and maximum diversion from landfill is achieved. As previously stated, records will be required to be maintained by all contractors and made available to Council so as to validate management pathways.

The potential for reuse of materials on-site (and this will be encouraged for both demolition activities as well as considering what could be used for the construction phase of the development), will depend on the quality of the materials once demolition proceeds.

The following table details the estimated composition by $m^3$ of demolition waste to be generated and management strategy. It is important to note that these are estimates and the important issue is that the materials will be managed so as to avoid wherever possible disposal to landfill.

This process and the management of any excavation and removal of contaminated soil and waste (if identified), from the site will be undertaken and managed by qualified contractors and consultants in accordance with all the relevant standards and regulations and is not addressed in this report.

**Waste management systems - demolition**

| Materials on site | | Destination | | |
|---|---|---|---|---|
| **Type of material** | **Estimated volume ($m^3$/tonnes)** | **On-site** | **Off-site** | **Disposal** |
| Excavation material (non-contaminated soil and rock) | 300$m^3$ | Will either be stockpiled for use during construction if required and if not disposed off-site. | Excavation materials will be collected and used as clean fill by the appointed contractor and/or forwarded to various facilities such as garden landscapers, or roadworks | Facility TBA upon appointment of contractor. No disposal to landfill. |

| Materials on site | | Destination | | |
|---|---|---|---|---|
| Type of material | Estimated volume ($m^3$/tonnes) | On-site | Off-site | Disposal |
| Concrete | 125$m^3$ | No on-site reuse | Collected by contractor and disposed at concrete recycling facility | Facility TBA upon appointment of contractor. No disposal to landfill. |
| Bricks | 95$m^3$ | Bricks will be stockpiled and reused wherever possible. | Acceptable quality bricks collected by a contractor and sold for reuse.<br>Unusable bricks will be collected and recycled at an appropriate brick/rubble recycling facility | Facility TBA upon appointment of contractor. No disposal to landfill. |
| Tiles | 50$m^3$ | No on-site reuse | Acceptable quality tiles collected by a contractor and sold for reuse.<br>Unusable tiles will be collected and recycled at an appropriate facility | Facility TBA upon appointment of contractor. No disposal to landfill. |
| Timber | 100$m^3$ | No on-site reuse | Recyclable timber (untreated) will be collected and recycled at appropriate timber yard. Unrecyclable timber will be disposed at landfill | Facility TBA upon appointment of contractor. No disposal to landfill. |
| Plasterboard | 130$m^3$ | No on-site reuse | Collected by the waste subcontractor on a weekly basis (or as required) for recycling | Facility TBA upon appointment of contractor. No disposal to landfill. |

| Materials on site | | Destination | | |
|---|---|---|---|---|
| Type of material | Estimated volume ($m^3$/tonnes) | On-site | Off-site | Disposal |
| Metals | $60m^3$ | No on-site reuse | Collected by specialist metal subcontractor for recycling. Facility | Facility TBA upon appointment of contractor. No disposal to landfill. |
| Mixed hard plastics | $35m^3$ | No on-site reuse | Collected by contractor for recycling. | Facility TBA upon appointment of contractor. No disposal to landfill. |
| Glazing | $25m^3$ | No on-site reuse | Recyclers consulted as to potential for recycling | Facility TBA upon appointment of contractor. No disposal to landfill. |
| Mixed Recyclables | $25m^3$ | No on-site reuse or recycling | Separated onsite into dedicated receptacles. Collected by the waste subcontractor for recycling. Facility TBA upon appointment of contractor. | Facility TBA upon appointment of contractor. No disposal to landfill. |
| General waste | $140m^3$ | No on-site reuse or recycling | Separated onsite into dedicated receptacles. Collected by the waste subcontractor for disposal to landfill with the facility TBA upon appointment of contractor. | Disposed into general waste bins onsite and collected by the waste contractor for disposal. Facility (TBA) upon appointment of contractor |

## Other Materials

A range of other materials may be present on the site once the demolition activities commence.

All potentially recyclable materials are to be separated and stored on-site for an appointed waste/recycling contractor to inspect and to determine the suitability of the material for recycling (or even reuse). If approved for either action, then the contractor can then remove the items.

For materials that are not designated as potentially able to be reused or recycled, then they are to be disposed of at a landfill licenced to receive those specific materials.

# 5 Hazardous Waste Materials

## 5.1 Management Procedures

Should any hazardous materials be identified, then a management plan will be, if necessary prepared for those materials. However, the principles as described in this Section will apply and be adopted.

If any are identified all contractors employed to manage any identified hazardous wastes will be required (prior to appointment), to demonstrate their compliance with NSW EPA and WorkCover requirements for management of the specific materials they are contracted to manage.

The following are the recommended approaches for managing and hazardous wastes if they were to be identified during the site analysis.

The key principles that need to be adhered to are[1]:

1. All hazardous wastes need to be correctly identified and managed in accord with all relevant legislation and Codes of Practices.
2. Hazardous materials need to be separated into their individual categories and not mixed with any other materials

Prior to commencing any clean-up activities, a Workplace Health & Safety Plan will be developed, implemented and monitored with all relevant site personnel receiving specific training in management of hazardous waste materials (including suspected hazardous materials).

## 5.2 Asbestos

While no asbestos has been identified, the following summarises the management processes should any be identified. This also includes any materials suspected of being asbestos.

According to the NSW EPA:

> *Exposure to airborne asbestos fibres, even in small quantities, can lead to significant health risks. Whilst environmental risks caused by asbestos are minimal, potential life-threatening illnesses caused by asbestos fibre exposure include asbestosis, lung cancer and mesothelioma.*
>
> *Illegal dumping of asbestos may lead to increased exposure of individuals to asbestos fibres and thus increase the incidence of asbestos-related illnesses. The*

[1] Reference should be made to the NSW EPA publication, Waste Classification Guidelines Part 1: Classifying Waste.

*risk of exposure increases when asbestos is dumped close to communities or sites that people frequently visit.*

Exposure to airborne asbestos should be kept as low as reasonably practicable below the mandated exposure standard of 0.1 fibres per millilitre of air.

The process for managing what has initially been suspected of being or containing asbestos waste is as follows[2]:

i. Treat the material as asbestos unless proven otherwise

ii. Do not disturb the material (ie., shift or place into a container) at all

iii. Seek advice from a suitably qualified laboratory to test the material(s) to determine if it is or is not asbestos.

iv. If determined not to be asbestos, then it can be managed as an inert waste.

v. If determined to be asbestos then managed by a licenced contractor for packaging, removal and disposal.

vi. If the material has accidently been uncovered, then the area should be cleared, barriers erected to prevent access, NSW WorkCover and EPA notified, and if broken, covered with a fine spray/mist of water.

For what has been conclusively identified as asbestos containing materials (including soils), a specialist/licenced asbestos contractor will be used. As required, only workers trained in asbestos removal techniques will be allowed to manage the removal of asbestos contaminated soil and any contained on the buildings.

In regards to disposal of asbestos containing materials, there are regulatory requirements under clause 42 of the Protection of the Environment Operations (Waste) Regulation 2005 that apply to the management of asbestos waste, including:

- Waste must be stored on the premises in an environmentally safe manner.
- Non-friable asbestos material must be securely packaged at all times.
- Friable asbestos material must be kept in a sealed container.
- Asbestos-contaminated soil must be wetted down.
- All asbestos waste must be transported in a covered, leak-proof vehicle.
- Asbestos waste must be disposed of at a landfill site that can lawfully receive this waste. Always contact the landfill beforehand to find out whether asbestos is accepted and any requirements for delivering asbestos to the landfill.
- It is illegal to dispose of asbestos waste in domestic garbage bins.
- It is also illegal to re-use, recycle or dump asbestos waste

These requirements will be adhered to.

[2] It may be that any material suspected of being asbestos is simply classified as such, and then managed accordingly. This though may result in excessive costs.

# 6 Construction Waste Profile

The following summarises the types, quantities and management systems for construction materials that may be generated during construction.

The quantity of waste materials to be generated onsite are estimates and therefore the systems that will be put in place need to incorporate flexibility to allow for variation in the total quantities generated. Active site management during the construction phase will ensure all waste/recyclable materials are disposed of appropriately and that all waste receptacles are of sufficient capacity to manage onsite activities.

Finalisation of the system(s) that will be implemented for the recovery of materials and for disposal of others to landfill will occur following appointment of contractor(s). A component of the appointment will be that contactors will be required to provide data as to the disposal pathway (eg., materials, volumes and final disposal site), as well as a validation process for this information.

The appointed contractor(s) will also be responsible for sourcing speciality recycling facilities for the materials that cannot be reused on site

The following table details the estimated composition by $m^2$ of construction waste to be generated for the total site.

**Composition and Management of Construction waste by $m^2$**

| Materials on site | | Destination | | |
|---|---|---|---|---|
| Type of material | Estimated volume ($m^3$) | On-site (Reuse or recycle) | Off-site (Detail contractor and recycling contractor) | Disposal (Detail contractor and landfill site) |
| Concrete | $30m^3$ | Separated on site and crushed for use in pavement construction where possible | Collected by contractor and disposed at concrete recycling facility | Facility TBA upon appointment of contractor |
| Timber (formwork) | $45m^3$ | Separated and where feasible, reused for further formwork | Unused material separate and stockpiled onsite.<br>Collected by specialist timber subcontractor for recycling | Facility TBA upon appointment of contractor |

| Materials on site | | Destination | | |
|---|---|---|---|---|
| Type of material | Estimated volume ($m^3$) | On-site (Reuse or recycle) | Off-site (Detail contractor and recycling contractor) | Disposal (Detail contractor and landfill site) |
| Metals | $35m^3$ | No on-site reuse | Collected by specialist metal subcontractor for recycling | Facility TBA upon appointment of contractor |
| Plasterboard | $25m^3$ | No on-site reuse | Collected by the contractor for recycling. | Facility TBA upon appointment of contractor |
| Carpet | $10m^3$ | No on-site reuse | This will be disposed of into a designated bin and collected regularly as required for recycling if of the required quality or disposal to landfill | Facility TBA upon appointment of contractor |
| Mixed hard plastics | $20m^3$ | No on-site reuse | Collected by contractor for recycling. Facility TBA upon appointment of contractor. | No disposal to landfill |
| Soil/Sand/Gravel | $20m^3$ | Will be stockpiled for reuse. | Excavation materials will be collected and used as clean fill by the waste contractor with appropriate notification as to location | All remaining material will be disposed at landfill – facility (or other sites as fill), TBA upon appointment of contractor |

| Materials on site | | Destination | | |
|---|---|---|---|---|
| Type of material | Estimated volume ($m^3$) | On-site (Reuse or recycle) | Off-site (Detail contractor and recycling contractor) | Disposal (Detail contractor and landfill site) |
| Mixed Recyclables | $65m^3$ | No on-site reuse | Contractor appointed to collect and recycle | No disposal to landfill |
| General waste | $125m^3$ | No on-site reuse | No recycling or reuse | Facility TBA upon appointment of contractor |

# 7 Contracts and purchasing

Each subcontractor working on the site will be required to adhere to this Waste Management Plan.

The Head Contractor will ensure each subcontractor:

- Takes practical measures to prevent waste being generated from their work
- Implements procedures to ensure waste resulting from their work will be actively managed and where possible recycled, as part of the overall site recycling strategy or separately as appropriate
- Ensures that the right quantities of materials are ordered, minimally packaged and where practical pre-fabricated. Any oversupplied materials are returned to the supplier
- Implements source separation of off cuts to facilitate reuse, resale or recycling.

The Site Manager will be responsible for:

- Ensuring there is a secure location for on-site storage of materials to be reused on site, and for separated materials for recycling off site.
- Engaging appropriate waste and recycling contractors to remove waste and recycling materials from the site
- Co-coordinating between subcontractors, to maximise on site reuse of materials
- Monitoring of bins on a regular basis by site supervisors to detect any contamination or leakage
- Ensuring the site has clear signs directing staff to the appropriate location for recycling and stockpiling station/s. And that each bin/skip/stockpile is clearly sign posted
- Proving training to all site employees and subcontractors in regards to the WMP as detailed below.

Should a subcontractor cause a bin to be significantly contaminated, the Site Manager will be advised by a non-conformance report procedure. The offending subcontractor will then be required to take corrective action, at their own cost. The non-conformance process would be managed by the Head Contractors' Quality Management Systems

# 8 Training and Education

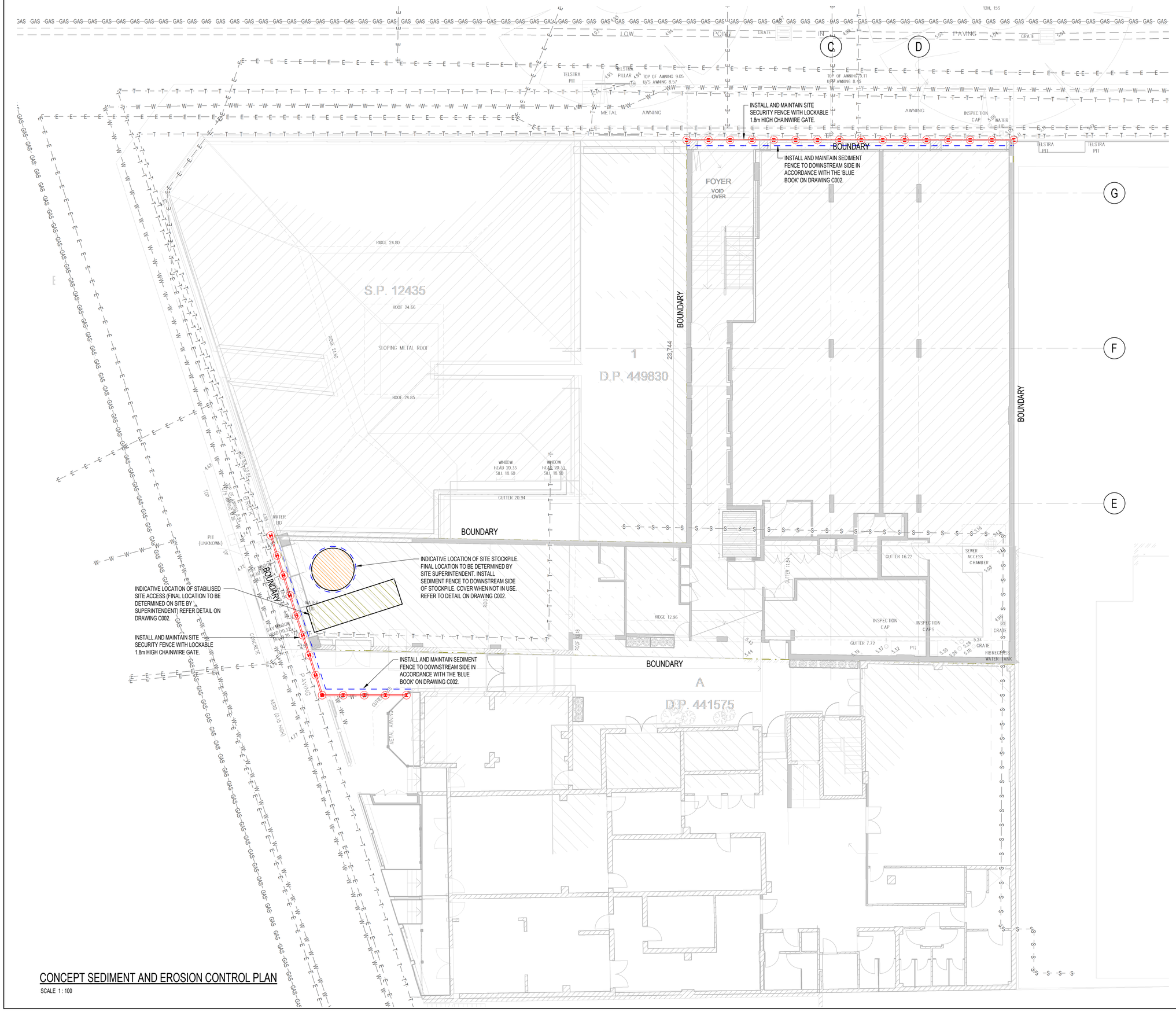
All site employees and sub-contractors will be required to attend a site specific induction that will outline the components of the WMP and explain the site specific practicalities of the waste reduction and recycling strategies outlined in the WMP.

All employees are to have a clear understanding of which products are being reused/recycled on site and where they are stockpiled. They are also to be made aware of waste reduction efforts in regards to packaging.

The site manager will post educational signage in relation the recycling activities on site in breakout areas, lunch rooms etc.

# Appendix A – Example Signage


# Appendix 3: Stormwater / Erosion and Sediment Control Plan




## CONCEPT SEDIMENT AND EROSION CONTROL PLAN

SCALE 1 : 100

## CIVIL LEGEND

| | |
|---|---|
| | SITE SECURITY FENCE |
| | SEDIMENT FENCE |
| | SITE STOCKPILE, REFER TO DETAIL ON DRG.C002 |
| | STABILISED SITE ACCESS (GRATED) |

## NOTES:

1. ALL SEDIMENT AND SOIL EROSION CONTROL MEASURES TO BE INSTALLED IN ACCORDANCE WITH THE 'BLUE BOOK'. CONTRACTOR TO ENSURE THESE MEASURES ARE IN PLACE AND MAINTAINED AT ALL TIMES DURING CONSTRUCTION WORKS.

| ISSUE | REVISION | DATE |
|---|---|---|
| 2 | DA ISSUE | 03/09/19 |
| 1 | DA ISSUE | 27/08/19 |


Adams
DESIGNING THE FUTURE
Melbourne Sydney Geelong

Suite 14.02, Level 14, 49 York Street
Sydney, NSW 2000
t +61 2 9222 9970 e projects@adamseng.com.au w www.adamseng.com.au




CLIENT
ASPIRING PROPERTIES


ARCHITECT
WOLSKI . COPPIN
ARCHITECTURE
LEVEL 3, 115 MILITARY ROAD NEUTRAL BAY NSW 2089
T: 9953 8477 E: info@wolskicoppin.com.au
DAVID WOLSKI NSW ARB No. 5297


TITLE
CONCEPT SEDIMENT AND EROSION CONTROL PLAN

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| Designed | SH | Drawn | CB | North |
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| Project Director | MW | Certified | - | |
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| 190047 | C010 | 2 |

# MIXED USE DEVELOPMENT , 6 THE CORSO & 46-50 EAST ESPLANADE, MANLY

Adams

DESIGNING THE FUTURE

# Stormwater Management Report for

Aspiring Properties at

6 The Corso & 46-50 East Esplanade, Manly

REVISION HISTORY

| Revision Number | Prepared By | Description | Date |
|---|---|---|---|
| 1 | Stephen Hazlewood | Issued for DA | 27/08/2019 |
| | | | |
| | | | |

## DOCUMENT ACCEPTANCE

| Action | Name | Signed | Date |
|---|---|---|---|
| Prepared by | Stephen Hazlewood | SH | 27/07/2019 |
| Reviewed by | Ben Hogarth | BH | 19/07/2019 |
| Approved by | Chris White | CW | 27/08/2019 |
| On behalf of | Adams Consulting Engineers Pty Ltd | | |

This report is of a defined scope and only for this commission. Adams should be consulted where any questions regarding the interpretation or completeness of our report arise.

**CONTENTS**

# 1 INTRODUCTION

Adams Consulting Engineers Pty Ltd (Adams) has been engaged by Aspiring Properties to prepare a Stormwater Management Report for the proposed development of an office, commercial and school building at 6 The Corso & 46-50 East Esplanade, Manly (Site). It is understood that the development of the Site consists of the combining of three separate properties into a single larger property. These properties are comprised of 6 The Corso, 46-48 East Esplanade and 50 East Esplanade.

This report will outline the methodology adopted and associated results of:

- Pre and post development stormwater flows generated due to development of the Site;
- Requirement of a detention tank; and
- Water sensitive urban design.

It is understood that this report will be utilised in the Development Application submission and will also inform the basis of the next phase of design works to ensure continuity through the project.

# 2 EXISTING SCENARIO

## 2.1 Existing Site Description

The Site is located approximately 10km to the north east of Sydney's CBD or 400m south west from Manly Beach, located within the suburb of Manly and has an area of approximately 0.1382 hectares. The Site is surrounded by The Corso to the north west and East Esplanade to the south west. Manly Wharf is located approximately 100m to the south west of the Site.

The Site currently serves as a commercial space made up of three separate building. As the majority of the existing Site is developed it is estimated that the total impervious area across the Site is approximately 100% of the total area. Refer to **Figure 1** For the location of the Site.

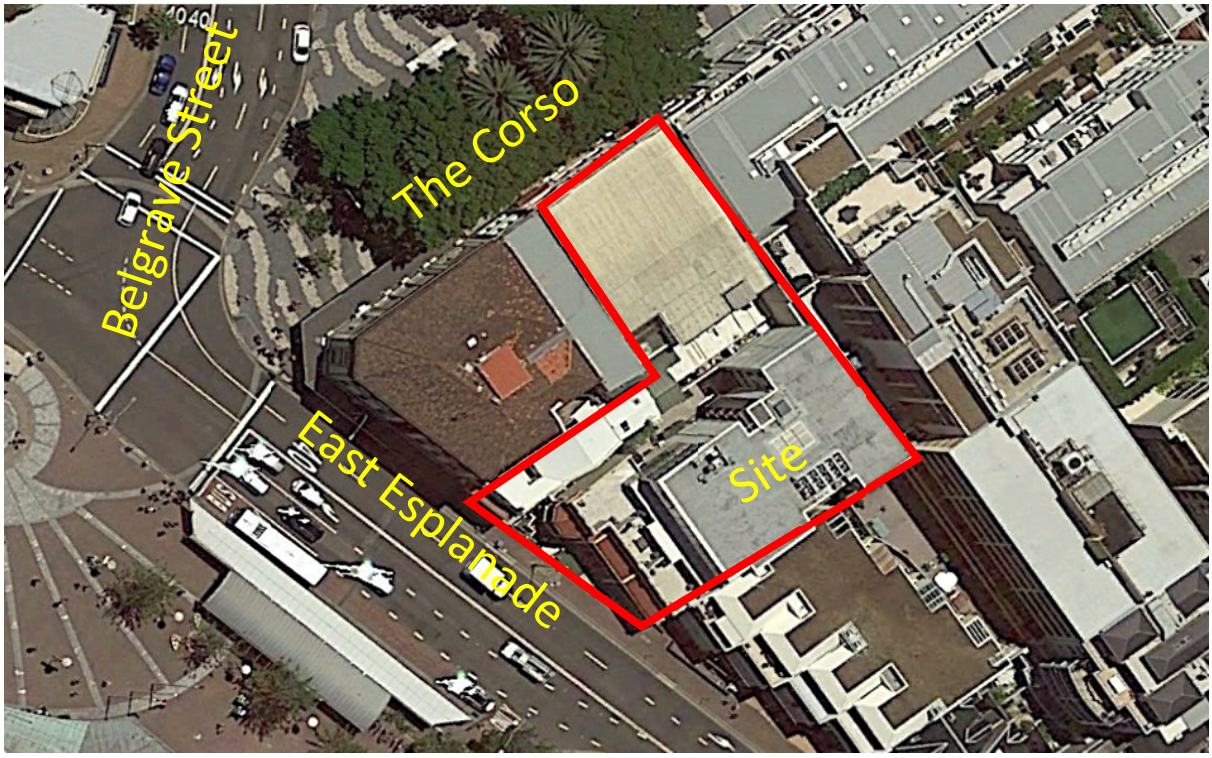



***Figure 1**- Site Aerial Image (Google Earth, 2019 accessed July 2019)*

## 2.2 Existing Stormwater Pipe Infrastructure

A review of the Dial Before You Dig (DBYD) information and information obtained from Northern Beaches Council (Council) indicates that there are the following nearby stormwater assets in close proximity to the Site:

1. A 375mm stormwater pipe to the north of the Site along the southern verge of The Corso;
2. There are no stormwater pipes shown in East Esplanade.

Refer to **Figure 2** for the Dial Before You Dig stormwater information obtained from Council.


**Figure 2** - Dial Before You Dig – Stormwater Maps (Northern Beaches Council, July 2019)

## 2.3 Existing Land Flooding Overlays

A review was undertaken of the Councils "Manly to Seaforth Flood Study by Cardno, 22 February 2019" to determine if the Site is flooded during a 1% Annual Exceedance Probability (AEP) rainfall event. The report showed that the Site was not affected in a 1% AEP event stormwater Peak Flood Depths. Please refer to "Manly to Seaforth Flood Study by Cardno, 22 February 2019 refer to Appendix B"

## 2.4 Site Drainage Description

A review of the Site shows that the properties along East Esplanade (46-48 East Esplanade and 50 East Esplanade) currently discharge to the kerb and gutter which is evident by the kerb outlets along East Esplanade (as shown below). It is not known how 6 The Corso discharges it's stormwater into the council system as it is not clear from the outside of the building or picked up on the current survey. However, it is expected that direct connection from the property occurs to the 375mm stormwater main in The Corso.

**Figure 3** - Existing Kerb and Channel Outlets (Google Street View accessed 27.08.19)

# 3 PROPOSED DEVELOPMENT

4 The proposed development of the Site will consist of one multi-story building comprising of teaching, communal and office space. Refer to **Figure 4** which indicates the building layout.

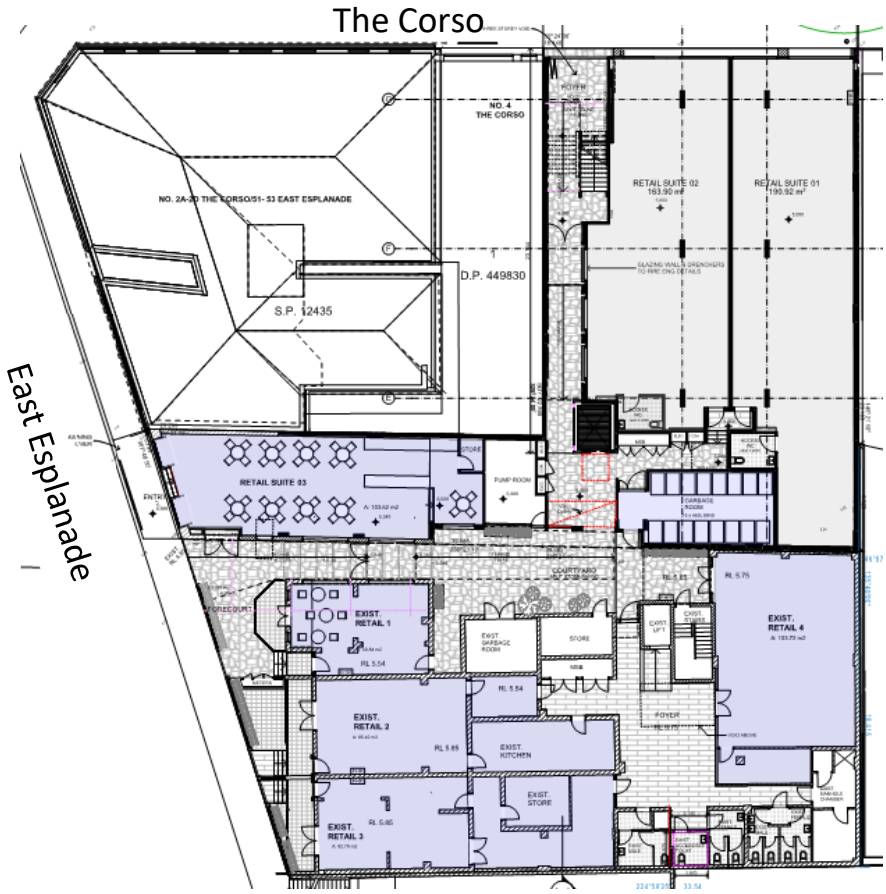



**Figure 4** - Site Plan (Wolski.Coppin Architecture 21 August 2019)

A review of the most recent architectural schedule indicates that the proposed development is intended to have a total impervious area of 100% of the total Site area.

# 5 DESIGN CRITERIA

## 5.1 Hydraulic Modelling Methodology

Referring to Manly specification for On-Site Stormwater Management (March 2004) Section 4.4 Permissible Site Discharge (PSD) from the Site may be calculated by using the Rational Method in accordance with Australian Rainfall and Runoff, Volume 1, 1987 or later editions.

$$Q = \frac{CIA}{3600}$$

Where:
Q = Stormwater flow (L/s);
C = Coefficient of impervious area;
I = Rainfall Intensity (mm/hr);
A = Area ($m^2$);

## 5.2 IFD Data

2016 rainfall intensity data was obtained from the Bureau of Meteorology website (accessed July 2019) and is presented in the below table.

**Table 1** - Annual Exceedance Probability (AEP) – Rainfall Intensity (mm/hr)

| | ***Annual Exceedance Probability (AEP)*** | | | | | | |
|---|---|---|---|---|---|---|---|
| ***Duration*** | **63.20%** | **50%** | **20%** | **10%** | **5%** | **2%** | **1%** |
| *1min* | 150 | 167 | 223 | 262 | 301 | 354 | 395 |
| *2min* | 125 | 139 | 181 | 210 | 238 | 277 | 308 |
| *3min* | 115 | 128 | 168 | 195 | 222 | 259 | 289 |
| *4min* | 108 | 120 | 159 | 185 | 212 | 248 | 276 |
| *5min* | 102 | 114 | 151 | 177 | 202 | 237 | 264 |
| *10 min* | 80.7 | 90.4 | 121 | 143 | 164 | 193 | 216 |
| *15 min* | 67.3 | 75.4 | 101 | 119 | 137 | 162 | 180 |
| *20 min* | 58.1 | 65.1 | 87.4 | 103 | 118 | 139 | 155 |
| *25 min* | 51.4 | 57.5 | 77 | 90.6 | 104 | 122 | 136 |
| *30 min* | 46.2 | 51.7 | 69 | 81.1 | 93.1 | 109 | 122 |
| *45 min* | 36 | 40.1 | 53.3 | 62.4 | 71.4 | 83.7 | 93.3 |
| *1 hour* | 29.9 | 33.3 | 43.9 | 51.3 | 58.7 | 68.7 | 76.6 |
| *1.5 hour* | 22.9 | 25.3 | 33.2 | 38.8 | 44.3 | 51.9 | 57.9 |
| *2 hour* | 18.9 | 20.9 | 27.3 | 31.8 | 36.3 | 42.6 | 47.5 |
| *3 hour* | 14.4 | 15.9 | 20.7 | 24.2 | 27.7 | 32.5 | 36.4 |
| *4.5 hour* | 11 | 12.2 | 15.9 | 18.6 | 21.4 | 25.2 | 28.3 |
| *6 hour* | 9.18 | 10.1 | 13.3 | 15.6 | 18 | 21.3 | 24 |
| *9 hour* | 7.12 | 7.88 | 10.4 | 12.3 | 14.3 | 17 | 19.2 |
| *12 hour* | 5.97 | 6.63 | 8.85 | 10.5 | 12.2 | 14.6 | 16.5 |
| *18 hour* | 4.66 | 5.21 | 7.05 | 8.41 | 9.84 | 11.8 | 13.4 |
| *24 hour* | 3.91 | 4.39 | 6 | 7.19 | 8.44 | 10.1 | 11.5 |
| *30 hour* | 3.41 | 3.84 | 5.28 | 6.35 | 7.47 | 8.98 | 10.2 |
| *36 hour* | 3.04 | 3.43 | 4.75 | 5.72 | 6.73 | 8.1 | 9.19 |
| *48 hour* | 2.53 | 2.87 | 3.99 | 4.81 | 5.66 | 6.81 | 7.71 |
| *72 hour* | 1.92 | 2.18 | 3.05 | 3.68 | 4.32 | 5.17 | 5.83 |
| *96 hour* | 1.55 | 1.77 | 2.47 | 2.97 | 3.47 | 4.14 | 4.65 |
| *120 hour* | 1.31 | 1.49 | 2.07 | 2.48 | 2.89 | 3.42 | 3.83 |
| *144 hour* | 1.13 | 1.28 | 1.77 | 2.11 | 2.45 | 2.9 | 3.23 |
| *168 hour* | 0.991 | 1.12 | 1.54 | 1.83 | 2.12 | 2.49 | 2.77 |

## 5.3 Catchment Data

The catchment area is consistent for the pre and post development scenarios – approximately 0.1382 hectares.

## 5.4 Existing Development

As outlined in Section 2.1, it is assumed that the existing Site is approximately 100% impervious.

## 5.5 Proposed Development

As outlined in Section 3, the architectural plans indicate that the Site is 100% impervious. ***Figure 5*** below shows the proposed catchment plan with the area in blue discharging to East Esplanade and the area in red discharging to The Corso

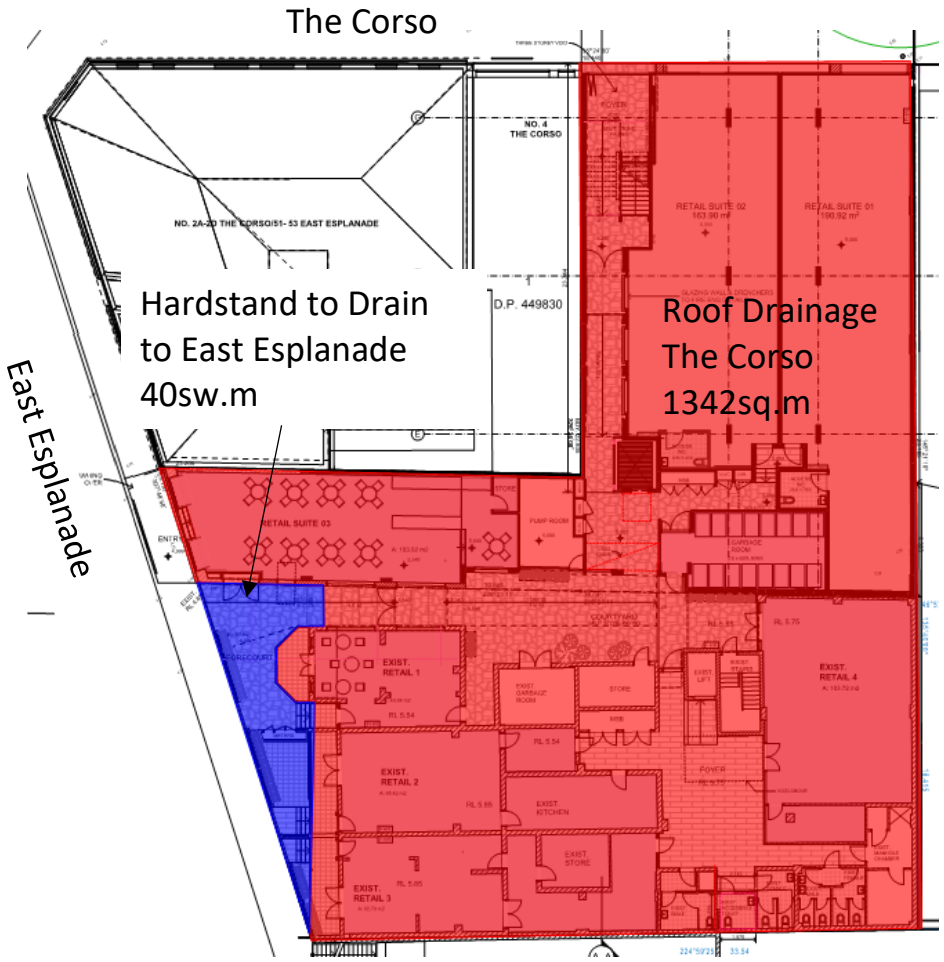



**Figure 5** - Proposed Catchment Plan

## 5.6 Detention Requirements

A discussion with Council was held to confirm the requirement of On-Site Detention (OSD). Council has confirmed that due to the pre and post developed Site being 100% impervious, they do not require OSD. Refer to **Appendix A** for Council correspondence.

## 5.7 Stormwater Discharge Controls

Referring to Manly specification for On-Site Stormwater Management (March 2004) Section 4.4, (Permissible Site Discharge (PSD)) the maximum PSD into kerb and gutter is 25L/s. This limits the amount that can discharge out to East Esplanade.

As outlined in Section 2.2 there is an existing Council stormwater pipe in The Corso that does not have any restrictions on stormwater discharge rates.

## 5.8 Water Sensitive Urban Design

The developments should comply with Manly Development Control Plan Part 3.5.8 Water Sensitive Urban Design to achieve the following water quality planning objectives:

- 80% retention of the typical urban annual load for Total Suspended Solids (TSS);
- 60% retention of the typical urban annual load for Total Phosphorus (TP);
- 45% retention of the typical urban annual load for Total Nitrogen (TN);
- 90% retention of the typical urban annual load for gross pollutants (litter);

Methods to achieve the above treatment targets can include the use of proprietary products, rainwater reuse, raingardens or detention basins.

## 5.9 Proposed Proprietary Products

Water Sensitive Urban Design (WSUD) has primary and secondary forms of treating stormwater runoff from site. Below are two proprietary products and the treatment rates that can achieve the requirements set out in the Manly Development Control Plan.

***Primary Treatment Device (Trash Screens/ Ocean Protect Enviropod 200 inserts)***

Ocean Protect Enviropod 200 inserts will be used as the primary treatment method for stormwater runoff to capture litter and coarse sediment from part of the Site. Trash screens will be installed in proposed selected locations. The following capture rates, based on information provided by Ocean Protect are as follows:

- TSS 54%
- TN 21%
- TP 30%
- Litter 100%

***Secondary Treatment Device (Ocean Protect Psorb(MMC) Stormfilter Cartridges)***

The design as a secondary treatment filter device located within a treatment chamber at the end of the treatment train. The following capture rates, based on information provided by Ocean Protect are as follows:

- TSS 94%
- TN 55.9%
- TP 86.1%
- Litter 100%

# 6 ANALYSIS RESULTS

## 6.1 Stormwater Flows

Stormwater runoff analysis was conducted to determine the amount of runoff generated by the Site for the pre and post development scenarios below. As outlined in Section 4.4 and 4.5, it is understood that the impervious area will not change and as a result there is no increase in run-off generated by the proposed development.

## 6.2 Stormwater Runoff

A C value of 1 was adopted due to the Site being 100% impervious.

$$Q_{Existing} = Q_{Proposed} = CIA$$

$$Q_{Existing} = \frac{1 * 264\left(\frac{mm}{hr}\right) * 1{,}382(m^2)}{3600}$$

$$Q_{Existing} = 101.3\frac{L}{s}$$

As shown above, for a 100 Year ARI, 5 minute storm, the Site is expected to generate a peak discharge flow rate of approximately 101.3 L/s.

## 6.3 Discharge Connections

Due to the limited discharge to East Esplanade being 25L/s to kerb and gutter, and the site producing 102.7L/s the discharge is either:

- Required to be split between East Esplanade and The Corso to spread the stormwater discharge load and between the two streets; or
- Send the stormwater to the council 375mm stormwater pipe in The Corso to meet the Council discharge requirements.

As such it is proposed to discharge to The Corso via connection to the existing Council stormwater pipe located in the southern verge of The Corso. There will also be a minor discharge to kerb along East Esplanade to control any of the surface flow not captured by the roof.

## 6.4 Discharge to Kerb and Channel

A C value of 1 was adopted due to the Site being 100% impervious.
It was measured that the area at the front of East Esplanade not drained by roof is 40m$^2$.

$$Q_{Existing} = Q_{Proposed} = CIA$$

$$Q_{Existing} = \frac{1 * 264\left(\frac{mm}{hr}\right) * 40(m^2)}{3600}$$

$$Q_{Existing} = 2.93\frac{L}{s}$$

As shown above, for a 100 Year ARI, 5 minute storm, the Site is expected to generate a peak discharge flow rate of approximately 2.93 L/s which is less than the 25L/s allowable to discharge to kerb and channel.

## 6.5 Water Sensitive Urban Design Implementation

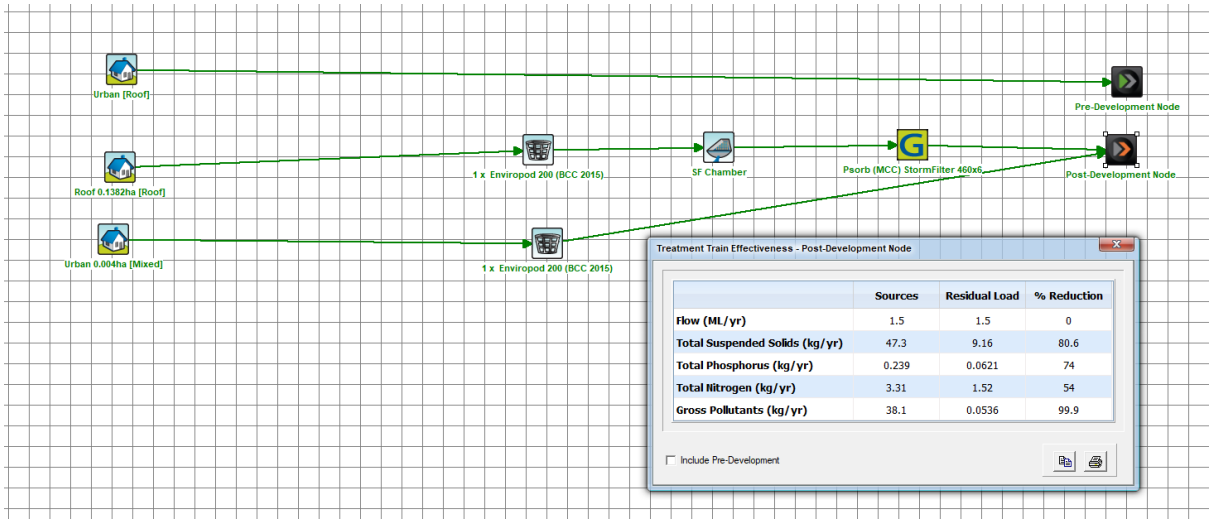
The Software MUSIC has been used to create a water quality model that provides an indication of the pollutant removal rates expected when a treatment train of water quality measures is applied to the proposed development.

The water quality modelling software MUSIC v6.3 was used to analyses the performance of the treatment train. **Figure 6** below shows the MUSIC node and link diagram used to describe the proposed treatment train. The model has been built to assess the adequacy of the Stormwater treatment measure proposed and to ensure that the quality of stormwater meets the objectives prior to stormwater runoff leaving the Site. The Water Sensitive urban design has been met through the use of 2 Ocean Protect Enviropod200 and 6x Ocean Protect 460Psorb (MCC) StormFilter;

The results of the analysis showed the treatment train will achieve the water quality targets set out by Councils. **Table 2** below display the effectiveness of the treatment train for the primary and secondary treatment.

*Table 2 - MUSIC Model Results*

| Pollutant | Before Treatment | After Treatment | % Reduction | % Objective | Compliance |
|---|---|---|---|---|---|
| Total Suspended Solids (kg/yr) | 47.3 | 9.16 | 80.6 | 80 | OK |
| Total Phosphorus (kg/yr) | 0.239 | 0.0621 | 74 | 60 | OK |
| Total Nitrogen (kg/yr) | 3.31 | 1.52 | 54.1 | 45 | OK |
| Gross Pollutants (kg/yr) | 38.1 | 0.0536 | 100 | 90 | OK |




| | Sources | Residual Load | % Reduction |
|---|---|---|---|
| Flow (ML/yr) | 1.5 | 1.5 | 0 |
| Total Suspended Solids (kg/yr) | 47.3 | 9.16 | 80.6 |
| Total Phosphorus (kg/yr) | 0.239 | 0.0621 | 74 |
| Total Nitrogen (kg/yr) | 3.31 | 1.52 | 54 |
| Gross Pollutants (kg/yr) | 38.1 | 0.0536 | 99.9 |

**Figure 6** - MUSIC Link and Node Diagram

# 7 CONCLUSION

Adams Consulting Engineers Pty Ltd (Adams) has been engaged by Aspiring Properties to prepare a Stormwater Management Report for the proposed development of an office, commercial and school building at 6 The Corso & 46-50 East Esplanade, Manly (Site). This report outlines the methodology adopted and associated results of:

- Pre and post development stormwater flows generated due to development of the Site;
- Requirement of a detention tank; and
- Water sensitive urban design.

As outlined in this report, the following key items have been identified:

- The Site is 100% impervious in both the pre and post developed conditions;
- The Site previously discharged to kerb and gutter on East Esplanade and it is not known how The Corso connected into Council's stormwater system. It is expected that the Site will discharge the majority of stormwater to existing Council infrastructure within The Corso and a minor amount to kerb and gutter onto East Esplanade;
- The Site is expected to discharge approximately 102.7L/s for the pre and post development scenarios in a 1 in 100 Year ARI, 5 minute storm event;
- No On-Site Detention System is required based on council correspondence**;**
- The Water Sensitive Urban Design requirements has been met through the use of 2 Ocean Protect Enviropod200 and 6x Ocean Protect 460Psorb (MCC) StormFilter;

## APPENDIX A – COUNCIL CORRESPONDENCE

# RE: 6 The Corso & 46-50 East Esplanade, Manly Stormwater Discharge

AK

Alex Kwok <Alex.Kwok@northernbeaches.nsw.gov.au>
To Stephen Hazlewood
Retention Policy 7 Years (7 years)
You replied to this message on 16/07/2019 1:58 PM.

Hi Stephen,
Sorry about the late reply.

In my understanding, a new DA will be lodged.
And there is no major amendment to the existing buildings.
The roof areas of the buildings will be similar or retained.
As such, Council will not require an OSD in the DA.

In relation to the stormwater discharge point, Council has a 375 diameter pipe on The Corso.
The roof water can be connected into the pipeline if it suits your design.
Also, the roof water can be discharged into the kerb & gutter on East Esplanade with max 25l/s.

Please feel free to contact me on 9942 2633 for any further assistance.

Regards,
Alex

**Alex Kwok**
Development Engineer

Development Engineering & Certification
t 02 9942 2633
alex.kwok@northernbeaches.nsw.gov.au
northernbeaches.nsw.gov.au

northern beaches council

## APPENDIX B – COUNCIL CORRESPONDENCE

SITE

**Legend**

- Study area
- Cadastre

**Peak Flood Level (mAHD)**

- 1 to 2
- 2 to 3
- 3 to 5
- 5 to 10
- 10 to 40
- 40 to 70
- 70 to 125

N

0.2 0 0.2 0.4 0.6

Kilometers

# Manly to Seaforth Flood Study
# 1% Peak Flood Water Level
# Map 3/4

**Figure 11**

Cardno