Bankstown Warehouse

Stormwater Management Plan

Date: 16th October 2023

Prepared by: Lauren Todd

Ref: 301351354

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Revision

Site Address:	125 Nancy Ellis Leebold Drive, Bankstown Aerodrome, NSW 2200
Real Property Description:	Lot 16/DP 1071297
Proposed Development:	Industrial Development, roadway regrading
Client:	Green Homes Australia
Authority	Bankstown Airport
Authority Reference #:	N/A
Stantec Reference:	301351354-SWMP-001

Rafal Piwonski

Civil Project Technical Lead

For and on behalf of
Stantec Australia Pty Ltd

Revision	Date	Comment	Prepared By	Approved By
01	16.10.2023	Issue for Development Application	LPT	RPW

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1. Introduction

Stantec have been commissioned to prepare this Stormwater Management Plan (SWMP) for the proposed development at 125 Nancy Ellis Leebold Drive, Bankstown Aerodrome New South Wales 2200, Australia.

This SWMP illustrates that the proposed development complies with the conditions set out by Bankstown Airport Development Guidelines, Australian Rainfall and Runoff (ARR) 2021, Australian Standards and appropriate engineering practices.

The overall site is bound by Nancy Ellis Leebold Drive to the East, aircraft runway and taxiway to the south, aircraft apron to the west, carpark and industrial infrastructure to the north. Refer to locality plan in **Figure 1** for further clarification.

Figure 1: Site Location Plan (Source: NearMap 2023)

2. Abbreviations Definitions

AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ARI	Average Recurrence Interval
ARR	Australian Rainfall and Runoff
BoM	Bureau of Meteorology
DA	Development Application
DCP	Development Control Plan
DN	Diameter Nominal (mm)
EY	Exceedances per Year
FFL	Finished Floor Level
FPL	Flood Planning Level
GPT	Gross Pollutant Trap
IFD	Intensity-Frequency-Duration
IL	Invert Level
L/s	Litres per second
m/s	Metres per second
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
OSD	On-Site Stormwater Detention
PSD	Permissible Site Discharge
RCP	Reinforced Concrete Pipe
RL	Relative Level
RWT	Rainwater Tank
SID	Safety In Design
SSR	Site Storage Requirement
WSUD	Water Sensitive Urban Design

3. Existing Site Characteristics

3.1 Property Detail

The proposed development forms part of the site with the following property details:

Site Address:	125 Nancy Ellis Leebold Drive, Bankstown Aerodrome New South Wales 2200, Australia.
Real Property Description:	Lot 16/DP 1071297
Site Area:	25,786m² (2.5786Ha)

The proposed development can be seen on the Civil Design Documentation shown in Appendix A of this report.

The proposed site mainly includes regrading of the vehicular access around the existing building, particularly proposed grading adjacent to the existing OSD to ensure vehicular access across a level difference. There will be additional car parking spaces, and an additional vehicular accessway to the south of the site.

3.2 Topography

The local topography around the site shows that the site primarily falls north east to south west. The high points of the site are located along the northern boundary of the site at ~RL 11.6m AHD, and the low point is located along the southern boundary of the site at ~RL 10.0m AHD. This is approximately a fall of 1.0% across the site.

Figure 2: Site Topography (Source: Nearmap 2023)

3.3 External Stormwater Catchments

The surrounding area has been investigated to determine the likely impact of existing external stormwater catchments on the proposed site.

The site is currently surrounded by industrial developments and roadway, so it is believed that little to no external catchments impact the development site. The neighbouring properties are largely developed and hence, it is assumed they have fully functioning stormwater infrastructure, which will capture and convey stormwater to the council system. This is also supported by The Bankstown Airport Site-Wide Flood and Stormwater Management Strategy completed by AECOM (2018), which generally states that the proposed site is not impacted by existing external stormwater catchments.

3.4 Existing Stormwater Infrastructure

Through analysis of survey information, Near Maps, and hydraulic works as executed documentation (CB Commercial Plumbing Pty Ltd, 2007), the site appears to have pit and pipe infrastructure, as highlighted in Figure 3. It is assumed surface runoff is directed to the stormwater inlet structures using the design topography of these elements, and the inlet structures have been designed to adequately convey the surface runoff into the in-ground drainage network. It is unknown whether the pre-development roof catchment and ground catchment is treated prior to discharge. The underground pipes appear to discharge into an existing pit external to the site, near the south western boundary.

Through analysis of hydraulic works as executed documentation (CB Commercial Plumbing Pty Ltd, 2007), there is an on-site detention tank, located towards the back of the site. Refer to the figure 3 below for more information.

Upstream runoff is conveyed to the on-site detention tank and then directed to the legal point of discharge using gravity and geometric falls of the pipe system.

Roof catchment is conveyed via the hydraulic building drainage system and discharged to the in-ground drainage system. For storm events exceeding the design storm event, flows assumably surcharge the roof drainage system and discharge into the surrounding ground where it is conveyed through the inground pits to the stormwater network within the site.

The existing stormwater infrastructure is expected to be retained.

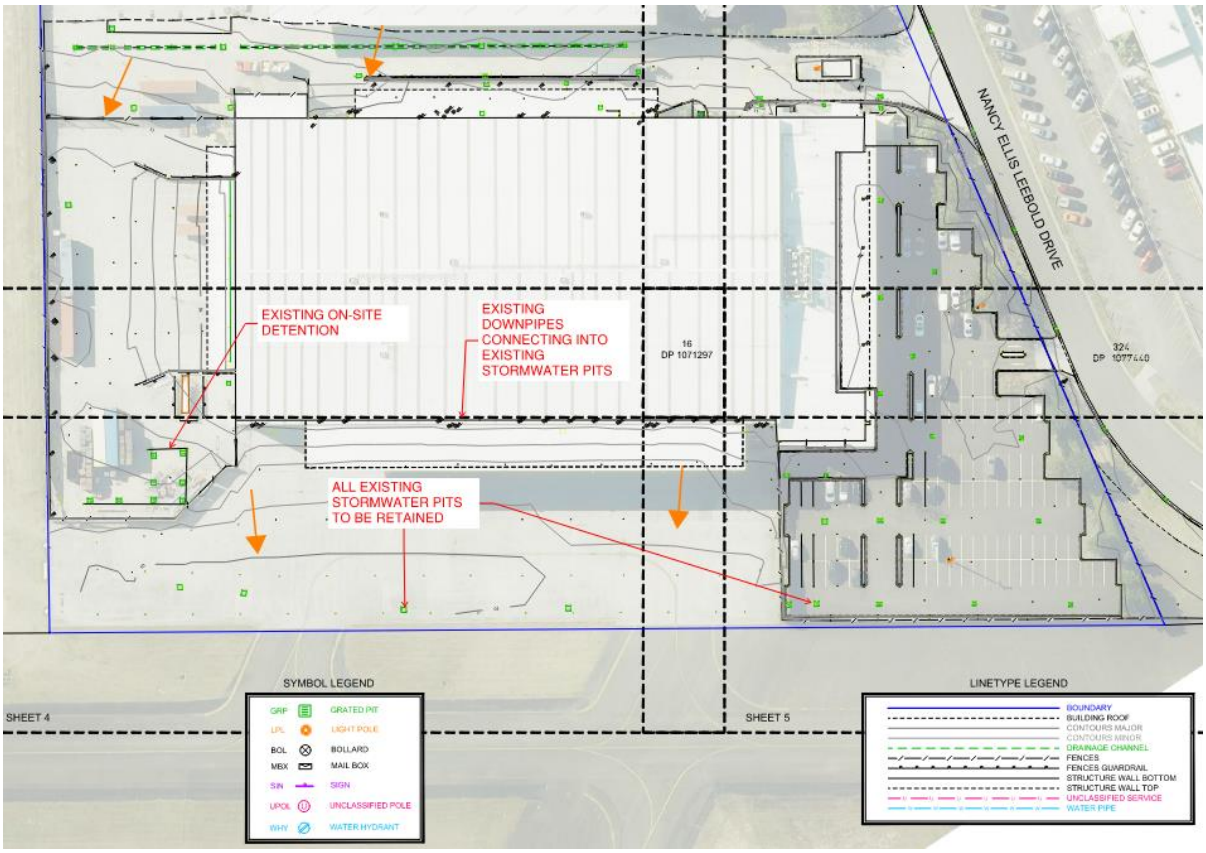

Figure 3: Existing Stormwater Drainage Infrastructure (Stantec Ref '3013-51354-001', Dated 06/10/2023)

3.5 Existing Stormwater Discharge

Analysis of survey and Google Maps indicates that there is formalised drainage infrastructure within the site.

The stormwater from the site's impervious roofed areas is captured via downpipe connections and the overland flow is collected via a network of grated inlet pits. Through review of hydraulic works as executed documentation (CB Commercial Plumbing Pty Ltd, 2007), the underground pipes appear to discharge into an existing pit external to the site, near the south western boundary.

4. Civil Services

4.1 Purpose of this Document

The purpose of this document is to describe the stormwater services in relation to the development at 125 Nancy Ellis Leebold Drive, Bankstown Aerodrome New South Wales 2200, Australia.

4.2 Reference Documents

This report is based on the following reference documents:-

- Survey Plan by Stantec, dated 09/10/2023 (Ref No.: '3013-51354-001')
- Hydraulic works as executed documentation (CB Commercial Plumbing Pty Ltd, 2007)
- Architectural Site Plan – Proposed by SBA Architects, dated 09/10/2023 (Project No. 23221)
- Dial Before You Dig.

4.3 Civil Scope of Work

The Civil Services scope of work consists of the following services:-

- Minor grading to enable truck access to and around the building;
- Minor stormwater drainage to support minor grading works;
- Existing and proposed connections to the drainage system;
- Sediment and erosion control;
- Minor demolition works to support the minor grading works.

The civil scope for proposed stormwater drainage shall comprise of the in-ground pit and pipe network external to the building and external overland flow paths.

4.4 Limitations

This report is based primarily on the information provided by the architect, design team, survey drawings, and information communicated during the design development process. Any assumptions made through the design process have been communicated in this report.

4.5 Design Criteria

Table 1: Civil Design Criteria

Item	Design Criteria
Stormwater Drainage	Australian Rainfall and Runoff (ARR) 2019 AS/NZS 3500.3-2021 – Stormwater Drainage AS 2865 – 2009 Safe Working in a Confined Space Bankstown Airport Development Guidelines 2019 Bankstown Airport Masterplan 2019 Bankstown Airport South West Precinct Site Works and Warehouse Major Development Plan Volume 2 2019
On-Site Detention (OSD) Tank	AS/NZS 3500.3-2021 – Stormwater Drainage AS 2865 – 2009 Safe Working in a Confined Space Bankstown Airport Development Guidelines 2019
Sediment and Erosion Control	Landcom 'Blue Book' – Managing Urban Stormwater Soils and Construction Guideline Edition

5. Stormwater Drainage

5.1 Stormwater Drainage Design Requirements

Design requirements for stormwater management on the site have been set out in the Bankstown Airport Development Guidelines 2019. These requirements are summarised in the sections below.

5.1.1 Stormwater Management

With reference to the Bankstown Airport Development Guidelines 2019, the design elements with regards to stormwater management are as follows:

- Where appropriate car park design should seek to ensure stormwater runoff is direct onto larger “dry land” areas within the site to improve moisture conditions for shrubs and trees. On-site stormwater retention and reuse is encouraged, which can be achieve through installation of rainwater tanks. Where this is not possible drainage swales and recharge basins should be incorporated into landscaped areas.
- Water Sensitive Urban Design principles should be incorporated into site design and stormwater management where possible.
- New developments require the installation of stormwater interception devices that help prevent sediment, litter and other gross pollutants entering the stormwater system.
- Development is encouraged to adopt water conservation practices and incorporate water management and quality measures, for example the use of water efficient fixtures and development of a site water management plan.
- Use of rainwater tanks and water reuse is encouraged where appropriate.
- All developments are to comply with the Bankstown Airport Stormwater and Flood Management Strategy Development should not increase stormwater load.
- All stormwater management is to be contained within the site other than exceptional circumstances, where BAL may consider alternatives but subject to a commercial arrangement for maintenance.

The existing development site currently contains an on-site detention tank that has been sized to cater for the site area, existing catchment and 100% total imperviousness. As the existing OSD already caters for the existing catchment, and no additional catchment is being diverted to the OSD, it is believed that the system has sufficient capacity to cater for the flows generated from the development. Therefore, no additional OSD is required for the site.

5.1.2 Stormwater Quality

The proposed site when compared to existing conditions, shall not increase in impermeable areas, and therefore, no stormwater quality management will be required for the site.

5.2 Stormwater Conveyance

This section of the report discusses the systems proposed to allow for stormwater to be conveyed across the site to the legal point of discharge. Typical set serviceability requirements for the stormwater conveyance network are such that minor flows are conveyed through piped drainage, and major flows are discharged via controlled overland flow.

5.2.1 Roof Drainage

The drainage system will be designed in accordance with AS3500.3-2021 to convey runoff from the roof to the in-ground drainage system. For storm events exceeding the design storm event, flows will surcharge the roof drainage system and discharge onto the surrounding ground where it will then be conveyed to the surrounding ground drainage within the site.

5.2.2 Surface Drainage

The surface areas will be drained through a variety of methods, discussed below, in accordance with AS3500.3:2021 and Bankstown Airport Development Guidelines 2019.

Surface runoff from the access road and surrounding landscaped areas will be directed to stormwater inlet structures using the design topography of these elements. The inlet structures have been designed to adequately convey the surface runoff into the in-ground drainage network.

The runoff will then be conveyed below-ground across the site to the legal point of discharge using gravity and the geometric falls of the pipe system.

5.3 Proposed Site Stormwater and OSD Design

The total development site area is 2.5786Ha, with a roof area of approximately 0.82Ha. Roof areas are captured via a downpipe system and discharge to the existing below-ground stormwater network.

All existing stormwater infrastructure is expected to be retained. An additional kerb inlet pit and grated drain have been proposed in some areas of the site to capture stormwater in regraded areas. The proposed site stormwater will include new pit and pipe infrastructure where required, which will reticulate to the legit point of discharge.

Refer to Appendix A Civil Design Documentation for a further understanding of the stormwater strategy proposed for the development site.

Discharge from the OSD tank shall discharge in the same manner as in pre-development conditions. The site discharges into an existing pit external to the site, near the south western boundary. As the existing OSD already caters for the existing catchment, and no additional catchment is being diverted to the OSD, it is believed that this system has sufficient capacity to cater for the flows generated from the development.

5.3.1 DRAINS Input Parameters

A DRAINS model has been prepared to verify the site stormwater drainage system. DRAINS is a runoff routing software program which assesses stormwater drainage hydraulics based on catchment hydrology input from various sources including the Bureau of Meteorology (BoM) and the Australian Rainfall and Runoff (ARR) Datahub.

The parameters used in the DRAINS model are as follows:-

- Soil Type – Normal 3.0
- Paved (Impervious) Area Depression Storage 1mm
- Supplementary Area Depression Storage 1mm
- Grassed (Pervious) Area Depression Storage 5mm
- Antecedent Moisture Condition 3.0
- Minimum Pit Blockage (Sag Pits) 0.5
- Minimum Pit Blockage (On-Grade Pits) 0.2
- Minimum Pit Freeboard 150mm
- Minimum Fall Across Pits 30mm

The DRAINS model has been prepared to confirm that the proposed stormwater pit and pipe network is adequately sized to capture and convey stormwater. Overland flow paths have been adequately sized to convey the major storm flows safely across the site in a south westerly direction.

The DRAINS model confirms that the proposed stormwater pipes within the stormwater design are adequately sized to contain and convey stormwater.

- 1x 300mm diameter stormwater pipe connecting from a proposed stormwater kerb inlet pit has been introduced.
- 3x 225mm diameter stormwater pipes connecting from proposed stormwater pits adjacent to the proposed awning have been introduced. The stormwater catchment from the awning will be conveyed to the new inlet pits via downpipes.
- 1x 150mm stormwater pipe connecting from a proposed grated drain has also been introduced to the site.

Refer to Appendix A Civil Design Documentation for further information on the stormwater design.

6. Flooding

When considering a new development, it is important to assess the impact of existing flooding on the proposed development and the impact of the proposed development on existing or potential flooding both upstream and downstream of the development.

6.1 Regional Flooding

Flood maps within the Bankstown Airport South West Precinct Site Works and Warehouse Major Development Plan Volume 2 (2019) identifies flood affected areas. Refer to Figure 4 and 5 below. As can be seen, the proposed development site is flood affecting during the 100-year and PMF storm events.

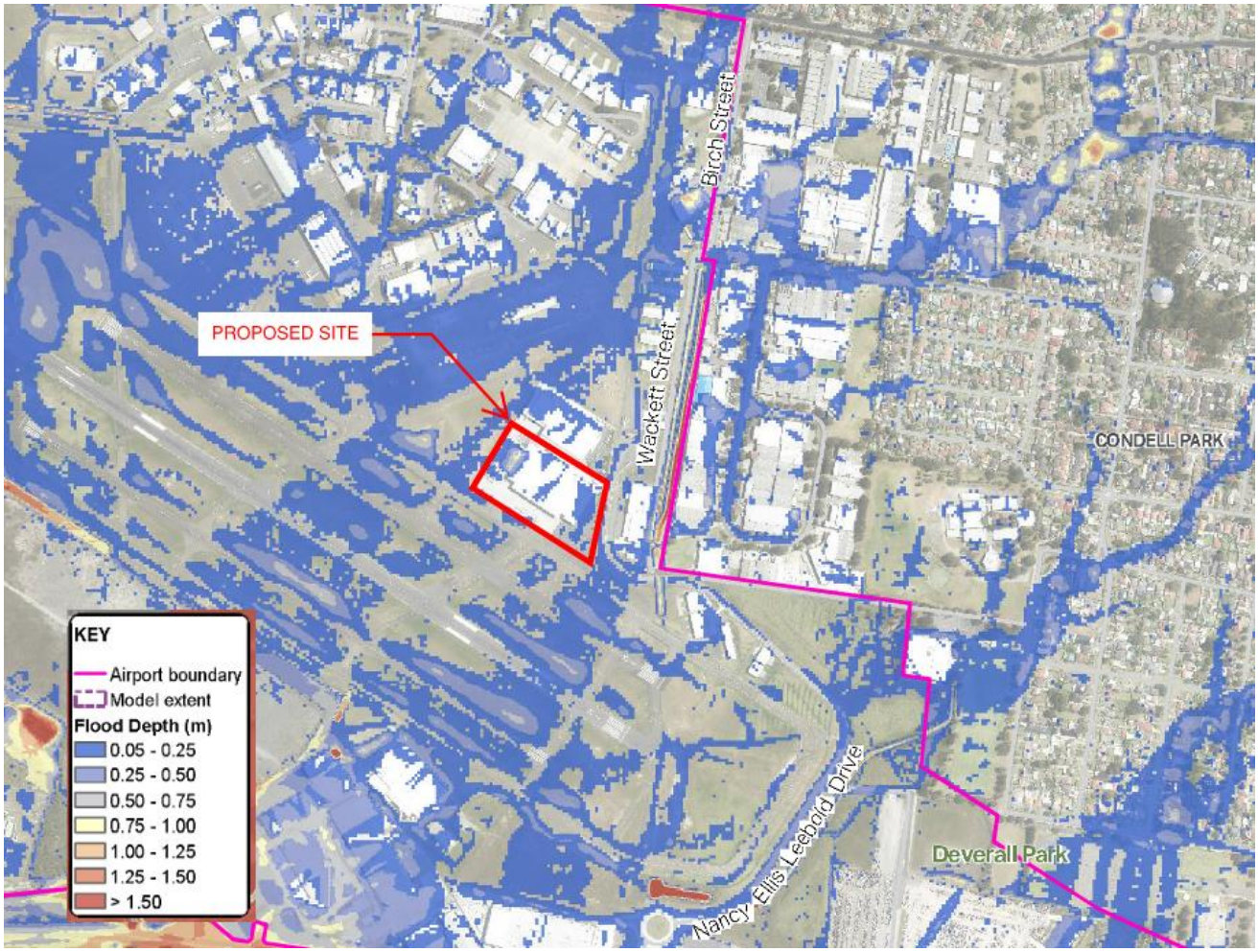

Figure 4: Bankstown Airport 100-Year ARI Local Catchment Flooding Conditions (AECOM, 2019)

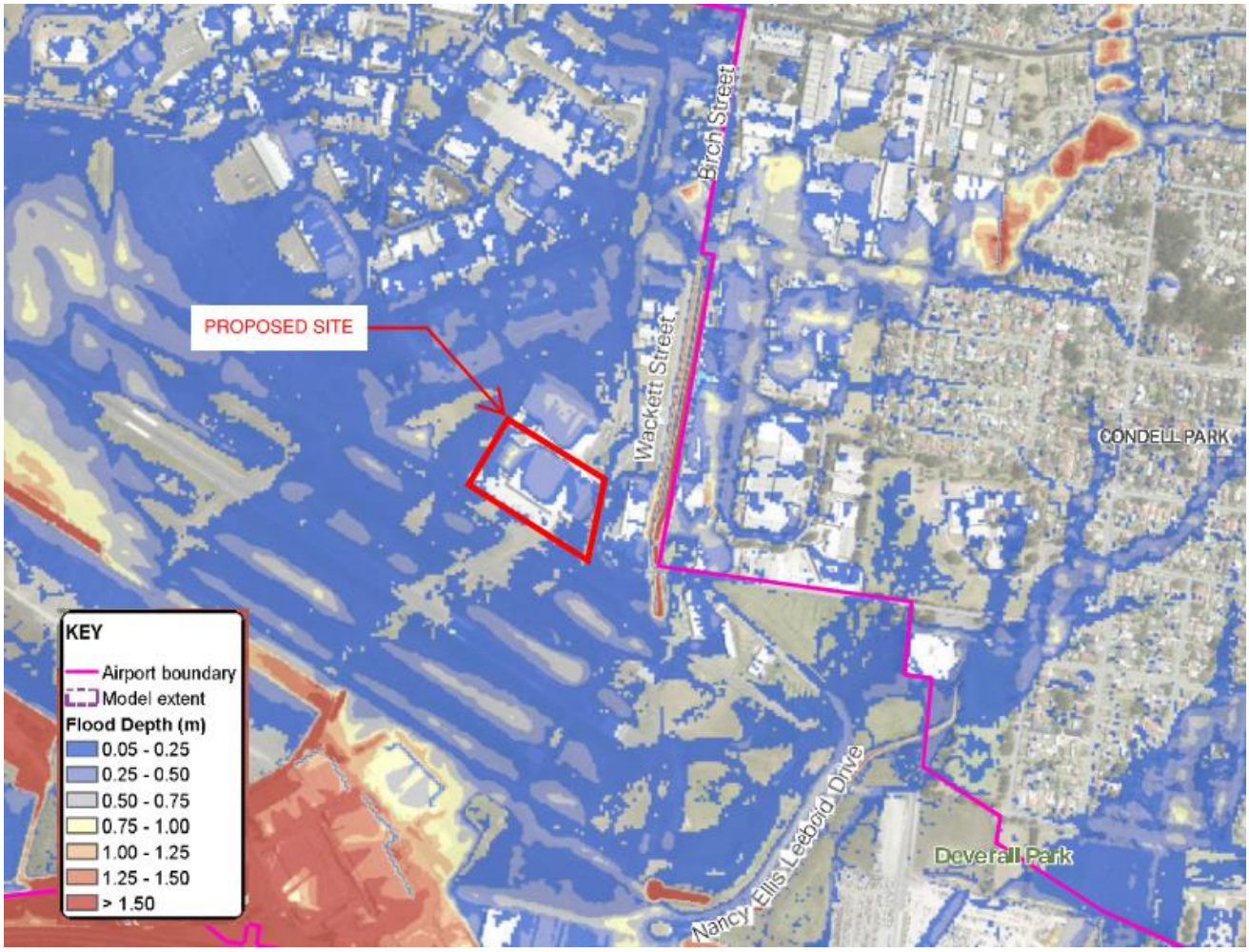

Figure 5: Bankstown Airport PMF Local Catchment Flooding Conditions (AECOM, 2019)

It is assumed the existing building floor levels, carparking and driveway access currently meet the Bankstown Airport Development Guidelines (2019) flood risk management requirements, such that:

- A freeboard of 300mm has been adopted for all new developments to ensure flood immunity from the 100-year ARI flood event.

The proposed additional vehicular access, and additional carpark spaces will not have an appreciable impact on the current flooding conditions.

The stormwater drainage shall be designed to avoid any adverse impact on the existing property, and adjacent properties. Particularly, the overland flow paths are integral for the stormwater system. The overland flow paths shall be unobstructed at all times.

7. Stormwater Network Maintenance Schedule

In order to ensure the ongoing effective operation of the stormwater network and water quality treatment devices, the devices must be maintained in accordance with manufacturer recommendations/requirements and general best practice. It is noted that all pits are to be inspected in a safe manner that assesses localised risk and in accordance with maintenance contractor safe work method statements (SWMS).

The below summarises the various stormwater network components that will need to be maintained, whilst Schedule 1 below details required maintenance of specific items within the network requiring maintenance.

7.1 Pit and Pipe Network

A general inspection of the stormwater pit network is to be undertaken every six (6) months and after major storm events. The general inspection involves visual inspection inside pits, removal and disposal of larger gross pollutants within pits in accordance with waste disposal regulations to prevent blockages, and minimal rectification works as required. Inspection of general pits can coincide with inspection and maintenance of water quality pit inlets (if applicable).

7.2 Stormwater Maintenance Schedule

Maintenance Action	Frequency	Responsibility	Procedure
Pit and Pipe Network			
Blockages of inlet and outlet pipes within pits	Six Monthly	Maintenance Contractor	Remove grate. Remove any debris/litter/sludge from within pits.
Condition of inlet grates	Six Monthly	Maintenance Contractor	Clear vegetation and any debris from the pit grate and repair as required.
Condition of pit structures and section of pipes at inlets/ outlets.	Two Years	Maintenance Contractor	Remove grate to inspect internal walls. Repair as required. Clear vegetation from external walls if necessary and repair as required. Notify structural engineer if detrimental features observed.
Overland flow paths and drainage swales	Six Monthly	Maintenance Contractor	Walk along the flow path and swale. Check batters and condition of path extent. Remove any debris/litter/sludge.
Survey pipe condition with CCTV's and repair defects as necessary	Five Years	Maintenance Contractor	Remove grate. Clear blockages for camera access. Operate camera in accordance with manufacturer specifications and operator standard procedures.
OSD and Discharge Control			
Blockage of orifice plate	Six Monthly	Maintenance Contractor	Remove grate and screen to inspect orifice. See attached Site Stormwater plan for location of Discharge Control Pit.
Orifice structure size and connection to wall	Five Years	Maintenance Contractor	Compare orifice diameter to approved design (see Works as Executed Drawing) and ensure edge of orifice is not pitted or damaged.
Trash rack blockage	Six Monthly	Maintenance Contractor	Remove grate and screen if required to clean it.
Trash rack condition and connection to wall.	Annually	Maintenance Contractor	Remove grate and rack screen. Check corrosion in particular corners. Check screen fixings to wall for stability and corrosion. Repair as required.
Condition and performance of flap valves	Annually	Maintenance Contractor	Remove grate. Test valve hinge by moving flap to full extent and allowing it to drop back into normal position. Flap should freely swing at hinge.

Blockage of overflow weirs	Six Monthly	Maintenance Contractor	Remove grate and open cover to ventilate underground storage if present. Ensure weir clear of blockages.
Tank and pit wall defects and structural adequacy.	Two Years	Maintenance Contractor	Remove grate to inspect internal walls. Repair as required. Clear vegetation from external walls if necessary and repair as required.
Tank slab build-up of sediment and sludge.	Six Monthly	Maintenance Contractor	Remove grate and screen. Remove sediment/ sludge build up, check orifice and flap valves are clear.
Condition and fixing of step irons	Two Years	Maintenance Contractor	Remove grate to inspect step irons and connection into wall. Repair as required. Notify structural engineer if detrimental features observed.
OSD warning signage	Two Years	Maintenance Contractor	Remove grate to inspect signage and connections. Check for fading in sign and any vegetation growth over or near sign impacting visibility. Repair as required.

8. Erosion & Sedimentation Control

Landcom have published a design guide entitled “Managing Urban Stormwater - Soils and Construction” which is regarded as the standard to which erosion and sedimentation control should be designed to within NSW.

The control of erosion and sedimentation describes the measures incorporated during and following construction of a new development to prevent the pollution and degradation of the downstream watercourse.

8.1 Stormwater Drainage Infrastructure Inlets

Risk:-

- Sediment from the construction site washing into the existing stormwater drainage inlet infrastructure.

Consequence:-

- The sediment will then be conveyed into the downstream waterbody by stormwater runoff, contaminating the waterbody.
- The sediment will build up blocking the stormwater infrastructure and preventing stormwater conveyance to the downstream waterbody and impacting drainage upstream.

Mitigation:-

- Sediment traps protection will be installed surrounding all existing stormwater drainage infrastructure inlets to prevent sediment entering the system.
- Temporary Stormwater Systems are to be installed where required to capture all site runoff within the zone of excavation. Runoff will be allowed to settle out suspended particles and debris, and an acceptable water of 50mg per litre of Non Filterable Residues (NFR) is required to be achieved prior to discharge.
- Installation of a fence around the perimeter of the basin is required as well as a rip rap to allow for bobcat access for periodic removal of sediment. Also, a perforated riser outlet pipe needs to be placed for the connection and discharge to an existing pit.

Maintenance: -

- Frequent inspection of the sandbags to ensure they are arranged in a manner that prevents sediment from accessing the drainage system. If sediment is building up on the sandbags they should be cleared of sediment and re-established.
- All soil erosion and sediment control structures including temporary sediment basins and sediment traps shall be inspected following each storm event and any necessary maintenance work shall be undertaken to ensure their continued proper operation.

8.2 Construction Exit Protection

Risk:-

- Spoil such as soil being conveyed from the site on the wheels of vehicles.

Consequence:-

- Spoil being tracked onto the public road corridors where it is then washed into the existing stormwater drainage infrastructure and is then washed downstream polluting the downstream waterbody.
- Spoil being tracked onto the public road creating dangerous driving conditions for other road users.

Mitigation:-

- A shaker grid and wash down facility will be installed at all exits from the construction site. All vehicles leaving the site will have their wheels washed down and pass over the shaker grid to remove any spoil collected on their wheels and retaining the spoil on site.

Maintenance:-

- Frequent inspection of the shaker grid to ensure it is clean and still functioning.

8.3 Downstream Site Boundaries

Risk:-

- Rainfall runoff falling on the site collecting sediment from the construction site and conveying it overland onto downstream properties and waterbodies.

Consequence:-

- Sediment discharge polluting downstream properties and waterbodies.

Mitigation:-

- Installation of sediment fences on all downstream boundaries of the site to collect sediment and prevent it discharging onto downstream properties or waterbodies.

Maintenance:-

- Regular inspection of the sediment fences to ensure they are functioning correctly and are intact.
- If sediment build up is present it should be removed to ensure correct functionality of the fences.

8.4 Sediment Runoff

Risk:-

- Sediment from the construction site washing into the existing stormwater drainage inlet infrastructure.

Consequence:-

- The sediment will build up blocking the stormwater infrastructure and preventing stormwater conveyance to the downstream waterbody and impacting drainage upstream.

Mitigation:-

- One sediment basin will be installed, and all overland flow directed towards them. The basins will attenuate stormwater flows allowing for the settlement of sediment preventing discharge into the downstream infrastructure.

Maintenance:-

- Frequent inspection of the basins to ensure there is sufficient volume for the storage of settlement. If there is insufficient storage the basins should be cleared of sediment and re-established.

Appendix A Civil Design Documentation

Design with
community in mind

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For more information, please visit
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