

Level 1 54 Union Street COOKS HILL NSW 2300

T 02 4926 4811

ENGINEERS

MANAGERS

INFRASTRUCTURE PLANNERS

DEVELOPMENT CONSULTANTS

Civil Engineering Report Development Application

Astra Aerolab, Aerospace Avenue, Williamtown 2318

Prepared for: Greater Newcastle Aerotropolis Pty Ltd

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Revisions

Revision	Description	Date	Prepared by	Approved by
А	Development Application Issue	08/09/2022	Jason Kidd	Brandon Gathercole
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Review Panel

Division/ office	Name
Newcastle	Jason Kidd, Brandon Gathercole

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1 Introduction

1.1 General

ACOR Consultants have been engaged by Greater Newcastle Aerotropolis Pty Ltd and EJE Architecture to prepare Civil Engineering Documentation and an Engineering Report to support the Development Application for a proposed development at Lot 109, Suite 1, Aerospace Avenue, Williamtown.

Engineering items addressed in this report include:

- Site grading and proposed levels.
- Stormwater Quantity
- Stormwater Quality

Stormwater quantity items addressed in this report include:

- Stormwater conveyance/network
- Stormwater detention

Stormwater quality items to be addressed in this report include:

- Operational water quality management incorporating Water Sensitive Urban Design principles (WSUD)
- Construction water quality management incorporating soil and water management.



2 Site

2.1 Location

Lot 109 (The Site) is a vacant lot within Stage 1 of the Astra Aerolab Subdivision and is located approximately 500m south-west of the Newcastle Airport. The property id is Lot 109 in an unregistered DP at Aerospace Avenue and has an approximate area of 2.39ha.

The area specifically subject to this report is known as Facility 109/1 (Suite 1) and is in the North-West corner of Lot 109. Refer Figure 1 below.



Figure 1 – Architectural Site Plan (EJE Architects)

2.2 Description

Lot 109 overall is currently vacant with a localised area of placed turf, regrowth grass and vegetation. A site survey has indicated the site to be relatively flat with a minor ridge running north-south through the centre of the lot.

Levels on site are generally between RL 4.20m AHD in the centre of the northern boundary and RL 3.10m (AHD) along the southern boundary. These levels provide a gentle 1.0% (1:100) fall towards the south-east corner and a recently constructed stormwater storage basin. Further review of the previous site information indicates the site was likely filled to the above levels to help provide the proposed storage volume in the southern storage basin and two grassed stormwater swales. Refer to Existing Site Plan DA102-001.

2.3 Existing Catchments and Site Drainage

Upstream catchments are diverted past the site via the two grassed drainage swales constructed as part of the previous subdivision works. These swales are located along the eastern and western boundaries of Lot 109.

Survey data provided indicates that no off-site runoff will be directed onto the lot from adjoining properties or the existing Aerospace Avenue Road formation. It is also noted that there are no existing pit or pipe network visible on site.



Lot 109 appears to currently sheet surface runoff towards the south and south-east of the site away from Aerospace Avenue. As there are no off-site catchments contributing to the site runoff, proposed stormwater networks will be sized to cater only the site specific pervious and impervious areas.

Figure 2 below provides the general fall of the site



Figure 2 – Existing Site

2.4 Site Clearing & Demolition

With the existing site being clear of structures and generally grassed, site clearing will be minimal with no demolition of existing structures required.



3 Proposed Development

The overall proposed development on Lot 109 will provide 3 industrial facilities and 1 data centre for the Astra Aerolab precinct. The focus of this development application (Facility 109/1) will provide a new industrial facility with 2 tenancies and will include construction of the main access driveway though the site and approximately 30 onsite car parking spaces. Refer to Overall Site Plan DA103-001 for the overall site layout.

The approximate development area for proposed lot 109/1 is 7,280m² with the proposed catchments being split as follows.

Impervious: (Approx. 78% of area 109/1)

- Roof area 2,710m²
- Trafficable Pavement area 2,675m²
- Non-trafficable pavements 310m²

Pervious (Approx. 22% of area 109/1)

• Landscaping/turf - 1,585m²

4 Concept Civil Design

4.1 Vehicle Access

Lot 109 and the 4 proposed facilities will utilise a single combined driveway and access point to provide suitable and safe access for both light vehicles (B85 and B99 – AS2890.1) and heavy vehicles (HRVs and AVs – AS2890.2). The verge crossing (between the kerb line and the boundary) will be designed in accordance with Port Stephens Council (PSC) Specifications and Australian Standards (AS2890) requirements to always provide 2-way heavy vehicle access into and from the site. Sight lines from the driveway in accordance with AS2890.1 will be achievable due to the flat existing grade of the site.

4.2 Carparking

On-site car parking will be provided for the Lot 109/1 facility. The car parking will primarily be used by staff and will be designed in accordance with the requirements of AS2890.1 – Off-Street Car Parking and AS2890.6 – Off-street Parking for People with Disabilities. Further information around site related traffic can be obtained from the Traffic Engineering Report

4.3 Concept Site Grading

Proposed levels and site grading for the proposed development of suite 109/1 will generally follow the natural topography of the site and maintain the existing site catchment. Some minor filling is likely to be required to raise local levels around the proposed building to ensure overland flow paths do not inundate the proposed buildings. Refer to Site Grading Plan DA103-101 for the concept site grading.

4.4 Footpaths and Pedestrian Access

The main pedestrian pathway is an existing footpath located in Aerospace Avenue. It is expected that general foot traffic will likely only access the site via the street frontage. All other pedestrian movements through and around the site (if required) will be by facility staff and likely localised to loading areas at the rear of the proposed facility.

All proposed paths of travel from the street and the adjacent staff car park will be designed to be complaint with AS1428 with consideration to slip and trip hazards. Further details will be provided at CC stage.



4.5 Bulk Earthworks

The proposed levels and grading intent for Lot 109/1 is to maintain the existing site grades and falls to allow surface runoff to sheet and flow into the existing surrounding swales.

The majority of bulk earthworks on the site have been completed as part of the Stage 1 Astra development. Remaining bulk earthworks over the site will generally involve minor cut to fill within a maximum difference of approximately 600mm to finished surface level.

Based upon the current engineering plans an approximate maximum cut and fill depth of 300mm will allow the construction of the pavement subgrade and slab bedding. All proposed finished levels will match to and maintain existing levels around boundaries.

5 Stormwater Quantity

ACOR Consultants have undertaken a review of the existing design and documentation supplied from the Astra Aerolab Stage 1 subdivision and associated or referenced reports. As part of this ACOR Consultants have put together the following understanding of the site-specific requirements and our proposal for managing stormwater quantity for the development of lot 109.

5.1 Stormwater Conveyance

Minor system stormwater conveyance for the development will be a via a traditional pit and pipe system. The minor stormwater system will have the capacity to convey the peak flows from a 5% AEP storm event. The proposed pit and pipe network through the development will be sized to convey the 5% AEP flows with a drainage design in accordance with the PSC design requirements & AS3500.

Major system stormwater conveyance for the proposed development will be via overland flow. This will be via the road carriage way and footpath. The major stormwater system will have the capacity to convey the peak flows from a 1% AEP storm event, containing flows within the road reserve. In the event of pipe or pit blockages, overland flow paths will be detailed to convey surface runoff away from building openings and into the constructed external swale and basin network.

Multiple stormwater outlets are proposed from the site to assist with

- Staging the proposed sites development for each nominated facility suite
- Keep pipe sizes within an acceptable range to maximise pipe cover
- Ensure min pipe grades of 1.0% can be achieved due to the flat site grades.

Refer to Stormwater Management Plan DA104-001 for the site stormwater layout.

Scour protection will be provided on each outlet during detailed design. The scour protection designs shall be in accordance with Catchments & Creek guidelines on rock sizing.

5.2 Stormwater Detention

Stormwater detention has been provided for the whole development as part of the Astra Aerolab Stage 1 subdivision. It has been assumed that the site has been allowed a 90% impervious percentage in accordance with PSC Engineering requirements. The overall development is proposed to stay under this 90% target in accordance with the PSC DCP requirements, as such Stormwater Detention shall not be required for the development.

5.3 Flooding

Previous reporting for the overall site has indicated that a detailed flood assessment was undertaken by Northrop Engineers in December of 2021. This assessment has identified the nominal 1% AEP Top Water level of 2.70m AHD in the detention basin.



By allowing a free board of 500mm above this, Lot 109 should at a min provide min floor levels at or above 3.20m AHD. It is noted that the existing survey provided of the site has identified the top of the swale embankments and southern basin to provide a nominal RL of 3.10m AHD.

Based on this, we believe the proposed site and floor levels shown on the Civil drawings will be above the 1% AEP with 500mm freeboard and will generally be free from flooding impact.

6 Stormwater Quality - Operational Phase

6.1 Objectives

The objectives of the stormwater quality management for the site are:

- Meet the water quality objectives of PSC for the operational phase of the site by using best practice stormwater treatment measures. The water quality reductions required by Port Stephens Council are:
- % Reductions from the developed site of:
 - 90% reduction in Total Suspended Solids (TSS)
 - 60% reduction in Total Phosphorus (TP)
 - 45% reduction in Total Nitrogen (TN)
 - 90% reduction in litter/gross pollutants

6.2 Operational Phase Water Quality Management

ACOR Consultants have reviewed the Astra Aerolab Stage 1 subdivision Stormwater Management Report (NL152640_Rev B) prepared by Northrop Engineers, it is understood that there is an approved strategy that considers the entire subdivision in a fully developed state and achieves the above noted pollutant reductions.

This strategy assumes each lot will be developed to a 90% fraction of impervious area and assumed to be industrial. The report proposed treatment train consisting of grassed swales, in-street rain gardens, storage basins and the existing downstream wetland.

It is understood that the approved strategy as noted in Northrop's report will achieve the following reductions (Table 1 of their Stormwater Management Report)

- 94.8% reduction in Total Suspended Solids (TSS)
- 74.6% reduction in Total Phosphorus (TP)
- 45.2% reduction in Total Nitrogen (TN)
- 100% reduction in litter/gross pollutants

This being noted, we understand that no site-specific stormwater quality measures/devices will be required for the proposed development. It is also noted that as mentioned above, the proposed impervious area for 109/1 is below the maximum allowable 90% impervious area noted in councils DCP and mentioned in the previous subdivision report by Northrop Engineers.



7 Stormwater Quality - Construction Phase

7.1 General

During the construction phase of the development, an Erosion and Sediment Control Plan will be implemented to minimise the water quality impacts. The erosion and sediment controls will be in accordance with Landcom's Managing Urban Stormwater: Soils and Construction Volume 1, 4th Edition (Landcom, 2004) and the requirements of PSC. Erosion and sediment controls will be required preconstruction, during construction and post construction until the site is stabilized. The expected erosion and sediment control measures will include stabilized site access, sediment fence, gully pit sediment barriers, rock outlet scour protection and a temporary sediment basin (if applicable).

7.2 Pre-Construction Erosion and Sediment Control

Due to the topography of the site, the preconstruction erosion and sediment controls will be limited to stabilized site access, sediment fence and a temporary sediment basin until the initial bulk earthworks is undertaken. The proposed detention/water quality basin will be used as a sediment basin while construction is being undertaken. Figures DA105-001 & DA105-101 detail preliminary erosion and sediment control plans for the development.

7.3 During Construction Erosion and Sediment Control

During the construction phase of the development, the erosion and sediment controls will consist of installed sediment fence, a constructed sediment basin, gully pit sediment barriers and permanent rock outlet scour protection.

Regular inspection and maintenance of the erosion and sediment controls is required during the construction process.

As the soils on site are clay, a sediment basin volume was calculated using the Blue Book for type F soils. During construction, if the soils are found to be dispersive, the contractor will need to provide a flocculating agent to ensure discharge from the basin meets the requirements of the Blue Book. The sediment basin calculations are shown in Appendix A.

In general, the required basin volumes for Lot 109/1 are as follows

- 15m³ sediment storage zone
- 260m³ water settlement zone

7.4 Post Construction Erosion and Sediment Control

The contractor/developer will be responsible for the maintenance of the erosion and sediment control devices from the practical completion of the works for a minimum of 6 months or until stabilization has occurred to the satisfaction of Port Stephens Council.



8 Conclusion

This Civil Engineering Report addresses the concept civil design, stormwater quantity and quality of the proposed industrial development known as Lot 109/1, Aerospace Avenue.

Stormwater quantity and stormwater quality (both operational and construction phases) have been addressed.

Stormwater conveyance for the site will be in accordance with the minor/major system philosophy and the requirements of Port Stephens Council. The minor system consisting of surface inlet pits and pipes has been designed for an AEP of 5%. The major stormwater system will consist of overland flow paths within the proposed driveway and landscaped areas, will be designed for an AEP of 1%.

On-Site Detention and Water Quality of runoff from the site is not to be required due to sufficient allowance and capacity being previously provided as part of the greater subdivision design and construction works.

Construction phase erosion and sediment control will be undertaken in accordance with Landcom's Managing Urban Stormwater and Port Stephens Council.

If you have any questions regarding the information provided in this Civil Engineering DA Report, please call the undersigned or Brandon Gathercole to discuss

Yours faithfully,

ACOR Consultants (NSW) Pty Ltd

for M

Jason Kidd Senior Civil Designer



9 Engineering Drawings

DA101-001 COVER SHEET AND DRAWING INDEX DA102-001 EXISTING SITE PLAN DA103-001 OVERALL SITE PLAN DA104-001 STORMWATER MANAGEMENT PLAN DA105-001 SOIL EROSION AND EDIMENT CONTROL PLAN DA105-002 EROSION AND SEDIMENT CONTROL NOTES AND DETAILS



Appendix A Sediment Basin Calculations

1. Erosion Hazard and Sediment Basins

Site Name: Astra Aerolab

Site Location: Newcastle Airport

Precinct/Stage:

Other Details:

Site area	Sub-catch	Sub-catchment or Name of Structure						
Site area	109/1							
Total catchment area (ha)	1.12							
Disturbed catchment area (ha)	0.615							

Soil analysis (enter sediment type if known, or laboratory particle size data)

Sediment Type (C, F or D) if known:	F			
% sand (fraction 0.02 to 2.00 mm)				
% silt (fraction 0.002 to 0.02 mm)				
% clay (fraction finer than 0.002 mm)				
Dispersion percentage				
% of whole soil dispersible				
Soil Texture Group	F			

Rainfall data

Design rainfall depth (no of days)	5			
Design rainfall depth (percentile)	85			
x-day, y-percentile rainfall event (mm)	48.3			
Rainfall R-factor (if known)				
IFD: 2-year, 6-hour storm (if known)	10.7	10.7		

RUSLE Factors

Rainfall erosivity (R -factor)	2500					
Soil erodibility (K -factor)	0.065					
Soil erodibility (K-factor) (Factoring Disperssion)	0.065					
Slope length (m)	80					
Slope gradient (%)	3					
Length/gradient (LS -factor)	0.65					
Erosion control practice (P -factor)	1.3	1.3	1.3	1.3	1.3	1.3
Ground cover (C -factor)	1	1	1	1	1	1

Sediment Basin Design Criteria (for Type D/F basins only. Leave blank for Ty

.				,		
Storage (soil) zone design (no of months)	2	2	2	2	2	2
Cv (Volumetric runoff coefficient)	0.48					

Calculations and Type D/F Sediment Basin Volumes

Soil loss (t/ha/yr)	138			
Soil Loss Class	1			
Soil loss (m ³ /ha/yr)	106			
Soil Loss for Site (m3/yr)	65			
Sediment basin storage (soil) volume (m ³)	11			
Sediment basin settling (water) volume (m ³)	260			
Sediment basin total volume (m ³)	271			



Appendix B Civil Engineering Drawings – For DA

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