COSTIN ROE CONSULTING

CIVIL & STRUCTURAL ENGINEERS

CIVIL ENGINEERING REPORT INCORPORATING SOIL AND WATER MANAGEMENT

SSD - 47601708

SYDNEY FLIGHT TRAINING CENTRE

28-30 BURROWS RD. ST PETERS

Prepared for:

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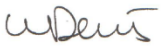
DOCUMENT VERIFICATION	
Project Title	SSD-47601708 Sydney Flight Training Centre 28-30 Burrows Road, St Peters
Document Title	Civil Engineering Report Incorporating Water Cycle Management Strategy
Project No.	Co14585.00
Description	SSD Report for proposed industrial development
Client Contact	Logos Development Management, Ms Athlene Kyle

	Name	Signature
Prepared by	Nelson Zeng & Denis Webber	
Checked by	Mark Wilson	
Issued by	Denis Webber	
File Name	14585.00-04c.rpt.docx	

Document History

Date	Revision	Issued to	No. Copies
26 Aug. 2022	Draft1	Logos – Ms Athlene Kyle	PDF
30 Sep. 2022	Draft2	Logos – Ms Athlene Kyle	PDF
04 Oct. 2022	A	Logos – Ms Athlene Kyle	PDF
25 Oct. 2022	B	Logos – Ms Athlene Kyle	PDF
25 Oct. 2022	C	Logos – Ms Athlene Kyle	PDF

EXECUTIVE SUMMARY

LOGOS Development Management Pty Ltd (LOGOS – the Applicant) are seeking to establish an industrial development to be used as a flight simulation facility located at 28-30 Burrows Road. The proposed flight training centre will enable pilots and flight crews from Qantas and other airlines to undertake periodic training and testing to meet regulatory requirements by simulating both aircraft and emergency procedural environments. The flight training centre will be situated within a three-storey industrial building.

The Proposal is considered State Significant Development (SSD) and accordingly, an Environmental Impact Statement (EIS) has been prepared to support the SSD Application for the Proposal. This Water and Hydrology Assessment has been prepared by Costin Roe Consulting to support the preparation of the EIS and assess the Proposal's impact on the surrounding environment in relation to soils and water including stormwater and stormwater management for both construction and operational phases of the development.

Proposal overview

The proposed development is for an industrial development on a 0.79 Ha parcel of land. Works will include erosion and sediment controls, bulk earthworks, provision of services, stormwater management, and finished surface levels.

Access to the development would be made via Burrows Road.

Purpose of this assessment

This Water and Hydrology Impact Assessment has been prepared to address the following Secretary's Environmental Assessment Requirements (SEARs):

- Item Number 12: Ground and Water Conditions
- Item Number 13: Stormwater and Wastewater
- Item Number 14: Flooding Risk

Construction impacts

During the construction phase, a Sediment and Erosion Control Plan will be in place to ensure the downstream drainage system and receiving waters are protected from sediment laden runoff.

Operational impacts

During the operational phase of the development, the proposed stormwater quality treatment system incorporating the use of a treatment train of gross pollutant traps (GPT's) and proprietary filtration is proposed to mitigate any increase in stormwater pollutant load generated by the development. Best management practices have been applied to the development to ensure that the quality of stormwater runoff is not detrimental to the receiving environment.

Further it has been confirmed that the development considers flood and overland flow planning requirements. The development does not impact or encroach on existing flood affected areas. The development does not increase runoff from existing conditions as such the site discharge will not adversely affect any land, drainage system or watercourse as a result of the development.

An existing inter-allotment drainage line is noted to traverse the project site and is proposed to be relocated to accommodate the new development. Assessment relating to the realignment has been undertaken based on ensuring no impact to upstream and downstream properties or drainage systems.

Conclusion

The hydrological assessment of the local site drainage confirms that recommended water quality and quantity measures will ensure that no adverse impacts result on receiving waterways as a result of the development.

The detail contained in this report provides sufficient information to show the consent authority that legal points of discharge and a suitable stormwater management strategy is available for the development and the requirements associated with the strategy. It is recommended the management strategies in this report be approved and incorporated into the future detailed design.

TABLE OF CONTENTS

1 INTRODUCTION & SCOPE

1.1 Introduction

Costin Roe Consulting Pty Ltd has been commissioned by LOGOS Development Management Pty Ltd to prepare this *Civil Engineering Report & Water Cycle Management Strategy* (WCMS) in accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs), and in support of the State Significant Development Application (SSD-47601708) for the proposed flight training centre at 28-30 Burrows Road, St Peters.

This report provides an assessment of the civil engineering characteristics of the development site and technical considerations of the following aspects:

- Earthworks & geotechnical considerations;
- Water Cycle Management Strategy (WCMS).

The WCMS comprises several key areas of stormwater and water management which are provided below. These key areas have been established with the aim to reduce impacts from the development on the surrounding environment and neighbouring properties. The water cycle management strategy identifies the management measures required to meet the targets set. The key water cycle management areas assessed in this report are:

- Storm Water Quantity;
- Storm Water Quality;
- Water Supply and Reuse;
- Flooding; and
- Erosion and Sediment Control

A request for Planning Secretary's Environmental Assessment Requirements (SEAR's) to the NSW Department of Planning, Industry and Environment (DPIE) has been made by the applicant and received from the NSW DPIE (reference SSD-47601708 SEAR's dated 12 September 2022). **Section 1.3** of this report for specific responses to civil engineering and water management related items included in the SEAR's.

1.2 Consultation

Consideration to the various stakeholders has been made in relation to the development, including Council and Sydney Water, during the assessment period.

Consultation with Sydney Water has been made to assist with coordination of the proposed stormwater drainage and water quantity management (on-site detention) requirements. Reference should be made to **Appendix F1** and **Section 5** of this report for correspondence and OSD requirements respectively.

Consultation has been completed with City of Sydney Council pertaining to relocation of the stormwater pipe and easement which is on the property. This included email correspondence, phone conversations and meetings (13 September 2022). Refer **Appendix F2** for email correspondence with City of Sydney Council.

1.3 SEAR's Responses

This report supports the EIS for the proposal and to address the NSW Department of Planning and Environment SEARS letter dated 12 September 2022, reference SSD-47601708, City of Sydney Council, Sydney Water, NSW Department of Planning (DPE) and NSW Office of Environment & Heritage (OEH).

Further reference to the EIS prepared by Urbis should be made for confirmation of how the SEAR's have been addressed for non-civil engineering related items.

Table 1.1 provides a summary of the SEARs Requirements which relate to water and hydrology, and where these have been addressed in this report.

Table 1.2 provides a summary of the SEARs Agency Response which relate to water and hydrology, and where these have been addressed in this report.

Table 1.1. SEARs Key Issues

SEAR's Key Item No. & Description	Issue & Assessment Requirements	How It Is Addressed	Report Reference
Key Issues			
Flood Risk	identification of any flood risk on-site having regard to adopted flood studies (including Alexandra Canal Catchment Area) and any relevant provisions of the NSW Floodplain Development Manual and the City of Sydney Interim Floodplain Management Policy - an assessment of the impact of flooding on the proposed development for the full range of flood events up to the probable maximum flood, including any changes to flood risk on-site or off-site, and detail design solutions and operational procedures to mitigate flood risk where required.	The proposal requires consideration to flooding and flood risk associated with the Alexandra Canal and local runoff relating to catchments surrounding Burrows Road, and an existing easement/ inter-allotment drainage pipe within the property. Council's most recent flood study (Alexandra Canal Model Update 2020) was obtained and an assessment for the site has been made based on this recent information. Council's Flood Maps indicate there is minor flooding in the 1% AEP local events in Burrows Road which does not impact the site. Councils GIS flood output however shows overland flow within the site (depth less than 0.15m) which flows from Burrows Road to the Alexandra Canal. Councils flood modelling, although quoted as the 2020 Update, is based on a LIDAR survey from 2013. All	Refer **Section 7** and **Appendix E** for assessments pertaining to flooding and overland flow.

SEAR's Key Item No. & Description	Issue & Assessment Requirements	How It Is Addressed	Report Reference
		catchments and grading as such reflect 2013 conditions. WE note that TfNSW have completed significant works relating to the motorway tunnel interchange including a detention/ water quality basin which flows to the west of the site toward the Gardeners Road off ramp and open channel on the east which drains toward the Campbell Road bridge. As such the current conditions reflect a significantly smaller catchment being directed toward the subject site. Two-dimension flood modelling (TUFLOW) has been completed by our office which reflect the 2022 conditions. This modelling shows the overland flow shown in Council model in the 1% AEP storm event is no longer present. Further, that the proposed relocation of the inter-allotment drainage line, and improved drainage conditions in Burrows Road associated with the relocation of the pipe, results in a reduction in the ponding in Burrows Road. The development floor level has been set allowing for freeboard to the Alexandra Canal of 0.6m above the 0.5% AEP flood event. This is noted to provide additional flood immunity to that required in local council policy (which is required to be at or above the 1% AEP). This is to provide additional flood immunity due to the sensitive equipment used in the facility. The requirements of council and NSW Floodplain Development	

SEAR's Key Item No. & Description	Issue & Assessment Requirements	How It Is Addressed	Report Reference
		Manual are met for this development.	
Soils and Water	A surface and groundwater assessment that includes:		
	An assessment of potential surface and groundwater impacts associated with the development, including potential impacts on the Alexandra Canal - details of the proposed stormwater and wastewater management systems (including any associated on-site detention and/or reuse), and an assessment of any associated water quality treatment options	The site comprises two existing industrial facilities with significant remnant concrete/ impervious surfaces. The redevelopment of the land will not result in any changes to groundwater, noting similar impervious surfaces and minor filling only being proposed. In regard to surface water runoff, a new drainage system has been proposed and included in concept design drawings included in **Appendix A**. The proposed stormwater system will ensure suitable management of surface water runoff including WSUD elements to manage quality of runoff in accordance with Bayside Council and Botany Bay Catchment load based pollution reduction objectives. Sydney Water has confirmed on-site detention is not required for this property (refer **Section 5** and **Appendix F**) Groundwater is noted to be 1.5-1.7m below existing ground level. Noting the site will be filled by 0.5-0.8m and the majority of works will not involve excavation below the noted water table, groundwater impact is considered to be negligible.	Refer to **Section 4, 5 & 6** for assessment of water resources, hydrology (including quality and quantity), watercourses and riparian lands during operation. Geotechnical assessments by PSM (ref: PSM4637-003L_2).
	a description of the proposed measures to minimise water use	A new drainage system has been proposed and included in concept design drawings	Refer to **Section 4, 5 & 6** for assessment of

SEAR's Key Item No. & Description	Issue & Assessment Requirements	How It Is Addressed	Report Reference
	and promote water sensitive urban design (WSUD)	included in **Appendix A**. The proposed stormwater system will ensure suitable management of surface water runoff including WSUD elements to manage quality of runoff in accordance with Bayside Council and Botany Bay Catchment load-based pollution reduction objectives. Sydney Water has confirmed that no OSD is required for this site, noting direct discharge to Alexandra Canal (a tidal waterway) and no change in impervious surfaces.	water resources, hydrology (including quality and quantity), watercourses and riparian lands during operation
	A description of the proposed erosion and sediment controls during construction.	Refer to **Section 8** for soil and water management measures during construction, drawings in **Appendix A** for associated erosion and sediment control drawings, and **Appendix C** for a Draft Soil and Water Management Plan. These sections show proposed measures, based on the Landcom document *Managing Urban Stormwater – Soils & Construction Volume 1 ('Blue Book')(Landcom, 2004)*, are proposed during the construction of the development. Measures proposed will limit potential for offsite impact associated with water runoff and soils during construction. Consideration to management of salinity and acid sulphate has been made based on the recommendations of the geotechnical investigations and noted Landcom document.	**Section 8**, ESCP drawings in **Appendix A** Draft Soil and Water Management Plan **in Appendix C**

Table 1.2. Agency Responses

Agency Responses	Issue & Assessment Requirements	How It Is Addressed	Report Reference
Sydney Water (8 September 2022)			
1	The proponent of development should determine service demands following servicing investigations and demonstrate that satisfactory arrangements for drinking water, wastewater, and recycled water (if required) services have been made.	Refer to service infrastructure report by others.	Refer to service infrastructure report by others.
2	The proponent must obtain endorsement and/or approval from Sydney Water to ensure that the proposed development does not adversely impact on any existing water, wastewater or stormwater main, or other Sydney Water asset, including any easement or property. When determining landscaping options, the proponent should take into account that certain tree species can cause cracking or blockage of Sydney Water pipes and therefore should be avoided. In order to ensure that the above noted asset is protected we request that the proponent lodges a feasibility or out of scope building application, as soon as possible and directly with Sydney Water, to ensure that the proposal meets our	A Sydney Water Service Coordinator has been engaged in relation to the project, in particular relating to the Alexandra Canal and works within the zone of influence (ZOI) of the Canal. The proponent understands that endorsement by Sydney Water is required prior to works for the project are undertaken the correct steps to ensure approval is made in relation to the project.	NA

Agency Responses	Issue & Assessment Requirements	How It Is Addressed	Report Reference
	requirements and to prevent delays or objections at later stages of the planning application process. Applications should be sent via an approved Water Servicing Coordinator, a list of which can be found on our website.		
3	Strict requirements for Sydney Water's stormwater assets (for certain types of development) may apply to this site. The proponent should ensure that satisfactory steps/measures been taken to protect existing stormwater assets, such as avoiding building over and/or adjacent to stormwater assets and building bridges over stormwater assets. The proponent should consider taking measures to minimise or eliminate potential flooding, degradation of water quality, and avoid adverse impacts on any heritage items, and create pipeline easements where required	Refer Item 2 response. The project requires a new stormwater easement and drainage connection to the Alexandra Canal. A detailed flood assessment has been completed to ensure no impact in the defined flood event.	NA Refer drawings in **Appendix A**. Refer **Section 7** and **Appendix E**.
4	The proponent should outline any sustainability initiatives that will minimise/reduce the demand for drinking water, including any alternative water supply and end uses of drinking and non-drinking water that may be proposed,	Refer infrastructure report pertaining to water use initiatives. Rainwater reuse is proposed for the development.	

Agency Responses	Issue & Assessment Requirements	How It Is Addressed	Report Reference
	and demonstrate water sensitive urban design (principles are used), and any water conservation measures that are likely to be proposed. This will allow Sydney Water to determine the impact of the proposed development on our existing services and required system capacity to service the development.		
City Of Sydney (6 September 2022)			
Public Domain and Flooding	It is considered essential that new development is compatible with the sites flood hazard and flood risk. In this regard new buildings need to be constructed at or above Councils minimum flood planning levels for the proposed land use which is the 1% AEP flood level. The EIS must provide an appropriate site specific flood risk assessment to support any development application addressing the requirements of the City's Flood Risk Management Policy. The flood impact assessment should: Identifies any flood prone land, flood risk on-site having regard to adopted flood studies, The potential effects of climate change, and any relevant provisions of the NSW Floodplain Development Manual and the City of Sydney	The proposal requires consideration to flooding and flood risk associated with the Alexandra Canal and local runoff relating to catchments surrounding Burrows Road, and an existing easement/ inter-allotment drainage pipe within the property. Council's most recent flood study (Alexandra Canal Model Update 2020) was obtained and an assessment for the site has been made based on this recent information. Council's Flood Maps indicate there is minor flooding in the 1% AEP local events in Burrows Road which does not impact the site. Councils GIS flood output however shows overland flow within the site (depth less than 0.15m) which flows from Burrows Road to the Alexandra Canal. Councils flood modelling, although quoted as the 2020 Update, is based on a LIDAR survey from 2013. All catchments and grading as such reflect 2013 conditions. We note that TfNSW have completed significant works relating to the motorway tunnel interchange including a detention/ water quality basin which flows to the west of the site toward the	Refer **Section 7** and **Appendix E** for assessments pertaining to flooding and overland flow.

Agency Responses	Issue & Assessment Requirements	How It Is Addressed	Report Reference
	Interim Floodplain Management Policy. Assesses and models the impacts of the development, including any changes to flood behaviour and risk onsite or offsite, and detail design solutions and operational procedures to mitigate flood risk where required.	Gardeners Road off ramp and open channel on the east which drains toward the Campbell Road bridge. As such the current conditions reflect a significantly smaller catchment being directed toward the subject site. Two-dimension flood modelling (TUFLOW) has been completed by our office which reflect the 2022 conditions. This modelling shows the overland flow shown in Council model in the 1% AEP storm event is no longer present. Further, that the proposed relocation of the inter-allotment drainage line, and improved drainage conditions in Burrows Road associated with the relocation of the pipe, results in a reduction in the ponding in Burrows Road. The development floor level has been set allowing for freeboard to the Alexandra Canal of 0.6m above the 0.5% AEP flood event. This is noted to provide additional flood immunity to that required in local council policy (which is required to be at or above the 1% AEP). This is to provide additional flood immunity due to the sensitive equipment used in the facility. The requirements of council and NSW Floodplain Development Manual are met for this development.	
	Further, the public domain surrounding the site is in poor condition and it is considered appropriate that a development of this scale upgrades the sites public domain to current council specifications. This includes as a minimum new concrete footpath, turf verges and street lighting to current standards. The EIS must demonstrate	Replacement of the footpaths has been included in the design drawings. It is also noted that the relocation of the inter-allotment drainage line (as agreed with Council) requires reinstatement of kerb and gutter along a large proportion of the site.	Refer drawings in **Appendix A**.

Agency Responses	Issue & Assessment Requirements	How It Is Addressed	Report Reference
	consideration and application of the City of Sydney's public domain codes where appropriate, including the Street's Code, Technical Specifications, Legible Sydney Wayfinding Strategy and Design Manual and any other relevant guidelines and codes.		
DPE Attachment A			
Water and Soils	*The EIS must describe background conditions for any water resource likely to be affected by the development, including:*		
	· Existing surface and groundwater.	Background conditions are discussed in **Sections 2, 3** and **4** of this report.	
	· Hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations.	Hydrologic conditions are discussed in this report including discharge locations. No intake locations are proposed.	**Sections 2, 4, 5 & 6**
	· Water Quality Objectives (as endorsed by the NSW Government http://www.environment.nsw.gov.au/ieo/index.htm) including groundwater as appropriate that represent the community's uses and values for the receiving waters.	Water quality and quantity objectives are based on the objectives set out by the Bayside Council and Botany Bay Catchment Management plan have been proposed.	**Section 4**.
	· Indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Water Quality and/or local objectives, criteria or targets	Water quality and quantity objectives are based on the objectives set out by the Bayside Council and Botany Bay Catchment Management plan have been proposed.	**Section 4**.

Agency Responses	Issue & Assessment Requirements	How It Is Addressed	Report Reference
	endorsed by the NSW Government.		
	· Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions *http://www.environment.nsw.gov.au/research-and-publications/publications-search/risk-based-framework-for-considering-waterway-health-outcomes-in-strategic-land-use-planning*	Water quality and quantity objectives are based on the objectives set out by the Bayside Council and Botany Bay Catchment Management plan have been proposed.	**Section 4**.
	The EIS must assess the impact of the development on hydrology, including:		
	a. Water balance including quantity, quality and source.	A new drainage system has been proposed and included in concept design drawings included in **Appendix A**. The proposed stormwater system will ensure suitable management of surface water runoff including WSUD elements to manage quality of runoff in accordance with Bayside Council and Botany Bay Catchment load-based pollution reduction objectives. Sydney Water has confirmed that no OSD is required for this site, noting direct discharge to Alexandra Canal (a tidal waterway) and no change in impervious surfaces.	Refer to **Section 4, 5 & 6** for assessment of water resources, hydrology (including quality and quantity), watercourses and riparian lands during operation
	b. Effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas.	A new drainage system has been proposed and included in concept design drawings included in **Appendix A**. The proposed stormwater system will ensure suitable management of surface water runoff including WSUD elements to manage quality of runoff in accordance with Bayside Council and Botany Bay Catchment load-based pollution reduction objectives.	Refer to **Section 4, 5 & 6** for assessment of water resources, hydrology (including quality and quantity), watercourses and riparian

Agency Responses	Issue & Assessment Requirements	How It Is Addressed	Report Reference
		Sydney Water has confirmed that no OSD is required for this site, noting direct discharge to Alexandra Canal (a tidal waterway) and no change in impervious surfaces.	lands during operation
	c. Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems.	A new drainage system has been proposed and included in concept design drawings included in **Appendix A**. The proposed stormwater system will ensure suitable management of surface water runoff including WSUD elements to manage quality of runoff in accordance with Bayside Council and Botany Bay Catchment load-based pollution reduction objectives. Sydney Water has confirmed that no OSD is required for this site, noting direct discharge to Alexandra Canal (a tidal waterway) and no change in impervious surfaces.	Refer to **Section 4, 5 & 6** for assessment of water resources, hydrology (including quality and quantity), watercourses and riparian lands during operation
	d. Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (e.g. river benches).	A new drainage system has been proposed and included in concept design drawings included in **Appendix A**. The proposed stormwater system will ensure suitable management of surface water runoff including WSUD elements to manage quality of runoff in accordance with Bayside Council and Botany Bay Catchment load-based pollution reduction objectives. Sydney Water has confirmed that no OSD is required for this site, noting direct discharge to Alexandra Canal (a tidal waterway) and no change in impervious surfaces.	Refer to **Section 4, 5 & 6** for assessment of water resources, hydrology (including quality and quantity), watercourses and riparian lands during operation
	e. Changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water.	No changes to water availability or licensed use of water is proposed in this development.	
	f. Mitigating effects of proposed stormwater and wastewater management during and	A new drainage system has been proposed and included in concept design drawings included in **Appendix A**. The proposed stormwater system	Refer to **Section 4, 5 & 6** for assessment

Agency Responses	Issue & Assessment Requirements	How It Is Addressed	Report Reference
	after construction on hydrological attributes such as volumes, flow rates, management methods and re-use options.	will ensure suitable management of surface water runoff including WSUD elements to manage quality of runoff in accordance with Bayside Council and Botany Bay Catchment load-based pollution reduction objectives. Sydney Water has confirmed that no OSD is required for this site, noting direct discharge to Alexandra Canal (a tidal waterway) and no change in impervious surfaces.	of water resources, hydrology (including quality and quantity), watercourses and riparian lands during operation
	g. Identification of proposed monitoring of hydrological attributes.	Monitoring is not proposed.	
Flooding	*9. The EIS must map the following features relevant to flooding as described in the Floodplain Development Manual 2005 (NSW Government 2005) including:* *a. Flood prone land.* *b. Flood planning area, the area below the flood planning level.* *c. Hydraulic categorisation (floodways and flood storage areas)* *d. Flood Hazard.* *10. The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 5% Annual Exceedance Probability (AEP), 1% AEP, flood levels and the probable maximum flood, or an equivalent extreme event.*	The proposal requires consideration to flooding and flood risk associated with the Alexandra Canal and local runoff relating to catchments surrounding Burrows Road, and an existing easement/ inter-allotment drainage pipe within the property. Council's most recent flood study (Alexandra Canal Model Update 2020) was obtained and an assessment for the site has been made based on this recent information. Council's Flood Maps indicate there is minor flooding in the 1% AEP local events in Burrows Road which does not impact the site. Councils GIS flood output however shows overland flow within the site (depth less than 0.15m) which flows from Burrows Road to the Alexandra Canal. Councils flood modelling, although quoted as the 2020 Update, is based on a LIDAR survey from 2013. All catchments and grading as such reflect 2013 conditions. WE note that TfNSW have completed significant works relating to the motorway tunnel interchange including a detention/ water quality basin which flows to the west of the site toward the Gardeners Road off ramp and open	

Agency Responses	Issue & Assessment Requirements	How It Is Addressed	Report Reference
	11. The EIS must model the effect of the proposed development (including fill) on the flood behaviour under the following scenarios: *a. Current flood behaviour for a range of design events as identified above. This includes the 0.5% and 0.2% AEP year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.* *12. Modelling in the EIS must consider and document:* *a. Existing council flood studies in the area and examine consistency to the flood behaviour documented in these studies.* *b. The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood, or an equivalent extreme flood.* *c. Impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazard categories and hydraulic categories*	channel on the east which drains toward the Campbell Road bridge. As such the current conditions reflect a significantly smaller catchment being directed toward the subject site. Two-dimension flood modelling (TUFLOW) has been completed by our office which reflect the 2022 conditions. This modelling shows the overland flow shown in Council model in the 1% AEP storm event is no longer present. Further, that the proposed relocation of the inter-allotment drainage line, and improved drainage conditions in Burrows Road associated with the relocation of the pipe, results in a reduction in the ponding in Burrows Road. The development floor level has been set allowing for freeboard to the Alexandra Canal of 0.6m above the 0.5% AEP flood event. This is noted to provide additional flood immunity to that required in local council policy (which is required to be at or above the 1% AEP). This is to provide additional flood immunity due to the sensitive equipment used in the facility. The requirements of council and NSW Floodplain Development Manual are met for this development.	

Agency Responses	Issue & Assessment Requirements	How It Is Addressed	Report Reference
	d. Relevant provisions of the NSW Floodplain Development Manual 2005. *13. The EIS must assess the impacts on the proposed development on flood behaviour, including:* *a. Whether there will be detrimental increases in the potential flood affectation of other properties, assets and infrastructure.* *b. Consistency with Council floodplain risk management plans.* *c. Consistency with any Rural Floodplain Management Plans.* *d. Compatibility with the flood hazard of the land.* *e. Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land.* *f. Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site.* *g. Whether there will be direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses.*		

Agency Responses	Issue & Assessment Requirements	How It Is Addressed	Report Reference
	h. Any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the NSW SES and Council. *i. Whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the NSW SES and Council.* *j. Emergency management, evacuation and access, and contingency measures for the development considering the full range or flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the NSW SES.* *k. Any impacts the development may have on the social and economic costs to the community as consequence of flooding.*		

2 DEVELOPMENT SITE

2.1 Location

The site is located at 28-30 Burrows Road, St Peters and comprises land known as Lot 2 of DP 212652 and Lot 15 of DP 32332. The site is bounded by Burrows Road to the north, Alexandra Canal to the south, and existing industrial developments to the east and west, as shown in **Figure 1.1**.

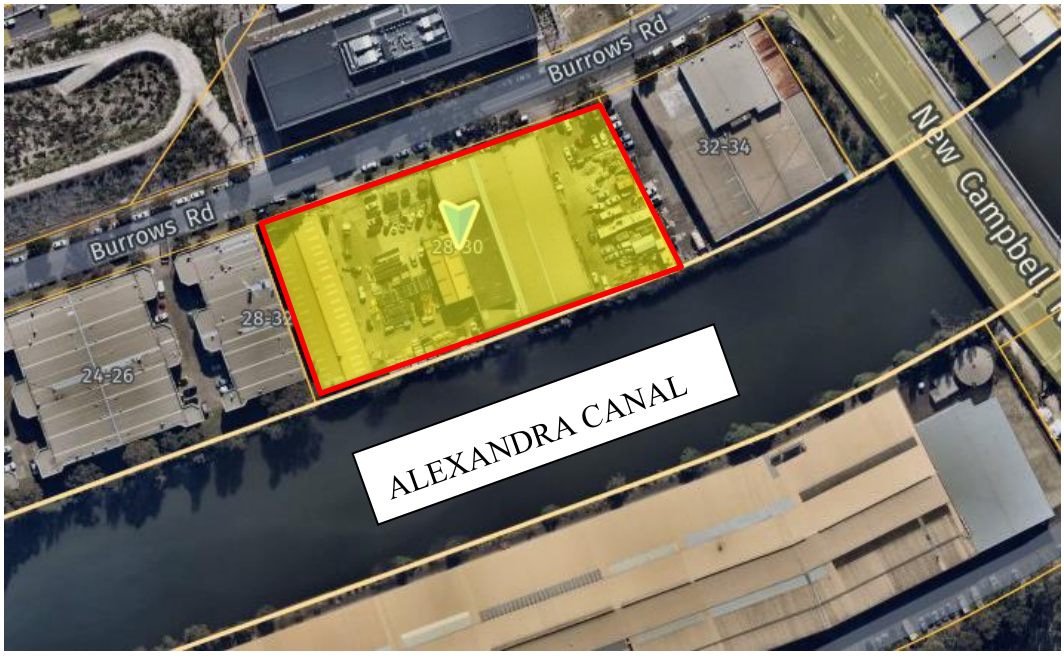


Figure 1.1. Site Locality Plan (Nearmap, 2022)

2.2 Existing Site Description

The site comprises a rectangular shape with an area of approximately 0.8 Ha. The primary frontage to Burrows Road is approximately 123m in length and the site maintains a depth of approximately 63.5m.

The site is relatively flat, with the highest level on the site at RL 3.09m AHD at the north edge and the lowest level at RL 2.34m AHD at the south-west corner. A Site Survey Plan accompanies the application which details the topographic characteristics of the site.

The site is currently occupied by two industrial / warehouse buildings with a large hardstand area for vehicle parking and deliveries. Vehicular access to the site from the local road network is available from Burrows Road which links the site to the WestConnex road network in the north and Sydney Airport to the west.

Limited vegetation is located along both the road frontage and the canal. The proposed development is to include a setback of 10m along the southern boundary to align with the City of Sydney's vision for a pedestrian and cycling network along the water's edge.

Industrial land uses extend along Burrows Road and Euston Road. St Peters railway station is approximately 1.5km from the site. The nearest residential neighbours south of the site are about 300m away and are separated by industrial warehouse buildings and the Alexandra Canal.

The site is located within the City of Sydney LGA.

2.3 Proposed Development

The proposed development is for the construction of a three-storey building with a total GFA of 6,510 sqm, hardstand, carparking, and landscaping. The proposed use is as a flight training facility. The facility will enable pilots and flight crews from Qantas and other airlines to undertake periodic training and testing to meet regulatory requirements by simulating both aircraft and emergency procedural environments.

The development will include:

- Flight simulator hall:
  - 8 x simulator bays – State of the art full motion flight simulators with visual fidelity, motion and sound. This allows crew to be trained in all aspects of normal and non-normal operations, including instrument approaches and landings in all weather conditions.
  - The proposed simulators will complement the flight training facilities in other states.
- Emergency procedures component including:
  - Cabin evacuation emergency trainer – Full-scale cabin mock-up is used as practical training device. These facilities allow emergency situations to be accurately portrayed and allow pilots and cabin crew to handle emergency situations in both wide and narrow-bodied aircraft.
  - Slide descent tower – Enables realistic training of deployment and use of slides to evacuate aircraft for pilots and cabin crew.
  - Door trainers – Enables realistic training of use of emergency exits to evacuate aircraft for pilots and cabin crew.
- Ancillary spaces (administration and training areas) including:
  - Equipment room – Storage of emergency equipment (oxygen tanks, defibrillators etc.) that supports the training and assessment of cabin crew and pilots of aviation medicine.
  - Pilots lounge – Area for pilots to wait prior to simulator sessions
  - Meeting rooms and lunch room.
  - Reception area.
  - Toilets, plant, loading dock.

The indicative site layout by PACE Architects is shown in **Figures 2.1 & 2.2.**

The GFA for the proposed site is as follows:

SIM Hall GFA	1,840 sqm
Training Facility GFA	4,670 sqm
Total GFA	6,510 sqm
Landscape area	1,490 sqm
Deep Soil Planting	1,474 sqm

Civil works will include earthworks, construction of retaining walls, landscaping, stormwater drainage and management, relocation of an existing inter-allotment drainage line and construction of pavements.

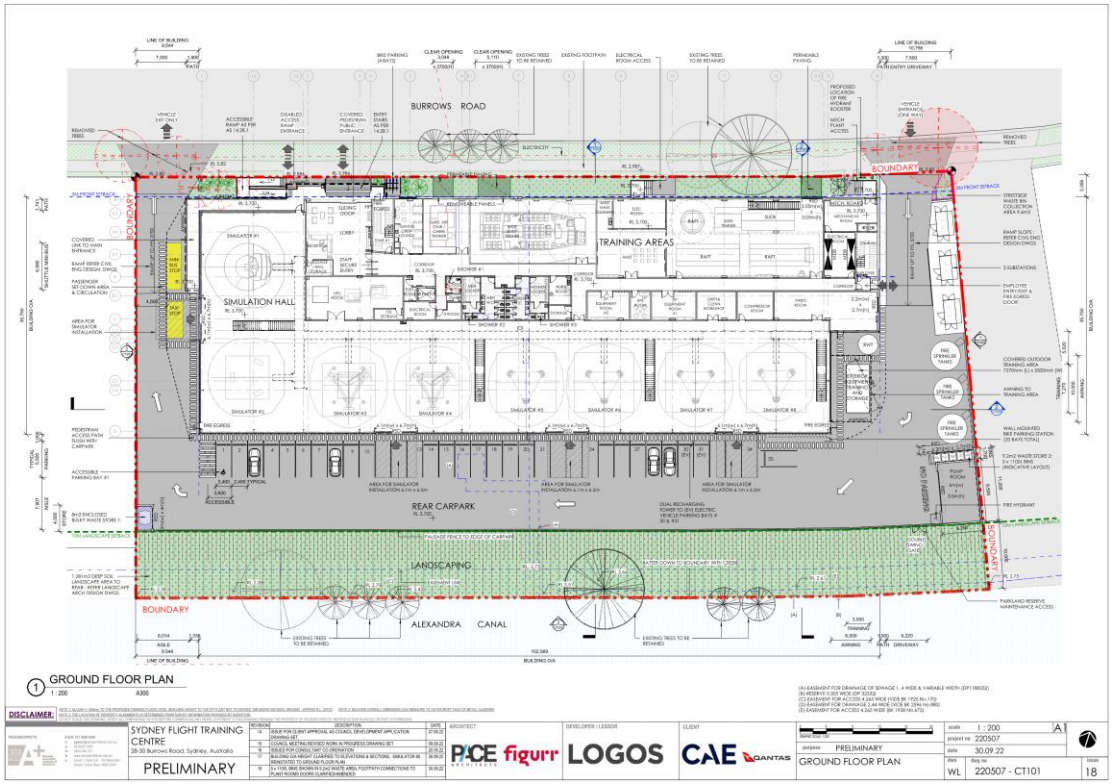


Figure 2.1. Proposed Development – Ground floor

Figure 2.2. Proposed Development – 3D View from Burrows Road

3 SITE WORKS

3.1 Soil and Geological Conditions

Assessments relating to soil have been undertaken by PSM (geotechnical investigation – PSM4029-103L dated 27 August 2021 & PSM4637-003L dated 11 August 2022).

As referenced in the investigation by PSM the 1:100 000 Geological Series Sydney Geological Map indicates that the site is underlain by medium to fine grained "marine" sand with podsols.

The PSM Geotechnical report confirms the subsoil profile as comprising pavements of 0.13-0.18m in depth over filling 0.25-0.32m in depth over natural sands to 2.35m deep over clay to 15m deep over extremely weathered shale bedrock.

3.2 Bulk Earthworks

Bulk earthworks on the site will be minor overall and limited to minor import to lift the new building to a level of RL 3.7m AHD. This requires raising the existing ground levels by approximately 1.0m. The increase in floor level is proposed to ensure the building is sited 0.6m above 0.2% AEP flood level of Alexandra Canal (refer discussion on flood planning requirements in **Section 7**). Final levels would be subject to a +/-0.5m variance to allow for variations in allowances for geotechnical conditions, final building layout and allowable building height, and drainage considerations.

Reference to plan drawing **Co14585.00-DA30** and section drawings **Co14585.00-DA35 & DA36** should be made for earthworks subgrade levels and estimates.

Soil Erosion and Sediment Control measures, including sedimentation basins are to be placed in accordance with submitted drawings and the *Soil and Water Management Plan* in **Section 8** and **Appendix C** of this report.

All geotechnical testing and inspections performed during the filling operations will be undertaken to Level 1 geotechnical control, in accordance with AS3798-2007.

3.3 Retaining Walls

The civil engineering objective is to minimise retaining walls within the constraints of the masterplan layout, allowable grading to suit industrial development and batters in landscaped areas where possible.

Minor retaining will be required along the eastern and western site boundaries, noting this retaining will be less than 1m in height.

Location and indicative heights of retaining walls are shown on drawing **CO14585.00-DA50**.

3.4 Embankment Stability

To assist in maintaining embankment stability permanent batters in clay will be no steeper than 3 horizontal to 1 vertical while temporary batters will be no steeper than 2 horizontal to 1 vertical. Based on the existing landform and minor changes to landform required for the proposal, it is anticipated that batters and landscaped areas will be generally less than 1V:4H

Permanent batters will also be adequately vegetated or turfed which will assist in maintaining embankment stability.

Stability of batters and reinstatement of vegetation shall be in accordance with the submitted drawings and the *Soil and Water Management Plan* in **Section 8** and **Appendix C** of this report.

3.5 Groundwater

Groundwater was identified by PSM at depths between 1.5m and 1.7m below ground level (i.e. approx. RL 1.3m AHD). Noting the proposed floor level is RL 3.7m AHD, there will be limited excavation required for the development. Further the site is currently full developed. As such impact associated with groundwater and on groundwater systems are considered negligible.

Surface water management, including conveyance of surface runoff, management of water quantity (through on-site detention) and water quantity (through on-site management systems using WSUD principles and best practice pollution reduction objectives) has been proposed in the design.

3.6 Acid Sulphate Soils and Salinity

An assessment of the potential for acid sulphate soils has been requested as part of the SEAR's requirements. Discussion on salinity and soil aggressivity has been included in the PSM Geotechnical report as listed in **Section 3.1**.

The PSM report confirms the soils to be non-saline. The PSM report also confirms the site has not been addressed for acid sulfate and this has not been assessed. Reference to PSM report should be made for further commentary on soil conditions.

4 WATER CYCLE MANAGEMENT STRATEGY & DRAINAGE METHODOLOGY

4.1 Key Areas and Objectives

Water Cycle Management (WCM) is a holistic approach that addresses competing demands placed on a region's water resources, whilst optimising the social and economic benefits of development in addition to enhancing and protecting the environmental values of receiving waters.

Developing a WCMS at the SSD stage of the land development process provides guidance on urban water management issues to be addressed for the development as a whole.

This WCMS has been prepared to inform DPIE that the development is able to provide and integrate WCM measures into the stormwater management strategy for the development. It presents guiding principles for WCM across the development which includes establishing water management targets and identifying management measures required.

Several WCM measures have been included in the WCMS and engineering design, which are set out in this report and the attached drawings. The key WCM elements and targets which have been adopted in the design are included in **Table 4.1** following.

Table 4.1. WCM Targets

Element	Target	Reference
Water Quantity	Minimise flooding from increased stormwater runoff due to development Water Quantity and Management to be provided as directed by Sydney Water, the waterway manager.	Council DCP 2012. On-site Detention Policy
Water Quality	Load-based pollution reduction targets based on an untreated urbanised catchment: Gross Pollutants 90% Total Suspended Solids 85% Total Phosphorus 65% Total Nitrogen 45% Total Hydrocarbons 90%	Section 3.7.3 Council DCP 2012
Flooding	Buildings set above the 1% AEP. No off-site impact in the 1% AEP event.	City of Sydney's *Floodplain Management Policy* NSW Floodplain Development Manual.
Water Supply	Reduce Demand on non-potable water uses.	

Element	Target	Reference
Construction Stormwater Management & Erosion and Sediment Control	A construction stormwater management plan and appropriate associated erosion and sedimentation control measures must be described in the environmental assessment for all stages of construction to mitigate potential impacts to surrounding properties.	Landcom Blue Book Council DPIE

A summary of the how each of the WCM objectives will be achieved are described below. Reference to the relevant sections of the report should be made for further and technical details relating to the WCM measures:

- *Stormwater Quantity Management (Refer **Section 5**)*

  The intent of this criterion is to reduce the impact of urban development on existing drainage system by limiting post-development discharge within the receiving waters to the pre-development peak, and to ensure no affectation of upstream, downstream or adjacent properties.

  Attenuation of stormwater runoff from the development is not required as the site is currently fully developed and existing trunk drainage systems available for discharge based on the fully developed site. Sydney Water, the waterway manager, has confirmed that on-site detention is not required for this development.

  Refer to **Section 5** of the document for further discussion pertaining to water quantity management and **Appendix F** for consultation with Sydney Water.

- *Stormwater Quality Management (Refer **Section 6**)*

  There is a need to target pollutants that are present in stormwater runoff to minimise the adverse impact these pollutants could have on downstream receiving waters.

  The required pollutant reductions are included in **Table 4.1** of this document and MUSIC modelling has been completed to confirm the reduction objectives can be met for the development.

  A series of Stormwater quality improvement devises (SQID's) have been incorporated in the design of the development. The proposed management strategy will include the following measures:

  - Primary treatment of external areas will be made via pit inserts.
  - Tertiary treatment of the development will be made via a proprietary stormwater treatment system housed in an underground tank. Refer to drawing **Co14585.00-DA40.**
  - Some treatment will also be present by provision of rainwater reuse tanks on development site through reuse and settlement within the tanks. Allowance for this treatment is noted to not be included in MUSIC modelling produced for the development.

  Reference to **Section 6** of this document should be made for detailed Stormwater Quality modelling and measures.

- *Flood Management (refer **Section 7**)*

  The proposed development considered flooding and large rainfall events in relation to the nearby Alexandra Canal, and local runoff and overland flow paths. We note that the TUFLOW modelling completed by Costin Roe Consulting shows the site to be clear of any significant local overland flow paths for events up to the 1% AEP event, and that the relocation of the existing easement and three proposed kerb inlet pits in Burrows Road results in a reduction in the ponding area in the post development conditions.

  Consideration to flood requirements has been made per Council Flood Management Policy. Refer **Section 7** and **Appendix E** for details.

  The following measures have been incorporated in the design:

  - All buildings are sited 600mm above the 0.2% AEP design flood level of local flow paths. We note this exceeds Councils minimum flood planning requirement to be at or above the 1% AEP flood level.
  - No overland flow paths effect this site.

- *Water Demand Reduction/ Rainwater Reuse (refer **Section 6.6**)*

  Rainwater reuse measures will be provided as part of this development design. Rainwater reuse will be required to reduce demand on non-potable uses, subject to Greenstar requirements. The reduction in demand will target non-potable uses such as toilet flushing and irrigation. Refer to **Section 6.6**.

- *Stormwater Management During Construction (refer **Section 8**)*

  A construction stormwater management plan and associated erosion and sediment control measures is proposed based on Landcom Blue Book and Council requirements. The management measures take a staged approach from initial site establishment, construction stages and the completion of the development site.

4.2 Existing Drainage System & Overland Flows

The site is currently a developed industrial property which has been described in **Section 2.2**.

An existing formal inground drainage is currently on the site which carries stormwater runoff from the existing warehouse buildings and surrounds offsite for discharge into the Alexandra Canal.

An existing inter-allotment drain (450mm pipe and easement) is located in between the two existing lots, beginning at Burrows Road and traversing south, adjacent to the common boundary of the Alexandra Canal. The pipe also collects runoff from the site. **Figure 4.1** shows the location of the existing inter-allotment drainage system. We note this conduit and easement is proposed to be relocated as part of the project – refer **Section 4.3**, **Section 7**, drawings in **Appendix A**.

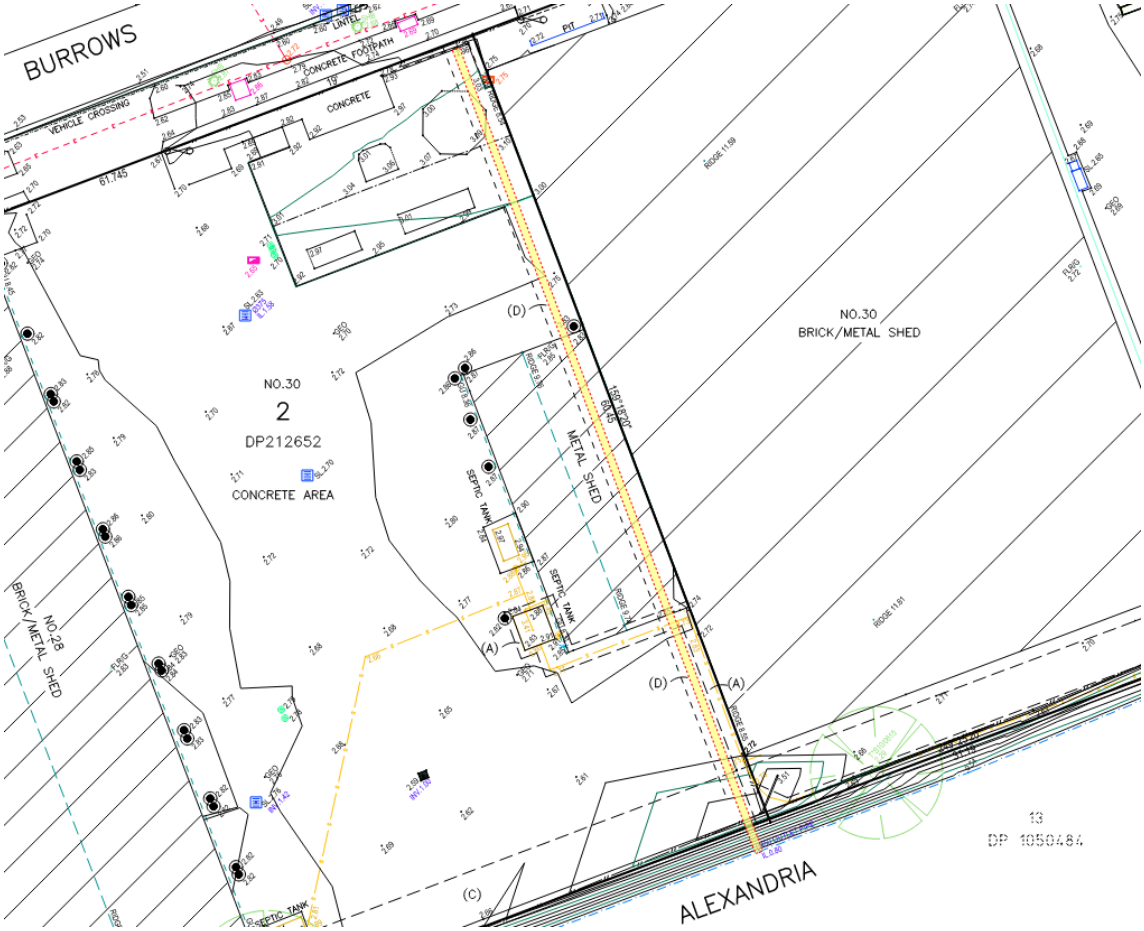


Figure 4.1. Location of Inter-allotment Drainage Line

The site is not affected by any overland flow paths up to the 1% AEP event.

Refer **Section 7** and **Appendix E** for detailed discussion pertaining to overland flow and flood management. Refer also to **Section 4.3** pertaining to relocation of the existing inter-allotment drainage system.

4.3 Proposed Drainage System

As per general engineering practice and the guidelines of Council, the proposed stormwater drainage system for the development will comprise a minor and major system to safely and efficiently convey collected stormwater run-off from the development to the legal point of discharge.

The minor system is to consist of a piped drainage system which has been designed to accommodate the 1 in 20-year ARI storm event (Q20). This results in the piped system being able to convey all stormwater runoff up to and including the Q20 event. The major system will be designed to cater for storms up to and including the 1 in 100-year ARI storm event (Q100). The major system will employ the use of defined overland flow paths, such as roads and open channels, to safely convey excess run-off from the site.

The design of the stormwater system for this site will be based on relevant national design guidelines, Australian Standard Codes of Practice, the standards of PCC and accepted engineering practice. Runoff from buildings will generally be designed in accordance with *AS 3500.3 National Plumbing and Drainage Code Part 3 – Stormwater Drainage*. Overall site runoff and stormwater management will generally be designed

in accordance with the Institution of Engineers, Australia publication "*Australian Rainfall and Runoff*" (2019 Edition), Volumes 1 and 2 (AR&R).

Water quality and re-use are to be considered in the design to ensure that any increase in the detrimental effects of pollution are mitigated, Council Water Quality Objectives are met and that the demand on potable water resources is reduced.

The legal point of discharge is a point specified by Council where stormwater from a property can be discharged. The legal point of discharge is usually Council's stormwater infrastructure (where available), the street kerb and channel for smaller developments or downstream receiving waters like an existing stream or gully, lake, pond or waterbody. Legal discharge for this site is via the existing inter-allotment drainage pipe which leads to the Alexandra Canal.

It is noted that the existing inter-allotment drainage pipe will be re-routed within the site to accommodate the proposed development footprint. The pipe is also proposed to be increased from a 450mm diameter to a 525mm diameter reinforced concrete pipe to account for the reduced hydraulic efficient associated with increased length of pipe and additional changes in direction. The existing easement will be extinguished, and new easement defined along the length of the pipe.

Reference to drawing **Co14585.00-DA40** should be made for the new pipe location. The route of the new pipeline is proposed to remain in Burrows Road, following the line of kerb) to the western boundary of the site (as requested by City of Sydney Council – refer **Appendix F2**), then following a trajectory along the western driveway to a new connection to the Alexandra Canal.

Hydraulic modelling, utilising DRAINS, was undertaken to test the capacity of the existing system and to ensure the capacity of the proposed system were as close as practically possible and to confirm there would be no negative impacts due to the proposed re-located drainage line. A hydraulic grade line assessment and drainage long-sections have been prepared and included in the Civil Development drawings included in **Appendix A**. The assessment confirms that for the 5% AEP (1 in 20yr ARI) the HGL decreases by 0.161m, and in the 1% AEP (1 in 100yr ARI) the HGL decreases by 0.372m, in the upstream pit located on Burrows Road (refer to drawing **Co14585.00-DA48).**

Based on the assessment completed it has been confirmed that the capacity of the existing system and existing conveyance performance will be maintained in the proposed re-routing shown in the Civil Package. We also note that during construction, it would be anticipated that construction program may necessitate construction of the building prior to the final drainage system being completed. Under these conditions it would be ensured that the ability for the existing system to convey stormwater flows would be maintained and pipe undamaged during the works.

The drainage system proposed can be described as follows:

- Site drainage system designed to the 5% AEP (1 in 20yr ARI);
- Diversion of the existing 450mm diameter inter-allotment drainage system and upgrade to a 525mm diameter pipe.
- Connection of the new drainage system
- Treatment of stormwater via a proprietary filtration system;
- Site discharge to public drainage system via the re-routed inter-allotment drainage line.

4.4 Hydrologic Modelling and Analysis

4.4.1 Rainfall Data

Rainfall intensity Frequency Duration (IFD) data used as a basis for DRAINS modelling for the 2 to 100 Year ARI events, was taken from The Bureau of Meteorology Online IFD Tool.

4.4.2 Runoff Models

In accordance with the recommendations and standards of Council, the calculation of the runoff from storms of the design ARI has been calculated with the catchment modelling software DRAINS for internal drainage only.

Detailed hydraulic assessment of the internal drainage system will be calculated at detail/ construction certificate stage.

The design parameters for the DRAINS model are to be based on the recommendations as defined by council and parameters for the area and are as follows:

Table 4.1. DRAINS Parameters

Model	Model for Design and analysis run	Rational method	
	Rational Method Procedure	ARR2019	
	Soil Type-Normal	3.0	
	Paved (Impervious) Area Depression Storage	1	mm
	Supplementary Area Depression Storage	1	mm
	Grassed (Pervious) Area Depression Storage	5	mm
AMC	Antecedent Moisture Condition (ARI=1-5 years)	2.5	
AMC	Antecedent Moisture Condition (ARI=10-20 years)	3.0	
AMC	Antecedent Moisture Condition (ARI=50-100 years)	3.5	
	Sag Pit Blocking Factor (Minor Systems)	0	
	On Grade Pit Blocking Factor (Minor Systems)	0	
	Sag Pit Blocking Factor (Major Systems)	0.5	
	On Grade Pit Blocking Factor (Major Systems)	0.2	

4.5 Hydraulics

4.5.1 General Requirements

Hydraulic calculations will be carried out utilising DRAINS modelling software during the detail design stage to ensure that all surface and subsurface drainage systems perform to or exceed the required standard.

4.5.2 Freeboard

The calculated water surface level in open junctions of the piped stormwater system will not exceed a freeboard level of 150mm below the finished ground/ grate level, for the peak runoff from the Minor System runoff.

The calculated water surface for the peak runoff from the Major System runoff will not exceed a freeboard level of 500mm below the finished floor level of the building.

4.5.3 Public Safety

For all areas subject to pedestrian traffic, the product (dV) of the depth of flow d (in metres) and the velocity of flow V (in metres per second) will be limited to 0.4, for all storms up to the 100-year ARI.

For other areas, the dV product will be limited to 0.6 for stability of vehicular traffic (whether parked or in motion) for all storms up to the 100-year ARI.

4.5.4 Inlet Pit Spacing

The spacing of inlets throughout the site will be such that the depth of flow, for the Major System design storm runoff, will not exceed the top of the kerb (150mm above gutter invert).

4.5.5 Overland Flow (development lots)

Dedicated flow paths have been designed to convey all storms up to and including the

100-year ARI. These flow paths will convey stormwater from the site to the detention systems prior to discharge.

5 WATER QUANTITY MANAGEMENT

City of Sydney Council's DCP 2012 and Sydney Water's On-Site Detention (OSD) policy require consideration of stormwater quantity management with the intent of minimising flooding from the increased stormwater run-off due to the development. Water quantity management may be made by providing a stormwater detention system (i.e. on-site detention), to limit the runoff discharged from private property or to provide an assessment which confirms on-site detention is not necessary for the development. Further, that areas within Alexandria require confirmation as to OSD requirements from Sydney Water who are the waterway managers for the area.

Consultation with Sydney Water has been undertaken and it has been confirmed that any development at 28-30 Burrows Road, St Peters does not require on-site detention. Refer to **Appendix F** for email correspondence with Sydney Water and confirmation of the OSD requirements for the site.

Management of Stormwater Quantity has been considered for the site. It is noted that the existing site is currently fully developed and does not contain a detention system. There is no increase in impervious site coverage hence no increased runoff as part of the proposal. As such the development will not adversely impact flooding upstream or downstream of the property without OSD.

The site is located in the lower end of the catchment and will discharge directly to the adjacent tidally influenced Alexandra Canal. Given the position in the catchment, local un-attenuated flows will peak well in advance of the main flood hydrograph in Alexandra Canal coming from the upstream catchments. The combined hydrograph in this situation will result in a double peak (small initial peak followed by larger extended peak) in the shorter duration storms. If traditional OSD were to be included, although local flows from the site would be reduced, the peak of flow from the site is drawn out over a longer period which would coincides with that of the larger and delayed peak flow within the Alexandra Canal. This will result in an overall increase in peak flows, hence an adverse effect would be achieved if OSD were to be provided.

It is considered that the combined peak flow runoff (from the local site catchment and larger Alexandra Canal catchment) in the Alexandra Canal will not increase as a result of the development (with the proposed flood management measures and without traditionally sized on-site detention).

Given there is no change to the runoff volume or peak flows and it has been confirmed by Sydney Water that OSD is not required for this site, none has been proposed for the development.

6 STORMWATER QUALITY, REUSE AND MAINTENANCE

6.1 Stormwater Quality Objectives

There is a need to provide a design which incorporates the principles of Water Sensitive Urban Design (WSUD) and to target pollutants that are present in the stormwater so as to minimise the adverse impact these pollutants could have on receiving waters and to also meet the requirements specified by Council.

City of Sydney Council have nominated, in *Section 3.7.3* of their *DCP 2012*, the requirements for stormwater quality to be performed on a catchment wide basis. These are presented in terms of annual percentage pollutant reductions on a developed catchment and are as follows:

Gross Pollutants	90%
Total Suspended Solids	85%
Total Phosphorus	65%
Total Nitrogen	45%

6.2 Proposed Stormwater Treatment System

Developed impervious areas including roof, hardstand, car parking, roads and other extensive impervious areas are required to be treated by the Stormwater Treatment Measures (STM's). The STM's shall be sized according to the whole catchment area of the development. The STM's for the development shall be based on a treatment train approach to ensure that all the objectives above are met.

Components of the treatment train for the development are as follows:

- Primary treatment to the parking, roof, and hardstand areas is to be performed via the provision of pit inserts to all grated pits;
- Tertiary treatment is to be performed via Ocean Protect Stormfilters (or approved equivalent) prior to discharge from the site;
- A portion of the roof will also be treated via rainwater reuse and settlement within the rainwater tank.

6.3 Stormwater Quality Modelling

The MUSIC model was chosen to model water quality. By simulating the performance of stormwater management systems, MUSIC can be used to predict if the proposed systems and changes to land use are appropriate for their catchments and capable of meeting specified water quality objectives (CRC 2002). The water quality constituents modelled in MUSIC, of relevance to this report, include Total Suspended Solids (TSS), Total Phosphorus (TP) and Total Nitrogen (TN).

The pollutant retention criteria set as required by Council and nominated in **Section 4.1** of this report were used as a basis for assessing the effectiveness of the selected treatment trains.

The parameters used in the MUSIC model are presented in **Appendix B**. **Figure 6.1** below shows the MUSIC model layout.

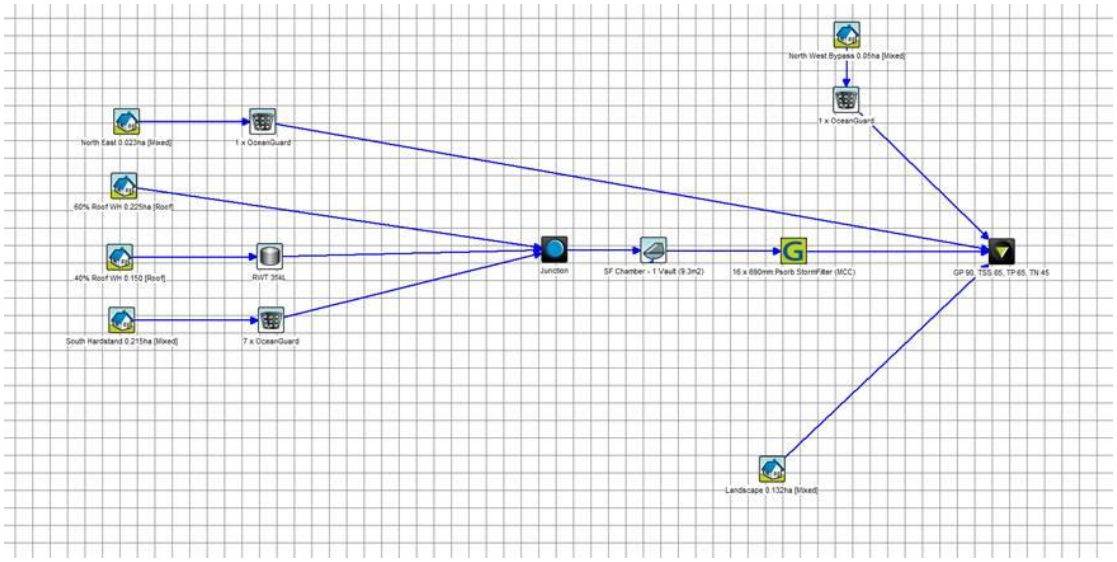


Figure 6.1. MUSIC model layout

Table 6.1 shows the results of the MUSIC analysis. The reduction rate is expressed as a percentage and compares the post-development pollutant loads without treatment versus post-development loads with treatment.

Table 6.1. MUSIC analysis results - % reductions

	Source	Residual Load	% Reduction
Total Suspended Solids (kg/yr)	785	99.7	87.3
Total Phosphorus (kg/yr)	1.83	0.624	65.9
Total Nitrogen (kg/yr)	18.7	9.54	49
Gross Pollutants (kg/yr)	203	0.00197	100

MUSIC modelling has been performed to assess the effectiveness of the selected treatment trains and to ensure that the pollutant retention requirements of Council's DCP 2012 have been met.

The MUSIC modelling has shown that the proposed treatment train of STM will provide stormwater treatment which will meet Council's and typical growth centre water quality reduction objective requirements in an effective and economical manner.

Given the expected low source loadings of hydrocarbons and oil/grease and removal efficiencies of the treatment devices we consider that the requirements of the Council have been met. Further discussion on hydrocarbons can be found in **Appendix B.**

6.4 Stormwater Harvesting

Stormwater harvesting refers to the collection of stormwater from the developments internal stormwater drainage system for re-use in non-potable applications. Stormwater from the stormwater drainage system can be classified as either rainwater where the flow is from roof areas, or stormwater where the flow is from all areas of the development.

For the purposes of this development, we refer to a rainwater harvesting system, where benefits of collected stormwater from roof areas over a stormwater harvesting system can be made as rainwater is generally less polluted than stormwater drainage.

Rainwater harvesting is proposed for this development with re-use for non-potable applications. Internal uses include such applications as toilet flushing while external applications will be used for irrigation. The aim is to reduce the water demand for the development in the range of 50-70%, subject to detail design.

In general terms the rainwater harvesting system will be an in-line tank for the collection and storage of rainwater. At times when the rainwater storage tank is full rainwater can pass through the tank and continue to be discharged via gravity into the stormwater drainage system. Rainwater from the storage tank will be pumped for distribution throughout the development in a dedicated non-potable water reticulation system. This however would be subject to future detail design.

Rainwater tanks have been designed, using MUSIC software to balance the supply and demand, based on the below base water demands and to provide 50-70% reduction in non-potable water demand. Rainwater tank reuse demands were calculated based on typical water demands of toilets and irrigation of landscaped areas. Water demands for toilets was calculated using 0.1kL/day/ toilet. Water demands for irrigation of landscaped areas was calculated using 0.3kL/year/m^2.

The above rates result in the following internal non-potable demand:

23 Toilets	0.1 kL/day

The above regime for the landscaped area for the site gives the following yearly outdoor water demand:

Irrigated Area (0.3kL/year/m^2)	1315m^2	395 kL/year
TOTAL		**395 kL/year**

6.4.1 Rainwater Tank Sizing

The use of rainwater reduces the mains water demand and the amount of stormwater runoff. By collecting the rainwater run-off from roof areas, rainwater tanks provide a valuable water source suitable for flushing toilets and landscape irrigation.

Rainwater tanks have been designed, using MUSIC software to balance the supply and demand, based on the calculated base water demands and proposed roof catchment areas. Allowances in the MUSIC model have been made for high flow bypass which will be managed by 300mm downpipe roofwater collection configuration along a portion of the south-west of the building.

Roof Catchment (m^2)	Highflow Bypass (L/s)	Tank Size in MUSIC (kL)	Predicted Demand Reduction (%)	Provided Tank (kL)
1504	$1*10^5$	30.00	63.43	35.00

Table 6.4. Rainwater Reuse Requirements

The MUSIC model, results summarised in **Table 6.4**, predicts that the reuse demands of 50-70% will be met for the development with the provision of a minimum 30 kL rainwater tank.

We note that the final configuration and sizing of the rainwater tanks is subject to detail design considerations and optimum site utilisation, and Greenstar requirements. The quoted volume is subject to changes based on the final water balance assessment in detail design stage.

6.5 Maintenance and Monitoring

It is important that each component of the stormwater system and water quality treatment train is properly operated and maintained. In order to achieve the design treatment objectives, an indicative maintenance schedule has been prepared and included as **Appendix D** to assist in the effective operation and maintenance of the various water quality components.

Inspection frequency may vary depending on site specific attributes and rainfall patterns in the area. In addition to the nominated frequency it is recommended that inspections are made following large storm events.

7 FLOODING AND OVERLAND FLOW

7.1 Introduction

An assessment of overland flow and flooding in relation to the proposed development, and confirmation of that the requirements of City of Sydney's *Floodplain Management Policy* and assessments as required of the SEAR's have been met.

Our review and assessment have been based, review of detail survey (refer **Appendix E**), the proposed development and an assessment of the site in relation to the flood modelling and documented flood behaviour included in the *Alexandra Canal Catchment Flood Study Model Update – ARR2019 Hydrology* completed by WMA Water (Ref: 117049-04) dated September 2020. It is noted that the 2020 report by WMA Water supersedes the 2014 *Alexandra Canal Catchment Flood Study Report Final* (Ref: W4785) prepared by Cardno on behalf of the City of Sydney Council (20 May 2014). The WMA Water report however does not include the subject site which was included in the 2014 study.

The WMA report will be referred to as the *Alexandra Canal 2020 Flood Study* from hereon, whilst the Carndo report as the *Alexandra Canal 2014 Flood Study*.

We have also obtained an electronic copy of the modelling output from the *Alexandra Canal 2020 Flood Study*. We have also completed our assessments utilising the GIS/ electronic information in the study, noting that this includes overland flow and flooding which has a depth lower than 0.15m which is not included in the formal flood maps included in the assessment.

Council's Flood Maps indicate there is minor flooding in the 1% AEP local events in Burrows Road which does not impact the site. Councils GIS flood output however shows overland flow within the site (depth less than 0.15m) which flows from Burrows Road to the Alexandra Canal.

Councils flood modelling, although quoted as the 2020 Update, is based on a LIDAR survey from 2013. All catchments and grading, and flood model output, as such reflect 2013 conditions.

We note that TfNSW have completed significant works relating to the motorway tunnel interchange including a detention/ water quality basin which flows to the west of the site toward the Gardeners Road off ramp and open channel on the east which drains toward the Campbell Road bridge. As such the current conditions reflect a significantly smaller catchment being directed toward the subject site.

Costin Roe Consulting Pty Ltd (being engineers who specialise in stormwater engineering and flooding assessments) have prepared this report and associated drawings utilising the above information. Two-dimension flood modelling (TUFLOW) has been completed by our office which reflect the 2022 conditions (including reduced catchments following TfNSW works). This modelling shows the overland flow shown in Council model in the 1% AEP storm event is no longer present. Further, that the proposed relocation of the inter-allotment drainage line, and improved drainage conditions in Burrows Road associated with the relocation of the pipe, results in a reduction in the ponding in Burrows Road. Refer further discussion in following sections.

We have included the following items as part of our review:

- *Alexandra Canal Catchment 2014 Flood Study*
- *Alexandra Canal Catchment 2020 Flood Study (incl. GIS/ electronic output)*;
- *M5 EIS SSI-6788 Flood Impact Assessment*;
- City of Sydney Councils *Floodplain Management Policy* in relation to the development including review of potential impacts of the development on existing flooding, and potential impacts on the development from flooding.

7.2 Alexandra Canal 2020 Flood Study

A flood study of the Alexandra Canal catchment was undertaken in 2014 by Cardno for The City of Sydney Council. This has now been superseded by an updated study undertaken in 2020 by WMA Water as noted above. The study involved a hydrological and hydraulic assessment of the catchment at a regional level. The hydraulic model utilising the two-dimensional hydraulic model (TUFLOW), including one-dimension pits and pipes for the significant council pipe infrastructure. Flow output from contributing catchments is based on "rain-on-grid" and it is noted that no drainage infrastructure in individual lots has been included in the model, unless this forms part of council trunk or significant inter-allotment drainage infrastructure.

Further, the flood study is based on 2013 Lidar survey information. As such modelling output depicts conditions prior to the substantial works completed by TfNSW associated with the M8 Motorway tunnel and interchange.

We provide excerpts of flooding associated with the 1% & 0.2% AEP storm events from the Alexandra Canal 2020 Flood Study in **Figures 7.1** and **7.2** below. **Figure 7.1** is noted to be an excerpt of *Flood Study Figure C6* and **Figure 7.2** an excerpt of *Flood Study Figure C8*.

We provide excerpts of flooding associated with the PMF storm event from the Alexandra Canal Flood Study in **Figures 7.3 & 7.4** below. **Figure 7.3** is noted to be an excerpt of *Flood Study Figure C9* and **Figure 7.4** an excerpt of *Flood Study Figure C36*.

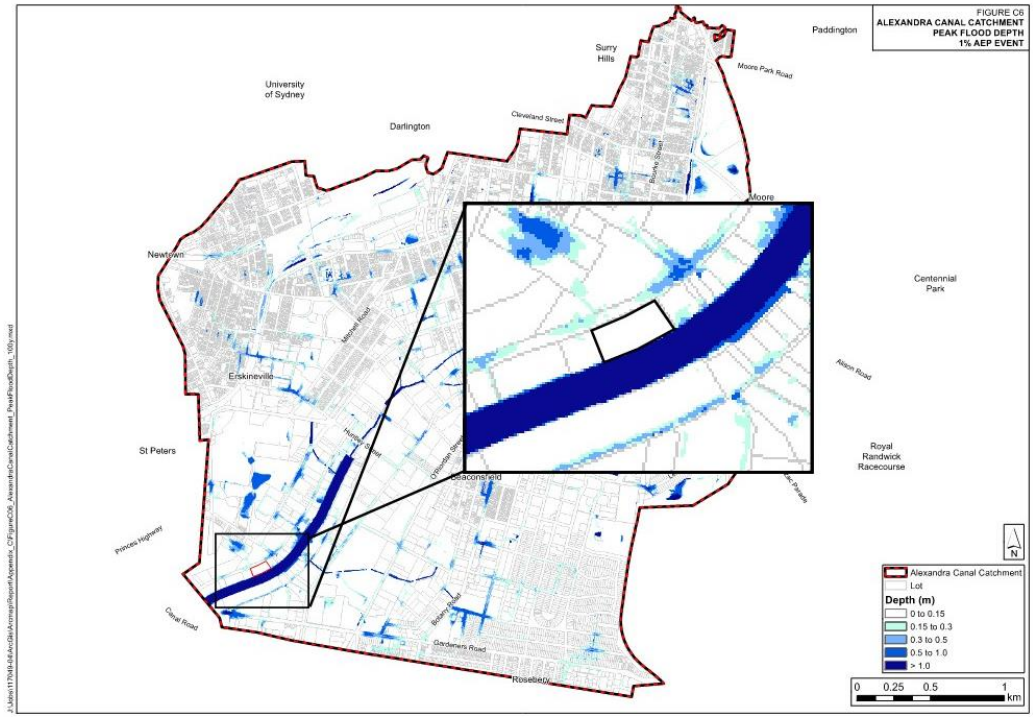


Figure 7.1. Alexandra Canal - 1% AEP Flood Extent and Depths

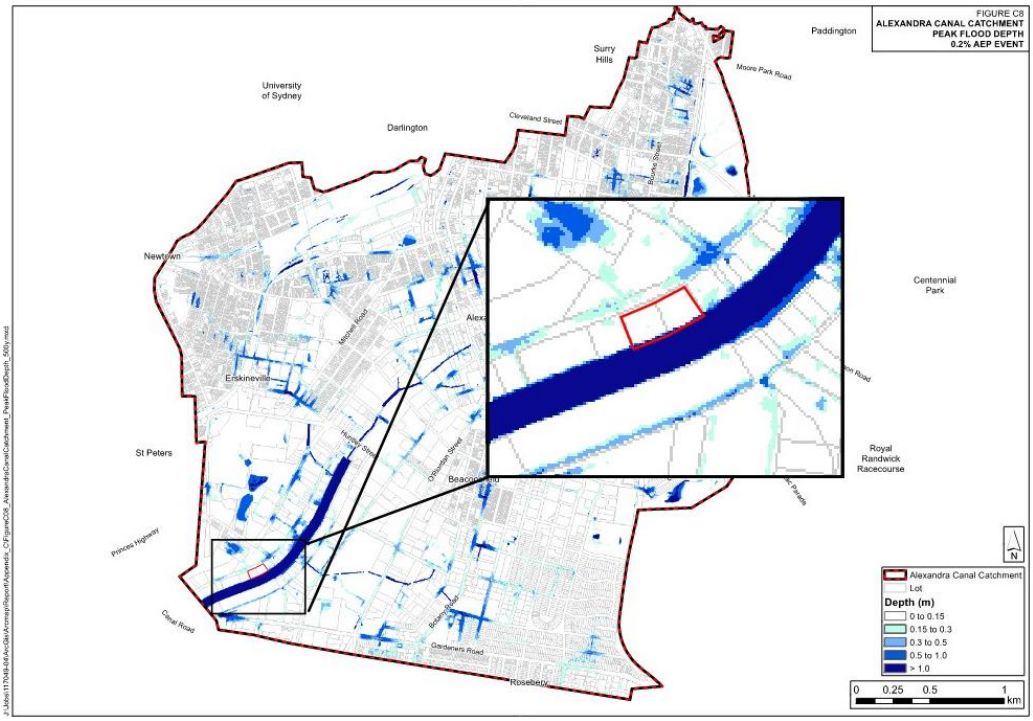


Figure 7.2. Alexandra Canal – 0.2% AEP Flood Extent and Depths

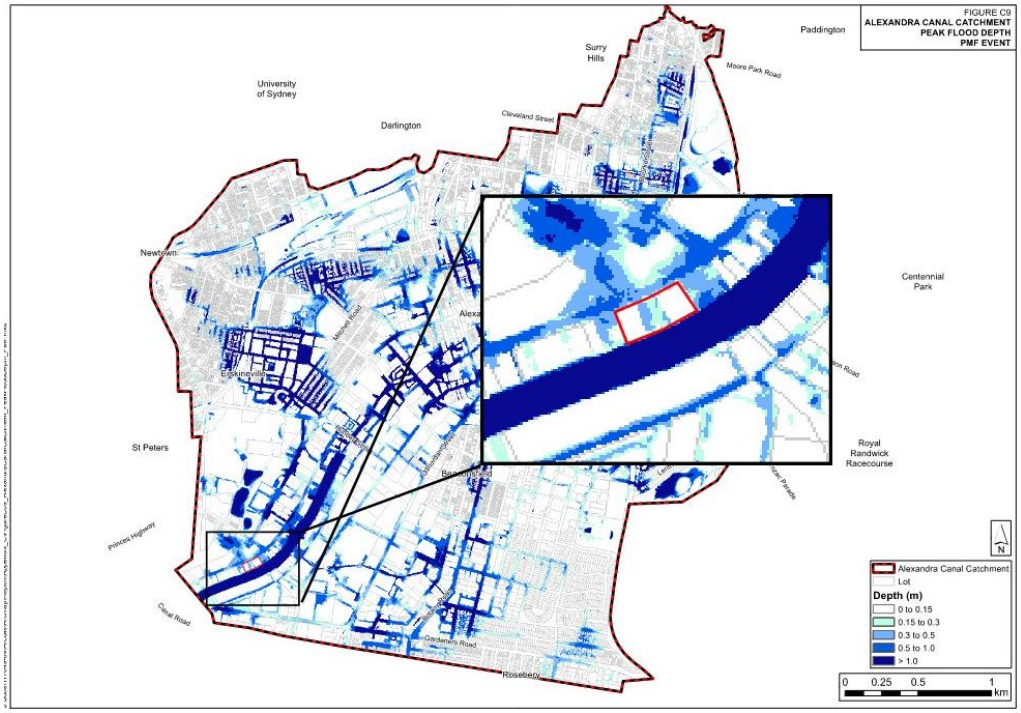


Figure 7.3. Alexandra Canal - PMF Flood Extent and Depths

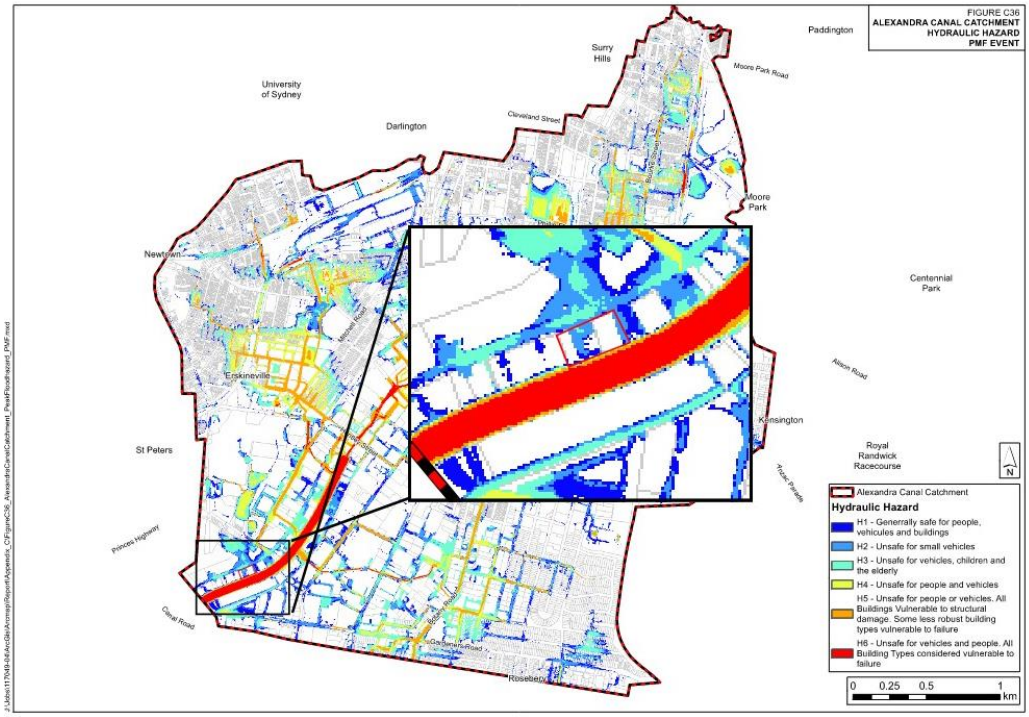


Figure 7.4. Alexandra Canal - PMF Hazard Categorisation

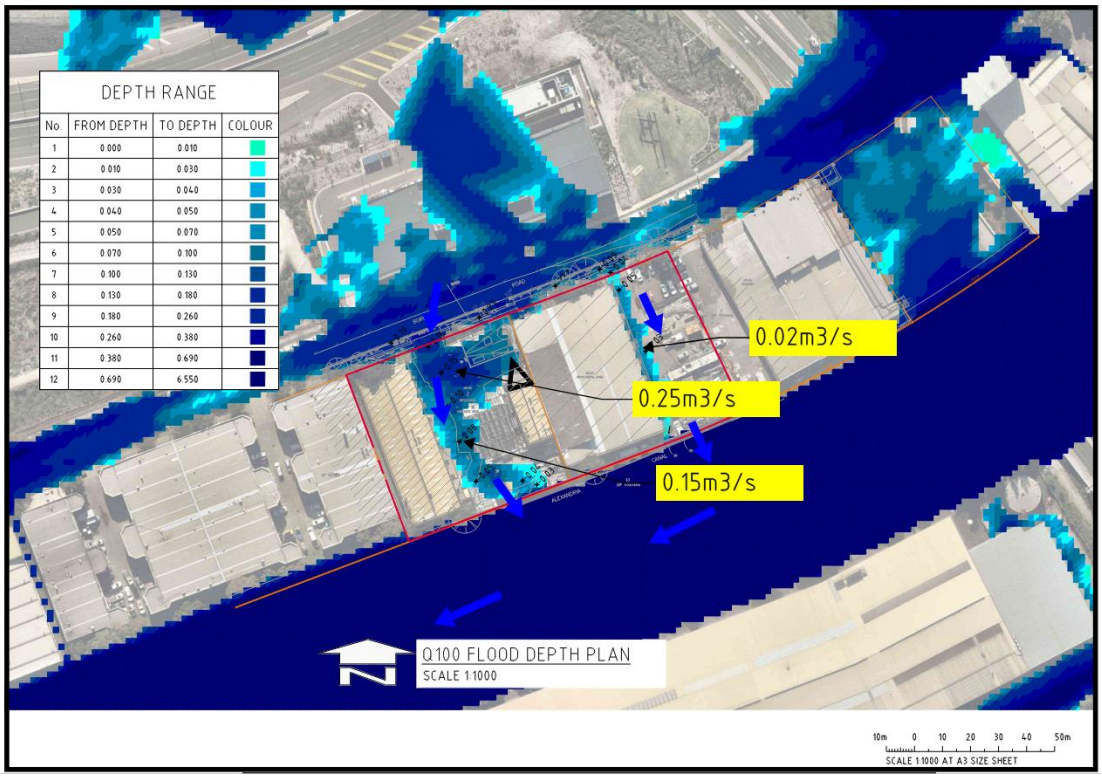


Figure 7.5. Alexandra Canal GIS Output- 1% AEP Depth & Approx Flow Rates

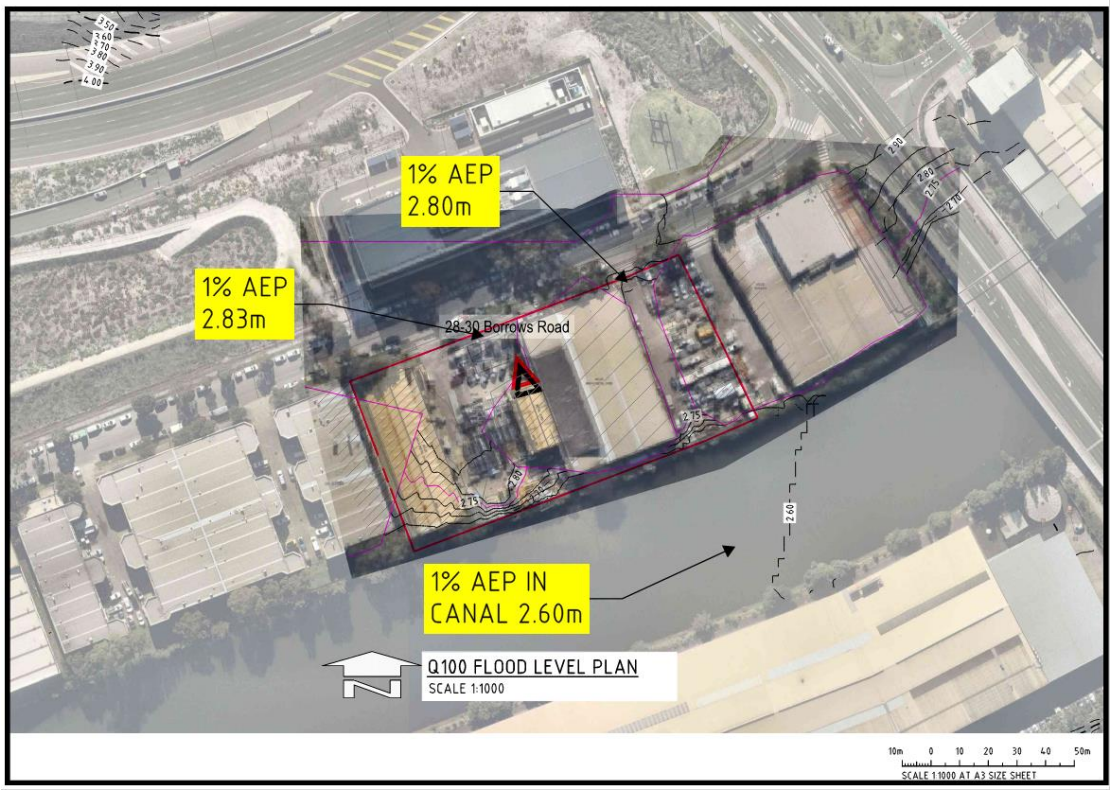


Figure 7.6. Alexandra Canal GIS Output- 1% AEP Levels

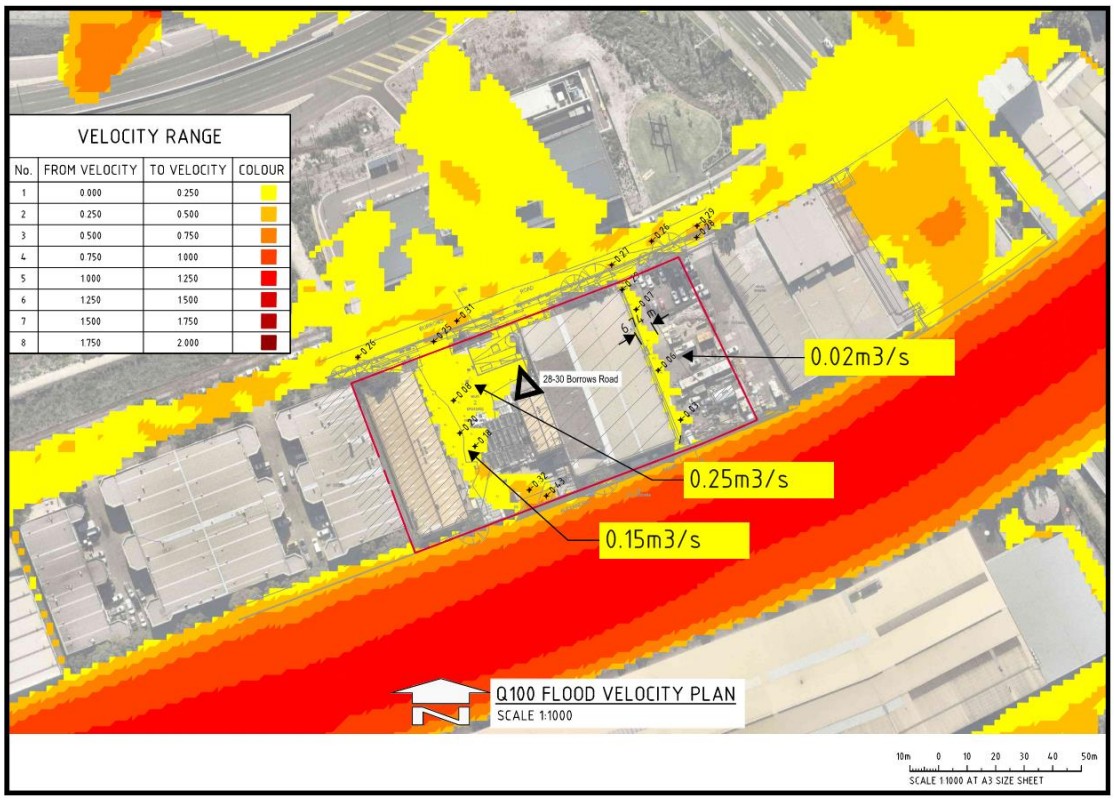


Figure 7.7. Alexandra Canal GIS Output- 1% AEP Velocity & Approx Flow Rates

With reference to the flood maps reproduced as **Figures 7.1** & **7.2**, ponding in the 1% AEP (depth less than 0.3m with velocity below than 0.5m/s) is observed on the edge of the site within Burrows Road. No flooding or overland flow is depicted in Councils formal flood plans within the site, noting that the flood maps do not show water depths less than 0.15m.

Review of **Figures 7.5** to **7.7** show the 1% AEP GIS output from Councils electronic version of the 2020 Flood Study. The GIS information shows shallow and slow overland flow within the site which flows across the site to Alexandra Canal. As previously noted Councils flood assessment is based on 2013 Lidar survey information. As such modelling output depicts conditions prior to the substantial works completed by TfNSW associated with the M8 Motorway tunnel and interchange which provide additional management of upstream catchments and redirection of these catchments away from the subject land. The modelling assessment completed by our office (refer **Section 7.4**) considers the current conditions and catchments post TfNSW works.

The site is shown to be clear of any significant flow paths and is not affected by mainstream flooding associated with the Alexandra Canal.

With reference to the PMF flood extent and hazard categorisation shown in **Figures 7.3** & **7.4**, insignificant flooding is shown to be within the property extent, and the property is shown to be clear of PMF flooding associated with the Alexandra Canal.

7.3 M5 EIS Flood Study SSI-6788

A flood study was completed by Lyall and Associates on behalf of TfNSW for the construction of the M5 Motorway and WestConnex Interchange. The interchange and lead in construction required works to Gardeners Road and Bourke Road (as included in **Appendix F**). The study involved a hydrological and hydraulic assessment of the catchment at a regional level. The hydraulic model utilising the two-dimensional hydraulic model (TUFLOW), including one-dimension pits and pipes for the significant council pipe infrastructure. Flow output from contributing catchments is based on "rain-on-grid" and it is noted that no drainage infrastructure in individual lots has been included in the model, unless this forms part of council trunk or significant inter-allotment drainage infrastructure.

We provide excerpts of flooding associated with the 1% AEP storm event in **Figures 7.8** and **7.9** below. **Figure 7.8** is noted to be an excerpt of *Flood Study Figure 4.8* and **Figure 7.9** an excerpt of *Flood Study Figure 4.13*.

We provide excerpts of flooding associated with the PMF storm event in **Figure 7.10**. **Figure 7.10** is noted to be an excerpt of *Flood Study Figure 4.10*.

The figures show the site to be clear of flooding and flood hazard areas for the 1% AEP but subject to heavy inundation of depths greater than 1m during the PMF event.

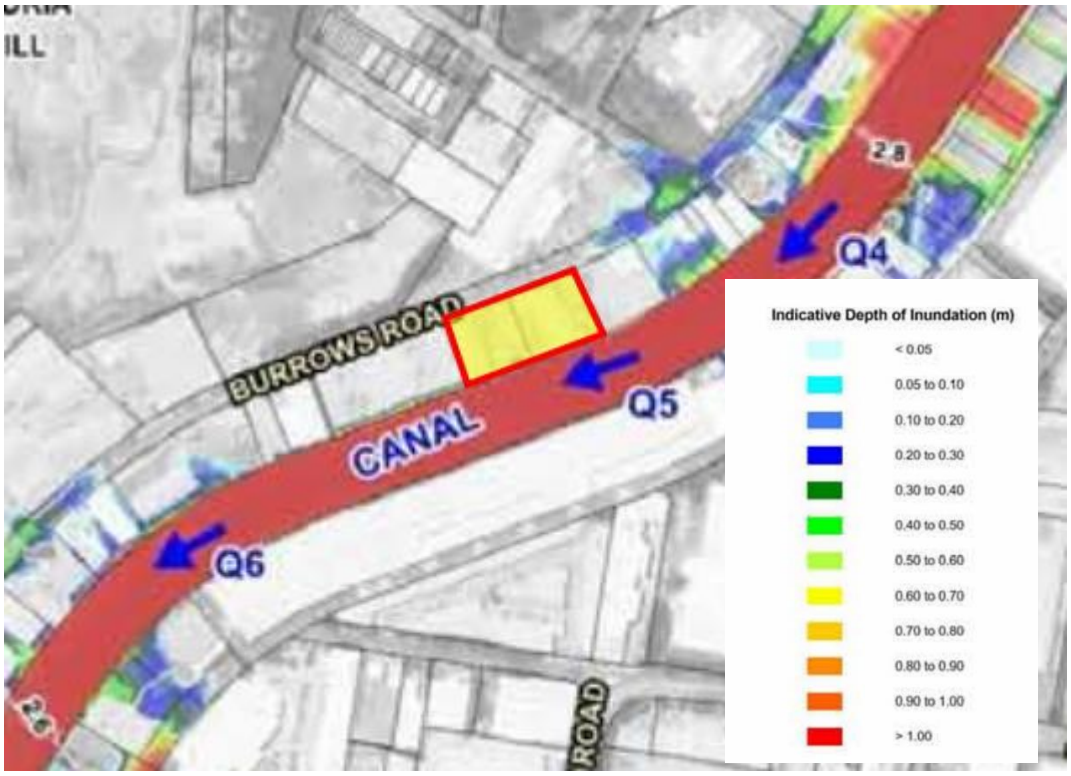


Figure 7.8. M5 EIS - 1% AEP Flood Extent and Depths

Figure 7.9. M5 EIS - 1% AEP Provisional Flood Hazard

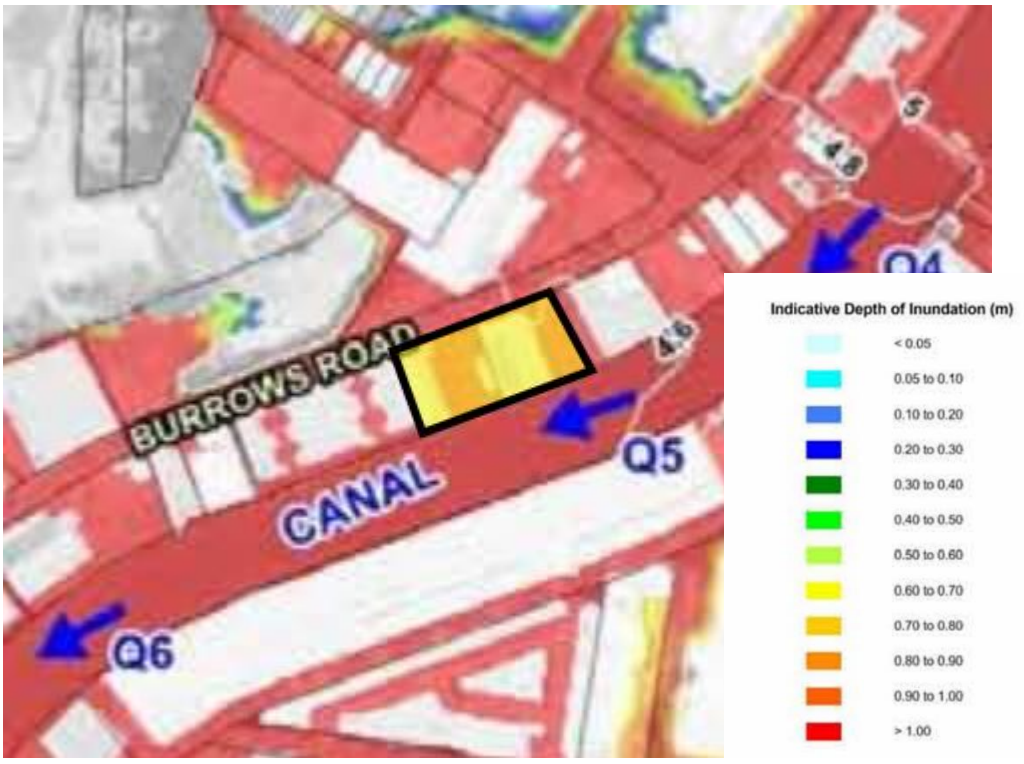


Figure 7.10. M5 EIS - PMF Flood Extent and Depths

7.4 Costin Roe Consulting Flood Model and Assessment

7.4.1 Introduction

A detailed site specific TUFLOW model of the pre and post development conditions has been completed by Costin Roe Consulting. The assessment being completed with consideration to City of Sydney interim flood management policy and the *NSW Floodplain Development Manual*. Technical parameters and detail included in the TUFLOW model are included as **Appendix E.**

The pre-developed model has been prepared utilising the 2022 conditions and catchments. It is noted that the Council flood study utilises 2013 Lidar information which does not consider the TfNSW works associated with the motorway tunnel and interchange works.

Refer **Section 7.4.2** for catchment and modelling output comparison.

7.4.2 Comparison of Council and Costin Roe Consulting Modelling

We provide the following comparison between the Council 2020 modelling (based on 2013 Lidar) and Costin Roe Consulting modelling (which considered 2022 conditions).

With reference to **Figure 7.11**, it can be observed that Councils catchment allows for 1.049Ha being drained to the Burrows Road Drainage system fronting Burrows Road. Based on the 2022 conditions this catchment is reduced to 0.556Ha, noting the inclusion of a significant detention basin and formalised flow paths which direct flows away from the subject area.

Figure 7.12 shows comparison of pre-development modelling by Council and Costin Roe Consulting for the 1% AEP event. The Costin Roe Consulting shows significantly less ponding in Burrows Road. This is due to the reduced catchments, based on 2022 conditions, and the more detailed site specific modelling undertaken by our office.

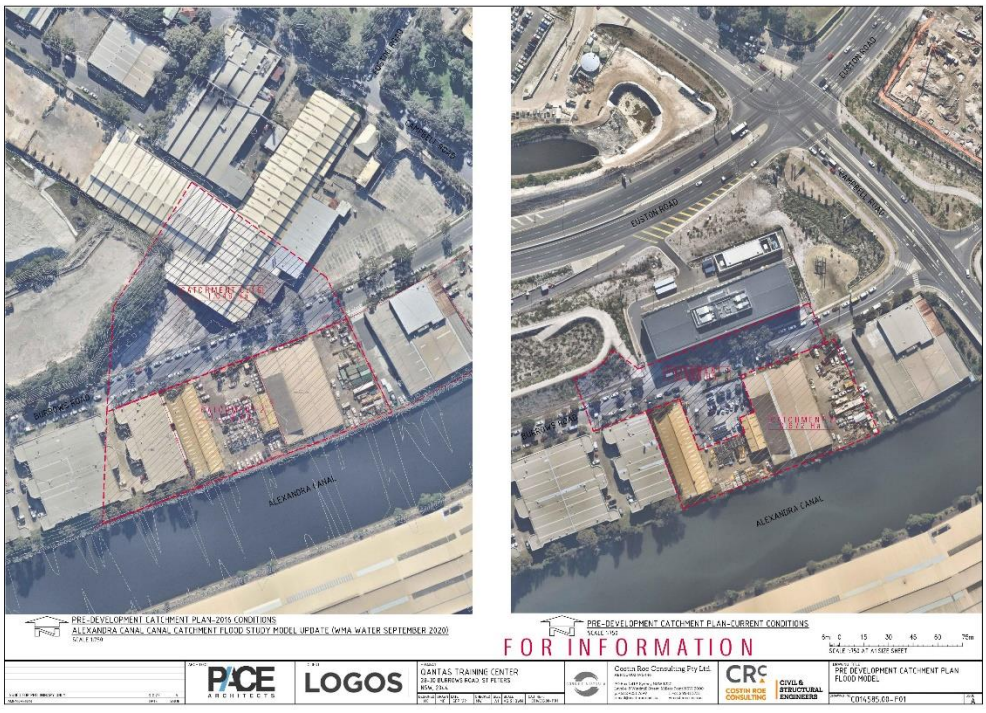


Figure 7.11. Comparison of Council and Costin Roe Consulting Catchments

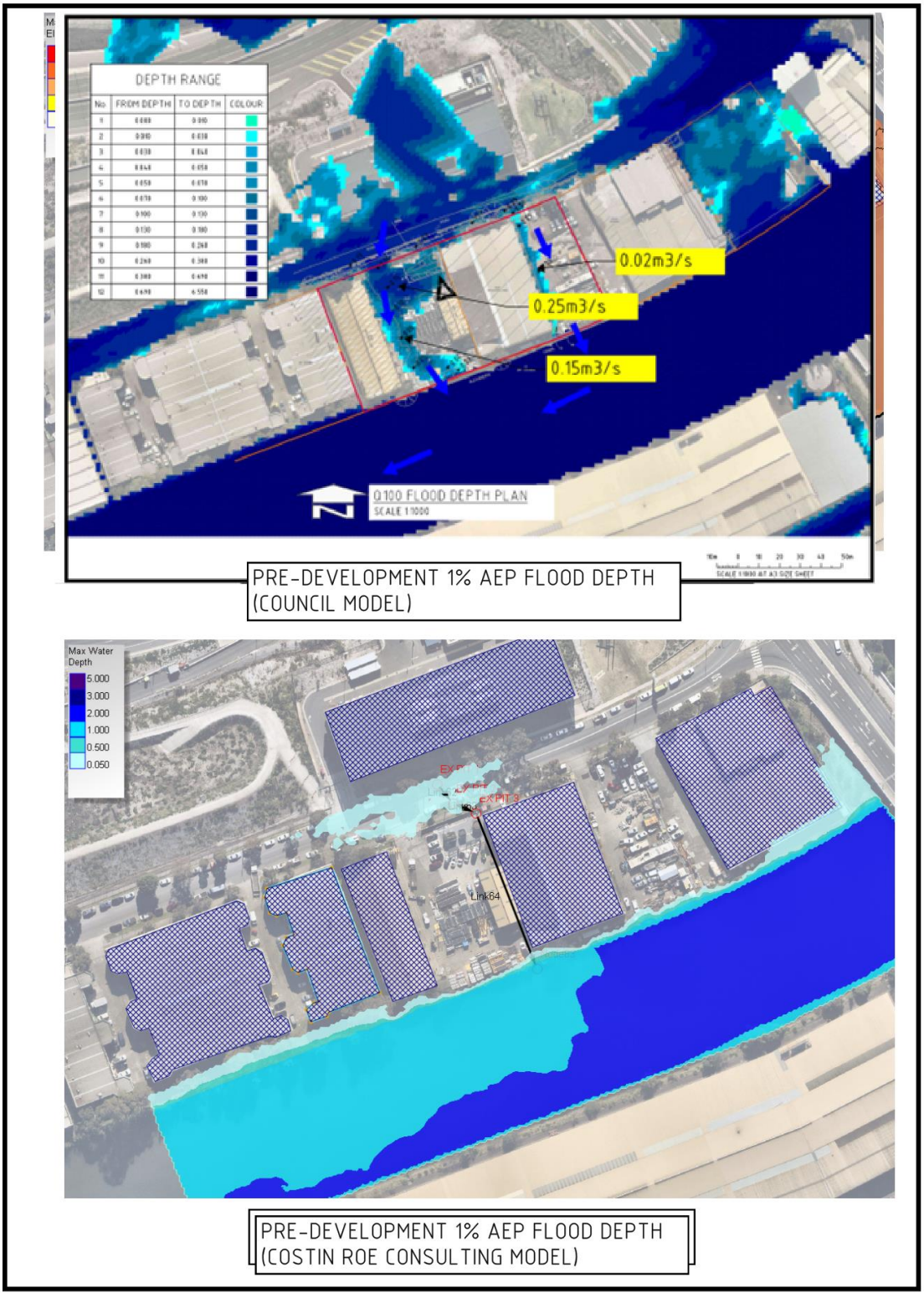


Figure 7.12. Comparison of Council and Costin Roe Consulting 1% AEP Flood Output

7.4.3 Pre-Development 1% AEP

Reference to **Figure 7.13** shows the pre-developed 1% AEP output for depth and levels. **Figure 7.14** shows velocity and **Figure 7.15** show true hazard categorisation.

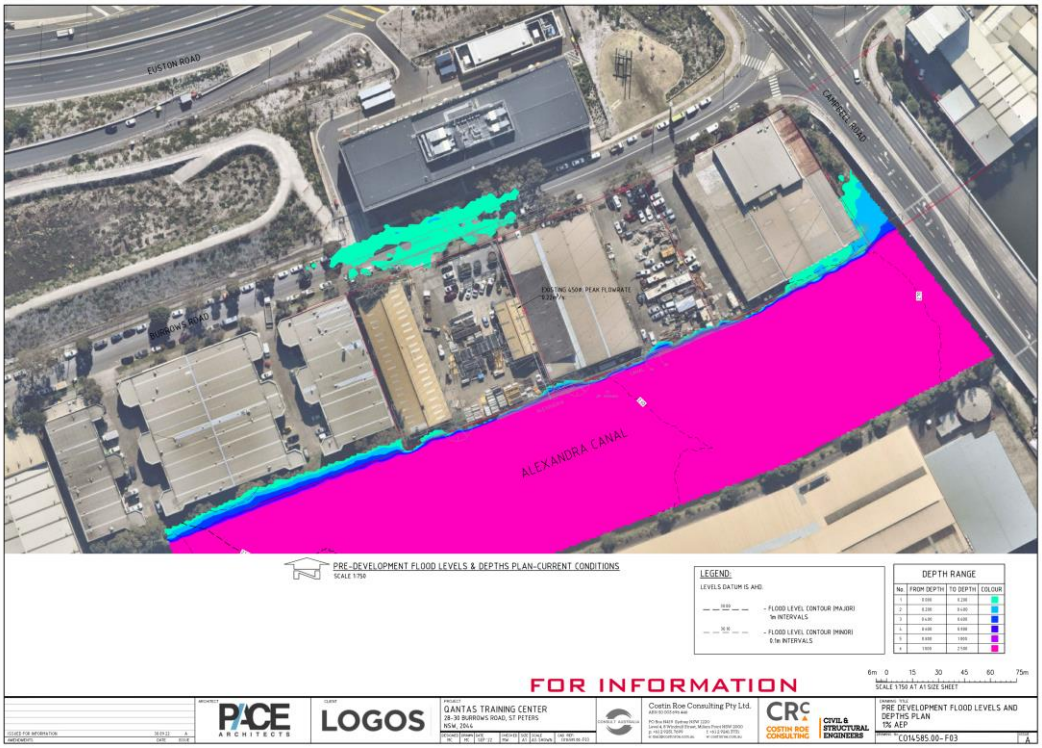


Figure 7.13: 1% AEP Pre-developed Level and Depths

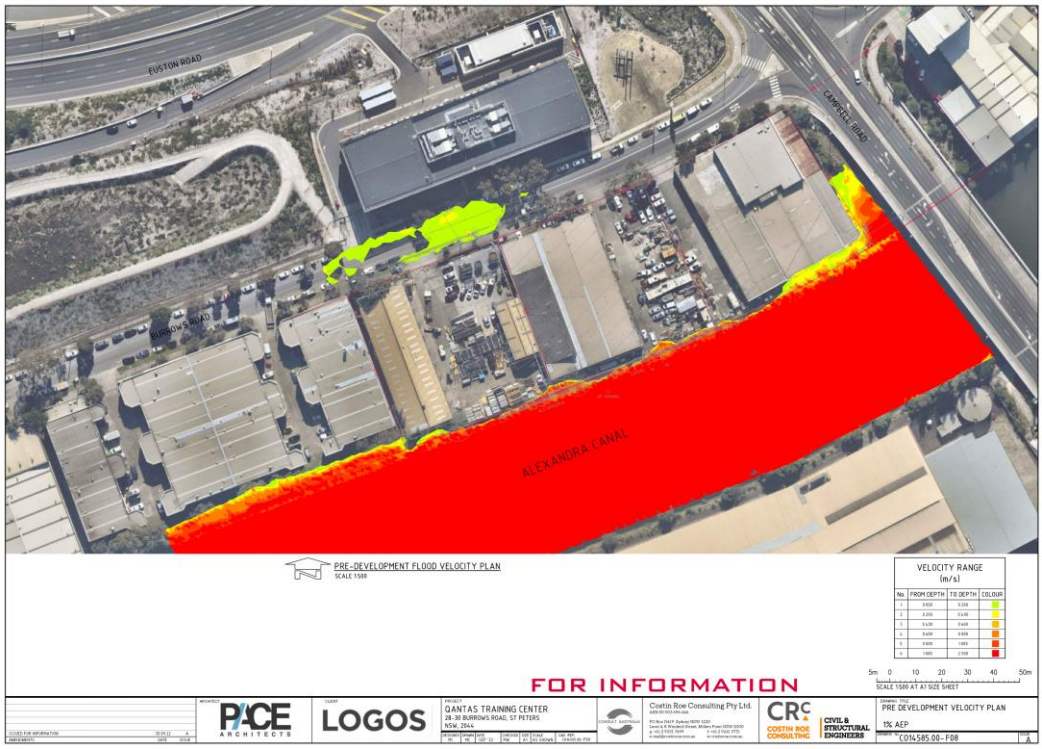


Figure 7.14: 1% AEP Pre-developed Velocity

Figure 7.15: 1% AEP Pre-developed Flood Hazard Categorisation

7.4.4 Post-Development 1% AEP

Reference to **Figure 7.16** shows the post-developed 1% AEP output for depth and levels. **Figure 7.17** shows velocity and **Figure 7.18** show true hazard categorisation.

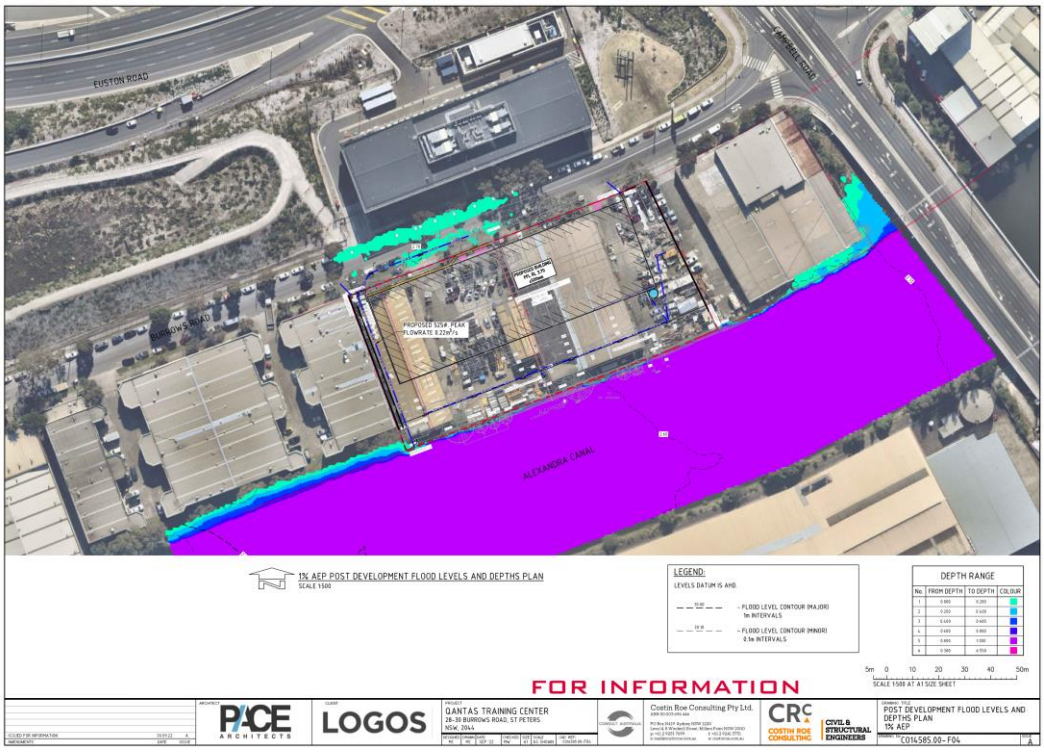


Figure 7.16: 1% AEP Post-developed Level and Depths.

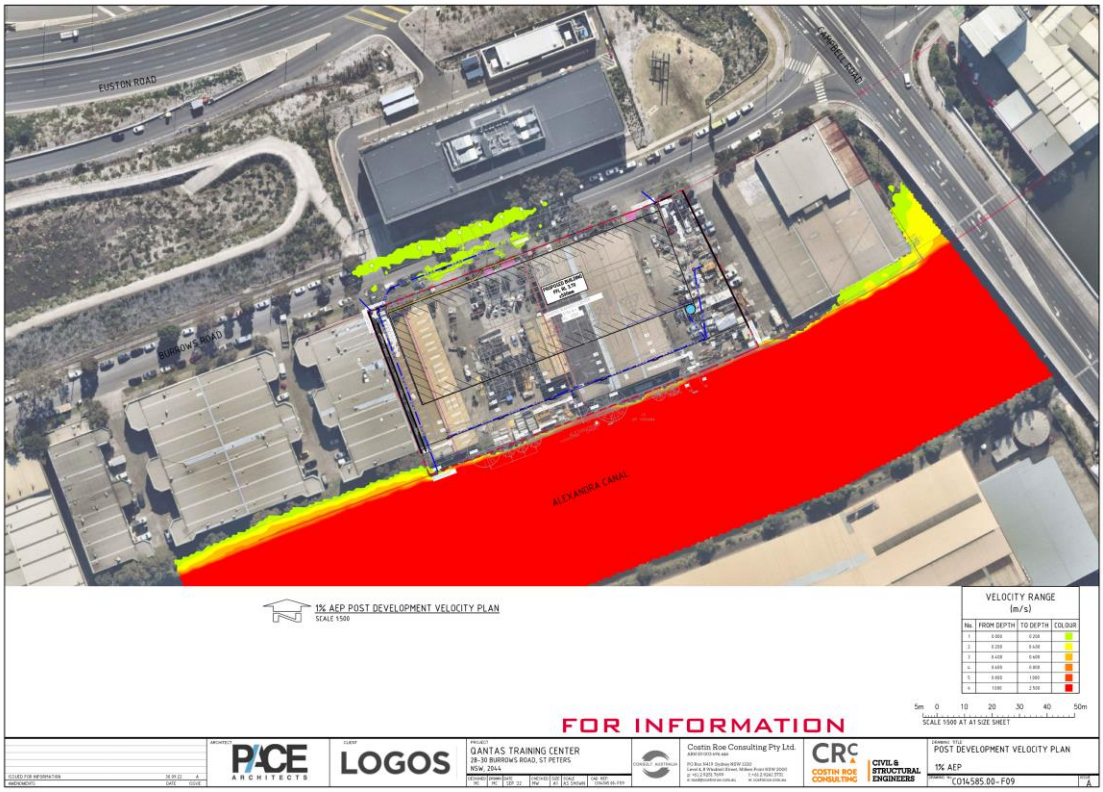


Figure 7.17: 1% AEP Post-developed Velocity

Figure 7.18: 1% AEP Post-developed Flood Hazard Categorisation

7.4.5 1% AEP Comparison

Figure 7.19 shows the 1% AEP flood level afflux (flood level difference) and **Figure 7.20** shows the 1% AEP velocity afflux, associated with the development.

The afflux output for the 1% AEP storm event shows that:

- There is a decrease in the flood levels of the ponding water in Burrows Road;
- There is no overland flow within the site;
- Overall there is no upstream, downstream or adjoining impacts associated with the development.
- The development results in an overall improvement in flood behaviour and conveyance.

Figure 7.19: 1% AEP Post Developed Flood Level Afflux

Figure 7.20: 1% AEP Post Developed Flood Velocity Afflux

7.5 City of Sydney Floodplain Management Requirements & NSW Floodplain Management Manual Requirements

Councils *Floodplain Management Policy* provides relevant policy requirements relating to development in and around identified flood affected development sites.

The intent of the document is to ensure that new developments do not experience undue flood risk and that existing development is not adversely flood affected through increased damage or hazard as a result of new development.

Section 5 of the *Floodplain Management Policy* notes the flood planning level for business/ industrial to be at or above the 1% AEP (1 in 100-year ARI) flood level.

The PMF or extreme event provides an upper limit of flooding and associated consequences for the problem being investigated. It is used for emergency response planning purposes to address the safety of people.

As discussed in earlier sections of this report, the site is shown to be free of flooding and overland flow to the 0.2% AEP event, per Councils 2020 Flood Study.

The following flood levels, Table 7.1, are estimated for the site based on the 2020 Flood Study information.

Table 7.1. Flood Levels

AEP / ARI Event	Flood Level (mAHD)
5%/ 1 in 20	2.3-2.4
1%/ 1 in 100	2.7
0.5%/ 1 in 200	2.9
0.2%/ 1 in 500	3.1
PMF	4.6

We note the FFL of the proposed building has been sited at RL 3.7m, being 0.6m above the 0.2% AEP. Noting the City of Sydneys minimum flood planning level is to be at or above the 1% AEP, the higher level meets Councils flood planning requirements. The higher floor level has been adopted to reduce the overall residual risk of the facility being affected by flooding, due to the sensitive equipment being housed in the facility minimum of 0.5m above the gutter level to ensure the site is not affected by nuisance runoff and gutter flows in Burrows Road.

In relation to flood impact on the development or impact from the development on flooding, it is noted that the modelled 1% & 0.2% AEP flood extent does not encroach the subject property. As such the proposed development does not impact on existing flood conditions.

Overall flood risk for the development, and from the development is considered low to negligible, and the development meets current council flood policy.

7.6 Flood Assessment Conclusion

A review of available flood studies has been made to determine flood behaviour in relation to the proposal.

Review of the available information, including Councils adopted 2020 Flood Study and new M5 EIS SSI-6788 has been made. Detailed flood modelling has been completed by our office.

The assessment by our office shows the site is not subject to flooding or overland flow paths. Post development conditions, which include the relocated drainage pipe and easement, have improved conveyance and as such a reduction in 1% AEP flood extent is achieved in Burrows Road and areas surrounding the property. The modelling and assessments completed confirm appropriate flood planning requirements have been met, and that the project results in improved drainage and flooding conditions.

We also note the floor level of the building has been set 0.6m above the 0.2% AEP flood level to ensure minimal residual risk to the operation of the facility due to flooding.

8 CONSTRUCTION SOIL AND WATER MANAGEMENT

8.1 Soil and Water Management General

Without any mitigation measures and during typical construction activities, site runoff would be expected to convey a significant sediment load. A *Soil and Water Management Plan* (SWMP) and *Erosion and Sediment Control Plan* (ESCP), or equivalent, would be implemented for the construction of the Proposal. The SWMP and ESCPs would be developed in accordance with the principles and requirements of *Managing Urban Stormwater – Soils & Construction Volume 1 ('Blue Book')(Landcom, 2004)* with a staged approach.

In accordance with the principles included in the Blue Book, a number of controls have been incorporated into a preliminary Staged ESCP (refer to accompanying Drawings in **Appendix A**) and draft SWMP in **Appendix C**. The Staged ESCP considers initial site establishment, requirements during construction of development and, completion of development works.

Section 1 provides a summary of the construction works for the Proposal. While all construction activities have the potential to impact on water quality, the key activities are:

- Erosion and sediment control installation.
- Grading of existing earthworks to suit building layout, drainage layout and pavements.
- Stormwater and drainage works.
- Service installation works.
- Building construction works.

The sections below outline the proposed controls for management of erosion and sedimentation during construction of the Proposal. The staged approach is noted to consider initial site establishment, construction of the development and the completion of the development, as included in the ESCP drawings **Appendix A**.

8.2 Typical Management Measures

Sediment Basins

The need for a sedimentation basin has been determined using a Revised Universal Soil Loss Equation (RUSLE) calculation. The parameters used for this calculation are shown in drawing **Co14585.00-DA20**. The calculation finds that the annual soil loss for the site equals 98.99m^3/year. According to Section 6.3.2.d of the *Landcom 'Blue Book'*, for sites with an annual soil loss less than 150m^3/year, a sedimentation basin may be considered unnecessary. Therefore, a sedimentation basin may not be needed for erosion and sediment control purposes for this site.

Sediment Fences

Sediment fences are located around the perimeter of the site to ensure no untreated runoff leaves the site. They have also been located around the existing drainage channels to minimise sediment migration into waterways and sediment basins.

Stabilised Site Access

For the proposal, stabilised site access is proposed at one location at the entry to the works area. This will limit the risk of sediment being transported on Burrows Road and other public roads.

8.3 Other Management Measures

Other management measures that will be employed are expected to include:

- Minimising the extent of disturbed areas across the site at any one time.
- Progressive stabilisation of disturbed areas or previously completed earthworks to suit the proposal once trimming works are complete.
- Regular monitoring and implementation of remedial works to maintain the efficiency of all controls.

It is noted that the controls included in the preliminary ESCP are expected to be reviewed and updated as the design, staging and construction methodology is further developed for the Proposal.

9 CONCLUSION

This Civil Engineering Report has been prepared to support the State Significant Development Application for a Proposed Development at 28-30 Burrows Road, Alexandra, NSW.

A civil engineering strategy for the site has been developed which provides a best practice solution within the constraints of the existing landform and proposed development layout. Within this strategy a stormwater quantity and quality management strategy has been developed to consider peak flows and reduce pollutant loads in stormwater leaving this site. The stormwater management for the development has been designed in accordance with City of Sydney Council requirements and ensuring acceptable impacts relating to the development.

The hydrological assessment shows local post development flows from the site will be consistent with pre-development flows and demonstrates that the site discharge will not adversely affect any land, drainage system or watercourse as a result of the development.

During the construction phase, a Sediment and Erosion Control Plan will be in place to ensure the downstream drainage system and receiving waters are protected from sediment laden runoff.

During the operational phase of the development, a treatment train incorporating the use of a proprietary filtration system is proposed to mitigate any increase in stormwater pollutant load generated by the development. MUSIC modelling results indicate that the proposed STM are effective in reducing pollutant loads in stormwater discharging from the site and meet the requirements of Council's pollution reduction targets. Best management practices have been applied to the development to ensure that the quality of stormwater runoff is not detrimental to the receiving environment.

It is recommended the management strategies in this report be approved and incorporated into the future detailed design.

10 REFERENCES

- Managing Urban Stormwater: Harvesting and Reuse – 2006 (NSW DEC);
- Managing Urban Stormwater: Source Control – 1998 (NSW EPA);
- Managing Urban Stormwater: Treatment Techniques – 1997 (NSW EPA);
- Managing Urban Stormwater: Soils & Construction – 2004 (LANDCOM);
- Water Sensitive Urban Design – "Technical Guidelines for Western Sydney" by URS Australia Pty Ltd, May 2004

Appendix A

DRAWINGS BY COSTIN ROE CONSULTING

CAE / QANTAS TRAINING CENTER

28-30 BURROWS ROAD, ST PETERS, NSW, 2044

CIVIL DEVELOPMENT APPLICATION

DRAWING LIST

DRAWING NO.	DRAWING TITLE
C014585.00-DA 10	DRAWING LIST & GENERAL NOTES
C014585.00-DA 20	EROSION & SEDIMENT CONTROL PLAN
C014585.00-DA 25	EROSION & SEDIMENT CONTROL DETAILS
C014585.00-DA 30	BULK EARTHWORKS PLAN
C014585.00-DA 35	BULK EARTHWORKS SECTIONS - SHEET 1
C014585.00-DA 36	BULK EARTHWORKS SECTIONS - SHEET 2
C014585.00-DA 40	STORMWATER DRAINAGE PLAN
C014585.00-DA 44	STORMWATER DRAINAGE DETAILS - DM
C014585.00-DA 45	STORMWATER DRAINAGE DETAILS - SHEET 1
C014585.00-DA 46	STORMWATER DRAINAGE DETAILS - SHEET 2
C014585.00-DA 47	STORMWATER DRAINAGE DETAILS - SHEET 3
C014585.00-DA 48	STORMWATER LONGSECTIONS - INTER-ALLOTMENT
C014585.00-DA 49	STORMWATER QUALITY IMPROVEMENT DEVICE
C014585.00-DA 50	FINISHED LEVELS PLAN
C014585.00-DA 55	TYPICAL SECTIONS - SHEET 1
C014585.00-DA 56	TYPICAL SECTIONS - SHEET 2
C014585.00-DA 65	RETAINING WALL DETAILS
C014585.00-DA 85	CIVIL WORKS DETAILS

GENERAL NOTES:

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL AND OTHER CONSULTANTS' DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
2. ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT AND CURRENT STANDARDS AUSTRALIA CODES AND WITH THE BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITIES EXCEPT WHERE VARIED BY THE PROJECT SPECIFICATION.
3. ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE.
   ENGINEER'S DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
   ENGINEER'S DRAWINGS ISSUED IN ANY ELECTRONIC FORMAT MUST NOT BE USED FOR DIMENSIONAL SETOUT.
   REFER TO THE ARCHITECT'S DRAWINGS FOR ALL DIMENSIONAL SETOUT INFORMATION.
4. DURING CONSTRUCTION THE STRUCTURE SHALL BE MAINTAINED IN A STABLE CONDITION AND NO PART SHALL BE OVERSTRESSED. TEMPORARY BRACING SHALL BE PROVIDED BY THE BUILDER TO KEEP THE WORKS AND EXCAVATIONS STABLE AT ALL TIMES.
5. UNLESS NOTED OTHERWISE ALL LEVELS ARE IN METRES AND ALL DIMENSIONS ARE IN MILLIMETRES.
6. ALL WORKS SHALL BE UNDERTAKEN IN ACCORDANCE WITH ACCEPTABLE SAFETY STANDARDS & APPROPRIATE SAFETY SIGNS SHALL BE INSTALLED AT ALL TIMES DURING THE PROGRESS OF THE JOB.

EXISTING SERVICES NOTES:

1. DURING THE EXECUTION OF WORKS, THE CONTRACTOR SHALL MAINTAIN THE INTEGRITY OF EXISTING SERVICES. THE CONTRACTOR SHALL REPAIR ANY DAMAGE CAUSED TO THE EXISTING SERVICES TO THE SATISFACTION OF THE SUPERINTENDENT AND THE RELEVANT SERVICE AUTHORITY, AT NO COST TO THE PRINCIPAL.
2. WHERE IT IS NECESSARY TO REMOVE, DIVERT OR CUT INTO ANY EXISTING SERVICE, THE CONTRACTOR SHALL GIVE AT LEAST THREE (3) DAYS NOTICE OF ITS REQUIREMENTS TO THE SUPERINTENDENT, WHO WILL ADVISE WHAT ARRANGEMENTS SHOULD BE MADE FOR THE ALTERATION OF SUCH EXISTING WORKS.
3. EXISTING SERVICES HAVE BEEN PLOTTED FROM SUPPLIED DATA. THE ACCURACY IS NOT GUARANTEED. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ESTABLISH THE LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO COMMENCING WORK. ALL CLEARANCES AND APPROVALS SHALL ALSO BE OBTAINED FROM THE RELEVANT SERVICE AUTHORITY PRIOR TO THE COMMENCEMENT OF WORK.
4. ALL NEW AND EXHUMED SERVICES THAT CROSS EXISTING AND FUTURE ROADS/PAVEMENTS WITHIN THE SITE SHALL BE BACKFILLED WITH DGB20 MATERIAL TO SUBGRADE LEVEL AND COMPACTED TO 98% STANDARD DENSITY RATIO. SUBJECT TO PRIOR APPROVAL FROM RELEVANT AUTHORITY.
5. ON COMPLETION OF SERVICES INSTALLATION. ALL DISTURBED AREAS SHALL BE RESTORED TO ORIGINAL, INCLUDING KERBS, FOOTPATHS, CONCRETE AREAS, GRAVEL AREAS, GRASSED AREAS AND ROAD PAVEMENTS.
6. CARE TO BE TAKEN WHEN EXCAVATING NEAR UTILITY SERVICES. NO MECHANICAL EXCAVATION TO BE UNDERTAKEN OVER SERVICES. LIAISE WITH RELEVANT AUTHORITY.
7. THE CONTRACTOR SHALL ALLOW FOR THE CAPPING OFF, EXCAVATION AND REMOVAL IF REQUIRED OF ALL EXISTING SERVICES IN AREAS AFFECTED BY THE WORKS WITHIN THE CONTRACT AREA AS SHOWN ON THE DRAWINGS UNLESS DIRECTED OTHERWISE BY THE SUPERINTENDENT. ALL TO REGULATORY AUTHORITY STANDARDS AND APPROVAL.
8. THE CONTRACTOR IS TO MAINTAIN EXISTING STORMWATER DRAINAGE FLOWS THROUGH THE ROADS AT ALL TIMES. MAKE DUE ALLOWANCE FOR ALL SUCH FLOWS AT ALL TIMES.
9. PRIOR TO COMMENCEMENT OF ANY WORKS THE CONTRACTOR SHALL OBTAIN THE SUPERINTENDENT'S APPROVAL OF THE PROGRAM FOR THE RELOCATION/CONSTRUCTION OF TEMPORARY SERVICES.
10. CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES AS REQUIRED TO MAINTAIN EXISTING SUPPLY TO BUILDINGS REMAINING IN OPERATION DURING WORKS TO THE SATISFACTION AND APPROVAL OF THE SUPERINTENDENT. ONCE DIVERSION IS COMPLETE AND COMMISSIONED THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SERVICES AND MAKE GOOD TO THE SATISFACTION OF THE SUPERINTENDENT.
11. INTERRUPTION TO SUPPLY OF EXISTING SERVICES SHALL BE DONE SO AS NOT TO CAUSE ANY INCONVENIENCE OR DAMAGE TO THE ADJACENT RESIDENCES. CONTRACTOR TO GAIN APPROVAL OF THE SUPERINTENDENT FOR TIME OF INTERRUPTION.
12. THE CONTRACTOR SHALL UNDERTAKE A DIAL BEFORE YOU DIG (DBYD 1100) SERVICES SEARCH BEFORE THE COMMENCEMENT OF ANY WORKS.

LOCALITY PLAN
N.TS

ELECTRONIC INFORMATION NOTES:

1. THE ISSUED DRAWINGS IN HARD COPY OR PDF FORMAT TAKE PRECEDENCE OVER ANY ELECTRONICALLY ISSUED INFORMATION, LAYOUTS OR DESIGN MODELS.
2. THE CONTRACTOR'S DIRECT AMENDMENT OR MANIPULATION OF THE DATA OR INFORMATION THAT MIGHT BE CONTAINED WITHIN AN ENGINEER-SUPPLIED DIGITAL TERRAIN MODEL AND ITS SUBSEQUENT USE TO UNDERTAKE THE WORKS WILL BE SOLELY AT THE DISCRETION OF AND THE RISK OF THE CONTRACTOR.
3. THE CONTRACTOR IS REQUIRED TO HIGHLIGHT ANY DISCREPANCIES BETWEEN THE DIGITAL TERRAIN MODEL AND INFORMATION PROVIDED IN THE CONTRACT AND/OR DRAWINGS AND IS REQUIRED TO SEEK CLARIFICATION FROM THE SUPERINTENDENT.
4. THE ENGINEER WILL NOT BE LIABLE OR RESPONSIBLE FOR THE POSSIBLE ON-GOING NEED TO UPDATE THE DIGITAL TERRAIN MODEL, SHOULD THERE BE ANY AMENDMENTS OR CHANGES TO THE DRAWINGS OR CONTRACT INITIATED BY THE CONTRACTOR.

FOR DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR SSDA	30.09.22	C
REVISED AS CLOUDED	26.07.22	B
ISSUED FOR PRELIMINARY ONLY	01.07.22	A

ARCHITECT: PACE ARCHITECTS

CLIENT: LOGOS

PROJECT: QANTAS TRAINING CENTER
28-30 BURROWS ROAD, ST PETERS
NSW, 2044

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DW	RN	JUNE '22	MW	A1	AS SHOWN	C014585.00-DA10

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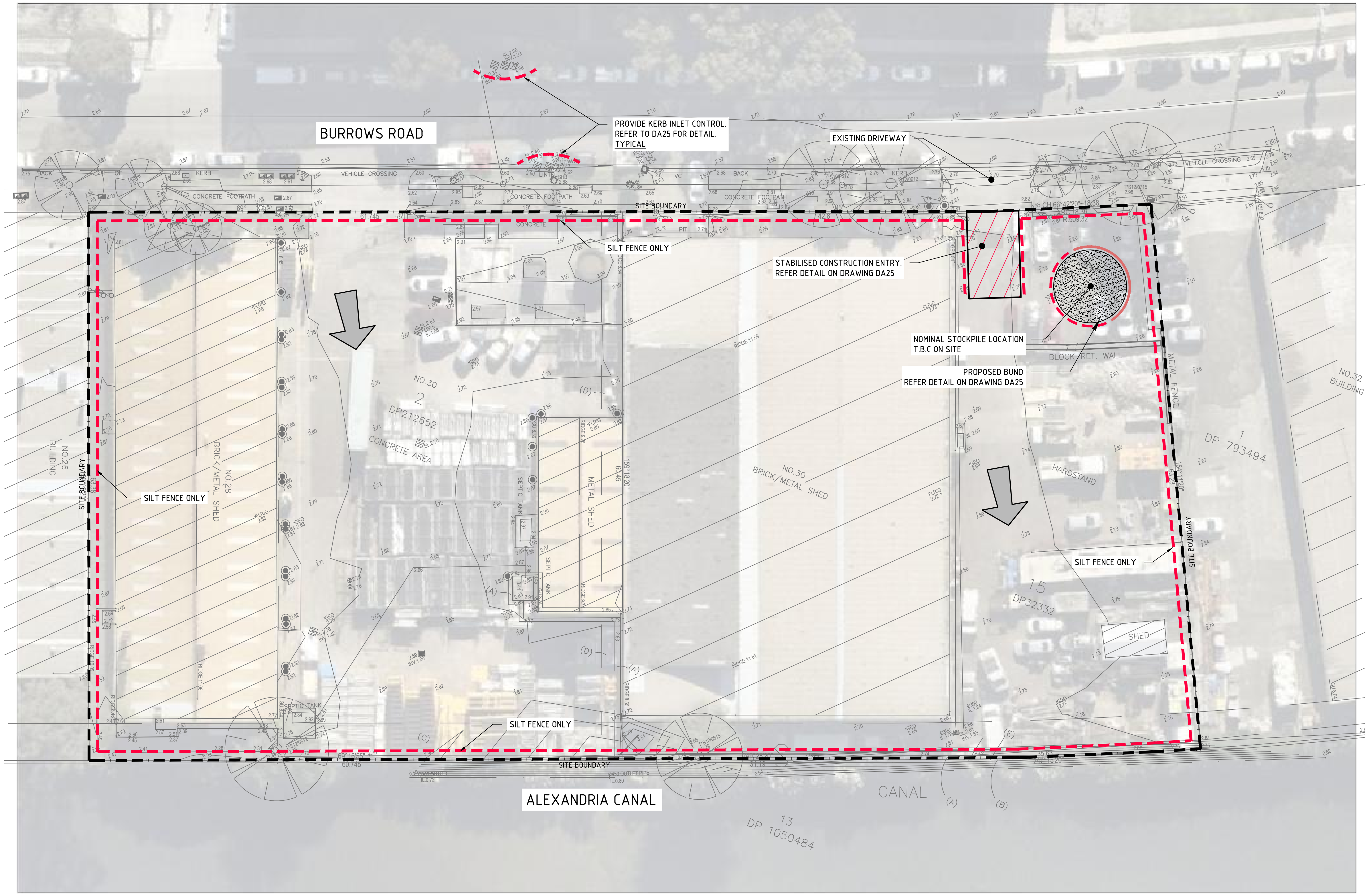
DRAWING TITLE: DRAWING LIST & GENERAL NOTES

DRAWING No: C014585.00-DA 10

ISSUE: C



EROSION & SEDIMENT CONTROL PLAN

SCALE 1:250

EROSION CONTROL NOTES:

ALL CONTROL WORK INCLUDING DIVERSION BANKS AND CATCH DRAINS, V-DRAINS AND SILT FENCES SHALL BE COMPLETED DIRECTLY FOLLOWING THE COMPLETION OF THE EARTHWORKS.

1. SILT FENCES AND SILT FENCE RETURNS SHALL BE ERECTED CONVEX TO THE CONTOUR TO POND WATER.
2. HAY BALE BARRIERS AND GEOFABRIC FENCES ARE TO BE CONSTRUCTED TO TOE OF BATTER, PRIOR TO COMMENCEMENT OF EARTHWORKS, IMMEDIATELY AFTER CLEARING OF VEGETATION AND BEFORE REMOVAL OF TOP SOIL.
3. ALL TEMPORARY EARTH BERMS, DIVERSION AND SILT DAM EMBANKMENTS ARE TO BE MACHINE COMPACTED, SEEDED AND MULCHED FOR TEMPORARY VEGETATION COVER AS SOON AS THEY HAVE BEEN FORMED.
4. CLEAR WATER IS TO BE DIVERTED AWAY FROM DISTURBED GROUND AND INTO THE DRAINAGE SYSTEM.
5. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND PROVIDING ON GOING ADJUSTMENT TO EROSION CONTROL MEASURES AS REQUIRED DURING CONSTRUCTION.
6. ALL SEDIMENT TRAPPING STRUCTURES AND DEVICES ARE TO BE INSPECTED AFTER STORMS FOR STRUCTURAL DAMAGE OR CLOGGING, TRAPPED MATERIAL IS TO BE REMOVED TO A SAFE, APPROVED LOCATION.
7. ALL FINAL EROSION PREVENTION MEASURES INCLUDING THE ESTABLISHMENT OF GRASSING ARE TO BE MAINTAINED UNTIL THE END OF THE DEFECTS LIABILITY PERIOD.
8. ALL EARTHWORKS AREAS SHALL BE ROLLED ON A REGULAR BASIS TO SEAL THE EARTHWORKS.
9. ALL FILL AREAS ARE TO BE LEFT WITH A BUND AT THE TOP OF THE SLOPE AT THE END OF EACH DAYS EARTHWORKS. THE HEIGHT OF THE BUND SHALL BE A MINIMUM OF 200mm.
10. ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND HYDROMULCHED WITHIN 10 DAYS OF COMPLETION OF FORMATION.
11. AFTER REVEGETATION OF THE SITE IS COMPLETE AND THE SITE IS STABLE IN THE OPINION OF A SUITABLY QUALIFIED PERSON ALL TEMPORARY WORK SUCH AS SILT FENCE, DIVERSION DRAINS ETC SHALL BE REMOVED.
12. ALL TOPSOIL STOCKPILES ARE TO BE SUITABLY COVERED TO THE SATISFACTION OF THE SITE MANAGER TO PREVENT WIND AND WATER EROSION.
13. ANY AREA THAT IS NOT APPROVED BY THE CONTRACT ADMINISTRATOR FOR CLEARING OR DISTURBANCE BY THE CONTRACTOR'S ACTIVITIES SHALL BE CLEARLY MARKED AND SIGN POSTED, FENCED OFF OR OTHERWISE APPROPRIATELY PROTECTED AGAINST ANY SUCH DISTURBANCE.
14. ALL STOCKPILE SITES SHALL BE SITUATED IN AREAS APPROVED FOR SUCH USE BY THE SITE MANAGER. A 6m BUFFER ZONE SHALL EXIST BETWEEN STOCKPILE SITES AND ANY STREAM OR FLOW PATH. ALL STOCKPILES SHALL BE ADEQUATELY PROTECTED FROM EROSION AND CONTAMINATION OF THE SURROUNDING AREA BY USE OF THE MEASURES APPROVED IN THE EROSION AND SEDIMENTATION CONTROL PLAN.
15. ACCESS AND EXIT AREAS SHALL INCLUDE SHAKE-DOWN OR OTHER METHODS APPROVED BY THE SITE MANAGER FOR THE REMOVAL OF SOIL MATERIALS FORM MOTOR VEHICLES.
16. THE CONTRACTOR IS TO ENSURE RUNOFF FROM ALL AREAS WHERE THE NATURAL SURFACE IS DISTURBED BY CONSTRUCTION, INCLUDING ACCESS ROADS, DEPOT AND STOCKPILE SITES, SHALL BE FREE OF POLLUTANTS BEFORE IT IS EITHER DISPERSED TO STABLE AREAS OR DIRECTED TO NATURAL WATERCOURSES.
17. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN SLOPES, CROWNS AND DRAINS ON ALL EXCAVATIONS AND EMBANKMENTS TO ENSURE SATISFACTORY DRAINAGE AT ALL TIMES WATER SHALL NOT BE ALLOWED TO POND ON THE WORKS UNLESS SUCH PONDING IS PART OF AN APPROVED ESCP / SWMP.

LEGEND:

PROVIDE 1m RETURNS TO SILT FENCE AT 30m MAX. INTERVALS.
TYPICAL (N.S.O.P.)

- DENOTES SILT FENCE WITH CATCH DRAIN
- DENOTES SILT FENCE ONLY
- DENOTES CONSTRUCTION ENTRY
- DENOTES OVERLAND FLOW PATH

RUSLE CALCULATION:

TOTAL CATCHMENT AREA = 0.7957 ha
DISTURBED CATCHMENT AREA = 0.7957 ha

A = R x K x LS x P x C

1. 2-yr, 6-hr ARI (S) = 7.07;
2. RAINFALL EROSIVITY FACTOR (R)
   $R = 164.74(1.1177)^{S} S^{0.6444} = 1275.92$;
3. SOIL ERODIBILITY FACTOR (K) = 0.075;
4. LENGTH/GRADIENT FACTOR (LS) = 1.0;
5. EROSION CONTROL PRACTICE FACTOR (P) = 1.3;
6. COVER FACTOR (C) = 1.0

SOIL LOSS (A) = $124.40m^3$/ha/yr
= $98.99m^3$/yr

PER BLUE BOOK GUIDELINES SECTION 6.3.2.d, FOR SITES WITH AVERAGE ANNUAL SOIL LOSS (A) < $150m^3$/yr, A SEDIMENT RETENTION BASIN MAY BE CONSIDERED UNNECESSARY.

2m 0 5 10 15 20 25m
SCALE 1:250 AT A1 SIZE SHEET

FOR DEVELOPMENT APPLICATION

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DW	RN	JUNE '22	MW	A1	AS SHOWN	C014585.00-DA20

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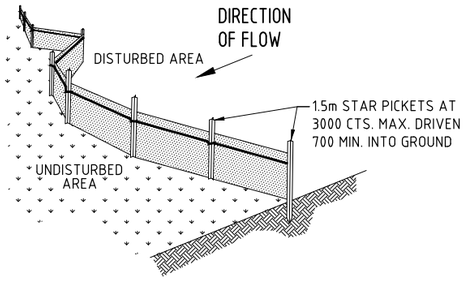
DRAWING TITLE: EROSION & SEDIMENT CONTROL PLAN

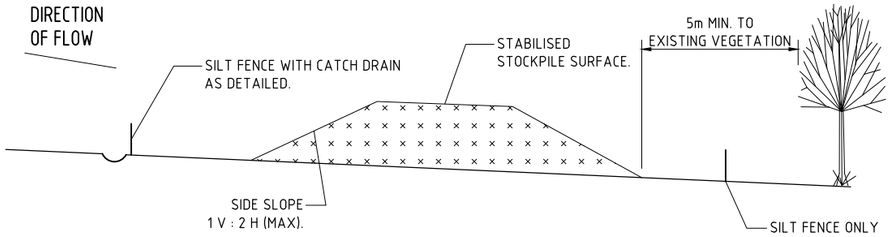
DRAWING No: C014585.00-DA20
ISSUE: B



TYPICAL SILT FENCE DETAIL

N.T.S

NOTE: PROVIDE 1m RETURNS AT 30m INTERVALS. TYPICAL

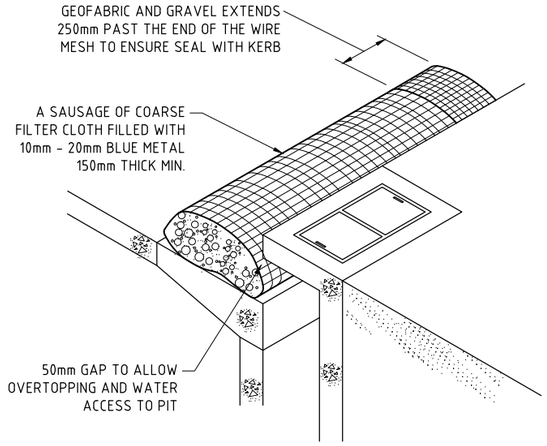


TYPICAL STOCKPILE DETAIL

N.T.S

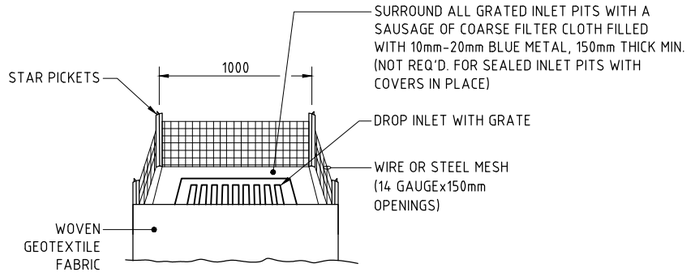
STOCKPILE NOTES

1. PLACE ALL STOCKPILES IN LOCATIONS MORE THAN 5m FROM EXISTING VEGETATION, ROADS & HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT ELONGATED MOUNDS. SIDE SLOPE TO BE 1 V: 2 H MAX.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT.
4. WHERE STOCKPILES ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE USING WOOD CHIP MULCH - 16 TONNE/Ha.
5. CONSTRUCT SILT FENCE WITH CATCH DRAIN ON UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES & SILT FENCE ONLY 1 TO 2m DOWNSLOPE AS SHOWN.



KERB INLET CONTROL

N.T.S



GRATED INLET PIT FILTER DETAIL

N.T.S

NOTE :
ADOPT ABOVE DETAILS AROUND ALL PITS WITHIN AREA ENCOMPASSED BY SILT FENCE & TO PITS ON THE ROAD ADJACENT TO SITE BOUNDARY.

NOTES:

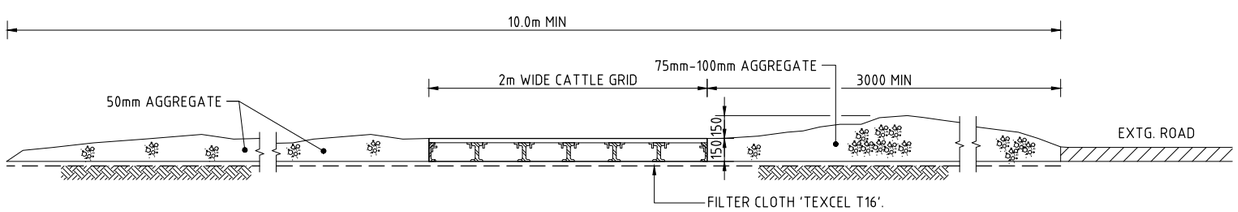
ALL EROSION & SEDIMENT CONTROL MEASURES TO BE INSPECTED & MAINTAINED DAILY BY SITE MANAGER.

MINIMISE DISTURBED AREAS.

ROADS & FOOTPATHS TO BE SWEPT DAILY.

1.2m TURF TO BE PLACED BEHIND KERBS.

DUST MINIMISATION CONTROL BY WATERING TO BE IMPLEMENTED BY SITE MANAGER AS REQUIRED OR AS DIRECTED BY THE CEMP.



SECTION 1:20 1/DA20 : STABILISED CONSTRUCTION ENTRANCE 'TRUCK SHAKER'

200mm 0 500 1000 1500 2000mm

SCALE 1:20 AT A1 SIZE SHEET

FOR DEVELOPMENT APPLICATION

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CLIENT: LOGOS

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28-30 BURROWS ROAD, ST PETERS
NSW, 2044

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DW	RN	JUNE '22	MW	A1	AS SHOWN	C014585.00-DA25

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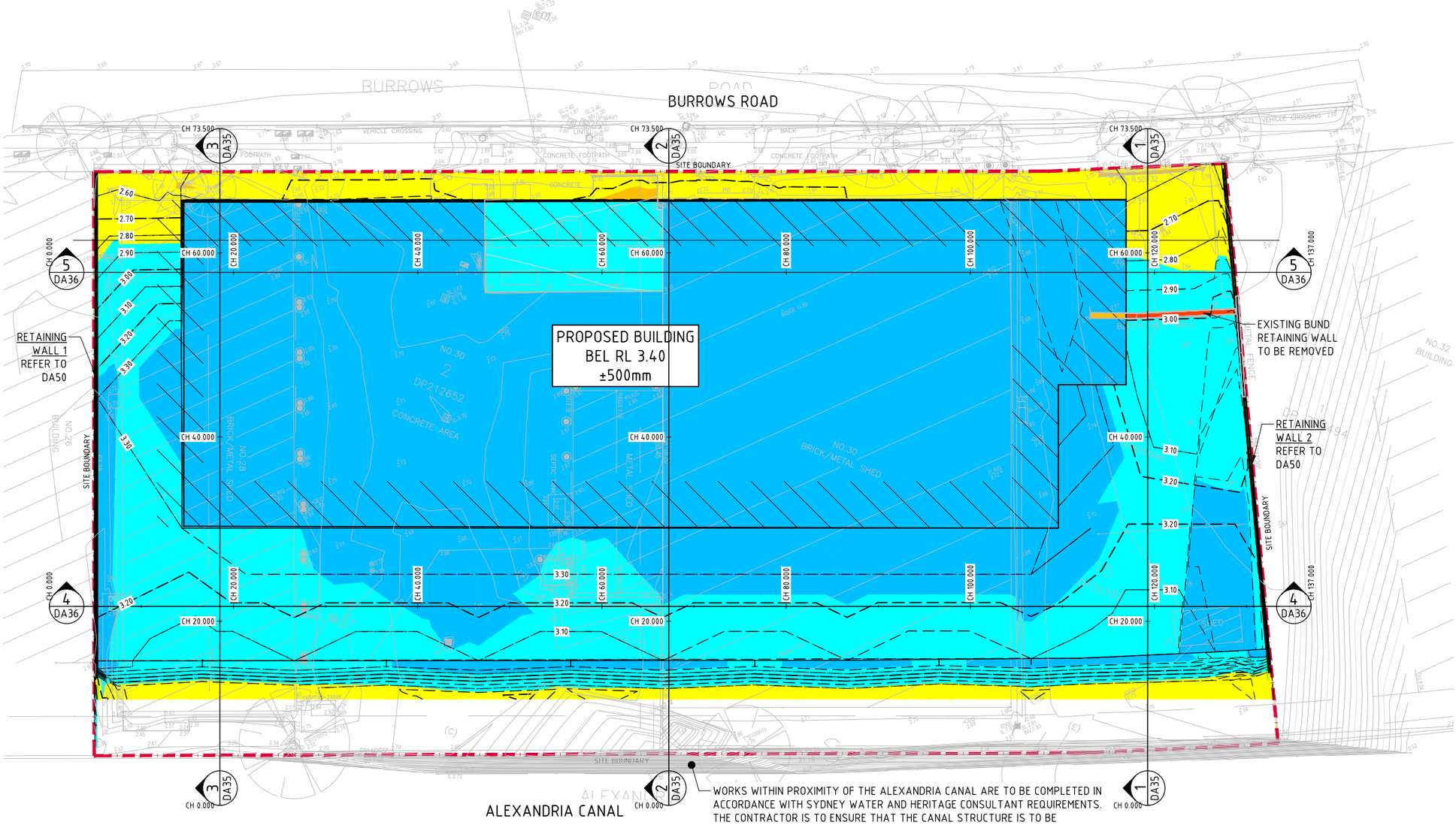
DRAWING TITLE: EROSION SEDIMENT CONTROL DETAILS

DRAWING No: C014585.00-DA25

ISSUE: B



WORKS WITHIN PROXIMITY OF THE ALEXANDRIA CANAL ARE TO BE COMPLETED IN ACCORDANCE WITH SYDNEY WATER AND HERITAGE CONSULTANT REQUIREMENTS. THE CONTRACTOR IS TO ENSURE THAT THE CANAL STRUCTURE IS TO BE MAINTAINED IN A STABLE AND UNDAMAGED CONDITION THROUGHOUT THE WORKS. REFER TO ZONE OF INFLUENCE DIAGRAMS ON DRAWINGS C014585.00-DA85 AND RELEVANT SYDNEY WATER IMPACT CRITERIA.

SITE PREPARATION NOTES:

1. ALL EARTHWORKS SHALL BE COMPLETED GENERALLY IN ACCORDANCE WITH THE GUIDELINES SPECIFIED BY THE GEOTECHNICAL ENGINEER.
2. EXISTING LEVELS ARE BASED ON INFORMATION PROVIDED BY LANDPARTNERS TITLED SY075517.000.1.1 DATED MARCH/2022.
3. STRIP ANY TOP SOIL OR DELETERIOUS MATERIAL AND DISPOSE OF FROM SITE OR STORE AS DIRECTED.
4. COMPLETE CUT TO FILL EARTHWORKS TO ACHIEVE THE REQUIRED LEVELS AS INDICATED ON THE DRAWINGS WITHIN A TOLERANCE OF +0mm/-10mm THROUGH BUILDING PADS/PAVEMENTS AND +0mm/-20mm ELSEWHERE.
5. PREPARE STEEP BATTERS TO RECEIVE FILL BY CONSTRUCTING BENCHING TO FACILITATE FILL PLACEMENT AND COMPACTION.
6. AREAS TO RECEIVE FILL (THAT ARE NOT ON BENCHED BATTERS) AND AREAS IN CUT SHALL BE PROOF ROLLED TO IDENTIFY ANY SOFT HEAVING MATERIAL. SOFT MATERIAL SHALL BE BOXED OUT AND REMOVED PRIOR TO FILL PLACEMENT. PROOF ROLLING TO BE INSPECTED BY A GEOTECHNICAL ENGINEER OR THE EARTHWORKS DESIGNER.
7. SITE WON FILL SHALL BE COMPACTED IN MAXIMUM 300mm LAYERS AND TO DRY OR HILF DENSITY RATIOS (STANDARD COMPACTION) OF BETWEEN 98% AND 103%. THE PLACEMENT MOISTURE VARIATION OR HILF MOISTURE VARIATION SHALL BE CONTROLLED TO BE BETWEEN 2% DRY AND 2% WET.
8. IMPORTED FILL SHALL BE COMPACTED IN MAXIMUM 300mm LAYERS AND TO DRY OR HILF DENSITY RATIOS (STANDARD COMPACTION) OF BETWEEN 98% AND 103%. THE PLACEMENT MOISTURE VARIATION OR HILF MOISTURE VARIATION SHALL BE CONTROLLED TO BE BETWEEN 2% DRY AND 2% WET.
9. ALL ENGINEERED FILL PARTICLES SHALL BE ABLE TO BE INCORPORATED WITHIN A SINGLE LAYER. FURTHER, LESS THAN 30% OF PARTICLES SHALL BE RETAINED ON THE 37.5 mm SIEVE. ENGINEERED FILL SHALL BE ABLE TO BE TESTED IN ACCORDANCE WITH THE STANDARD COMPACTION METHOD (AS1289.5.4.1) OR HILF TEST METHOD (AS1289.5.7.1). THESE METHODS REQUIRE LESS THAN 20% RETAINED ON THE 37.5 mm SIEVE. WHERE BETWEEN 20% AND 30% OF PARTICLES ARE RETAINED ON THE 37.5 mm SIEVE THE ABOVE TEST METHODS SHALL STILL BE ADOPTED AND TEST REPORTS ANNOTATED APPROPRIATELY. THESE REQUIREMENTS SHOULD BE MET BY THE MATERIAL AFTER PLACEMENT AND COMPACTION
10. ALL THE EARTHWORKS UNDERTAKEN AND THE SUBGRADE CONDITION IN THE CUT AREAS [IN THE STATED PERIOD] ARE DOCUMENTED IN THE REPORTS AND HAVE BEEN UNDERTAKEN IN ACCORDANCE WITH THE SPECIFICATION.
11. PRIOR TO ANY EARTHWORKS, EROSION CONTROL AS OUTLINED IN THE EROSION AND SEDIMENTATION CONTROL PLAN SHALL BE COMPLETED.
12. EXISTING ROCK, IF ANY, SHALL BE REMOVED BY HEAVY ROCK BREAKING OR RIPPING.
13. MATCH EXISTING LEVELS AT BATTER INTERFACE.
14. CONTRACTOR TO MATCH EXISTING LEVELS AT THE INTERFACE OF EARTHWORKS AND EXISTING SURFACE AT BATTER LOCATIONS OR WHERE NO RETAINING WALLS ARE PRESENT. ANY DISCREPANCY BETWEEN DESIGN AND EXISTING LEVELS TO BE REFERRED TO THE ENGINEER FOR DIRECTION OR ADJUSTMENTS TO DESIGN LEVELS.
15. DURING EARTHWORKS THE CONTRACTOR IS TO ENSURE ALL AREAS ARE FREE DRAINING & WILL NOT RETAIN WATER DURING RAINFALL. PROVIDE TEMPORARY MEASURES AS REQUIRED TO ENSURE FREE FLOWING RUNOFF THROUGH MANAGED DRAINAGE PATHS, DIVERSION DRAINS OR OTHER SUITABLE DISPOSAL METHOD AS AGREED DURING THE WORKS. REFER ANY CONCERNS TO THE ENGINEER. REFER TO EROSION AND SEDIMENT CONTROL DRAWINGS AND NOTES.

EARTHWORK ESTIMATES

SITE AREA	= 0.796 Ha
CUT	= -165m³
FILL	= +3,470m³
ALLOWANCES	
DETAILED EXCAVATION (1,200m³/Ha)	= -955m³
DIFFERENCE	= + 2,350m³

NOTE:
NO ALLOWANCE HAS BEEN MADE FOR THE REMOVAL AND DEMOLITION OF THE EXISTING SLAB. EXTENT OF EXISTING SLAB TO BE LEFT IN-SITU CONTRACTOR O JACK HAMMER THROUGH EXISTING SLAB IN A 2m GRID. CONTRACTOR TO PLACE FILL ON TOP OF EXISTING SLAB TO BULK EARTHWORKS LEVELS IN ACCORDANCE WITH SITE PREPARATION NOTES. PROVIDE NEW CONCRETE PAVEMENT AS SHOWN.

EARTHWORKS VOLUMES ARE APPROXIMATE ONLY.

EXISTING WAREHOUSE FFL ASSUMED AT 2.73m AND EXISTING WAREHOUSE SHED FFL ASSUMED AT 2.85m. TBC ON SITE.

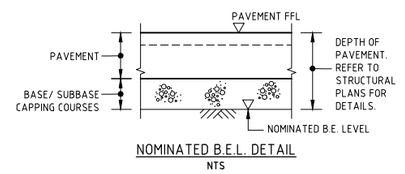
NO ALLOWANCE HAS BEEN MADE FOR DELETERIOUS MATERIAL, EROSION AND SEDIMENT CONTROL, BULKING OR COMPACTION OF FILLED SOILS, THE REMOVAL OF UNCONTROLLED OR CONTAMINATED MATERIAL OR ANY OTHER UNSPECIFIED EXCAVATION RELATED TO CONSTRUCTION ACTIVITIES. DETAILED EXCAVATION ALLOWANCE IS APPROXIMATE ONLY AND ACCOUNTS FOR STORMWATER/SERVICES TRENCHING AND FOUNDATIONS. THE DETAILED EXCAVATION VOLUMES ARE TO BE CONFIRMED BY THE CONTRACTOR. REFER ANY CONCERNS TO ENGINEER.

LEGEND:

LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON SURVEY 'SY075517.00.1.1' PROVIDED BY LAND PARTNERS MARCH/2022.

- 13.00 – EXISTING CONTOUR (0.1m INTERVAL)
- 13.00 – B.E.L. CONTOUR (MAJOR 0.5m)
- 13.10 – B.E.L. CONTOUR (MINOR 0.1m)
- ×13.50 – B.E.L. SPOT LEVEL



NOMINATED B.E.L. DETAIL
NTS

BULK EARTHWORKS PLAN
SCALE 1:250

ALLOWANCES FOR STRUCTURE

	DEPTH OF PAVEMENT
INTERNAL	
WAREHOUSE	300mm
EXTERNAL	
HARDSTAND	300mm
LANDSCAPING	100mm
PEDESTRIAN	100mm

DEPTH RANGE

No.	FROM DEPTH	TO DEPTH	COLOUR
1	-2.000	-1.500	
2	-1.500	-1.000	
3	-1.000	-0.500	
4	-0.500	0.000	
5	0.000	0.500	
6	0.500	1.000	
7	1.000	1.500	
8	1.500	2.000	
9	2.000	2.500	

CUT / FILL

LEVELS NOTE:

LEVELS SHOWN TO BE +/-500mm FROM THOSE SHOWN. FINAL LEVELS SUBJECT TO FINAL GEOTECHNICAL INVESTIGATIONS, ARCHITECTURAL LAYOUT AND ACHIEVING A CUT TO FILL EARTHWORKS BALANCE OVER THE PROPERTY.

2m 0 5 10 15 20 25m
SCALE 1:250 AT A1 SIZE SHEET

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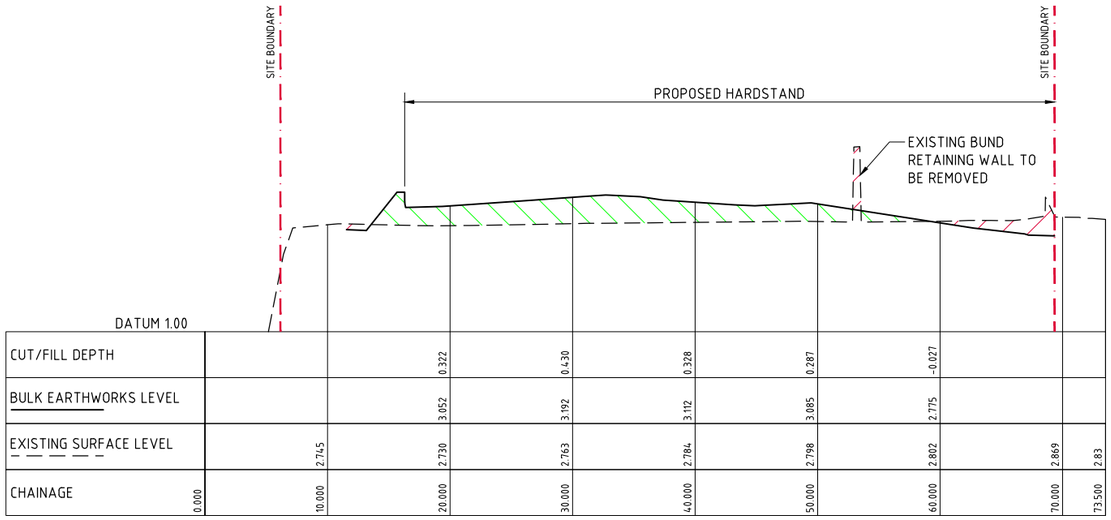
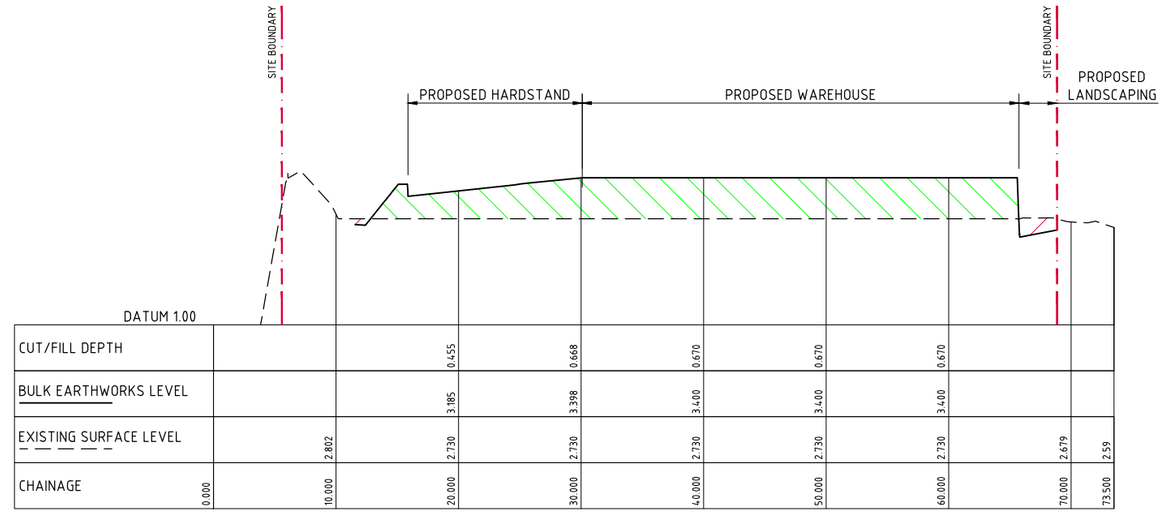
DRAWING No: C014585.00-DA30 ISSUE: B



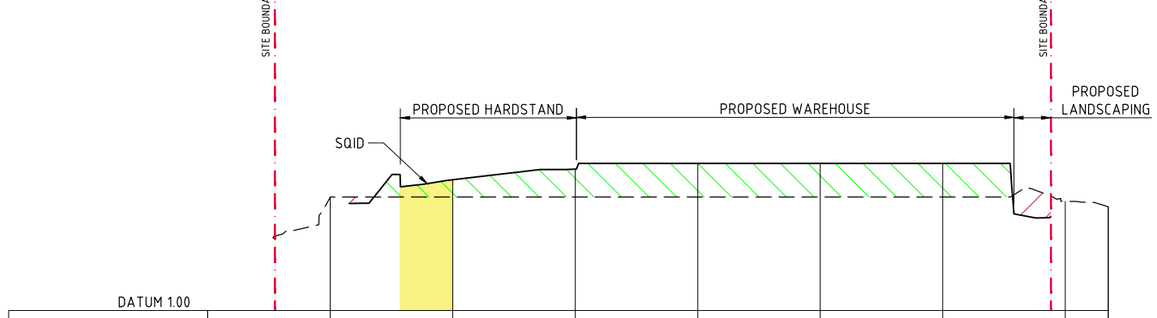
DATUM 1.00									
CUT/FILL DEPTH		0.322	0.430	0.328	0.287	-0.027			
BULK EARTHWORKS LEVEL		3.052	3.192	3.112	3.085	2.775			
EXISTING SURFACE LEVEL	2.745	2.730	2.763	2.784	2.798	2.802	2.869	2.83	
CHAINAGE 0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	73.500	

SECTION 1
HORIZONTAL SCALE 1:250
VERTICAL SCALE 1:50



DATUM 1.00									
CUT/FILL DEPTH		0.455	0.668	0.670	0.670	0.670			
BULK EARTHWORKS LEVEL		3.185	3.398	3.400	3.400	3.400			
EXISTING SURFACE LEVEL	2.802	2.730	2.730	2.730	2.730	2.730	2.679	2.59	
CHAINAGE 0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	73.500	

SECTION 2
HORIZONTAL SCALE 1:250
VERTICAL SCALE 1:50



DATUM 1.00								
CUT/FILL DEPTH		0.282	0.456	0.550	0.550	0.550		
BULK EARTHWORKS LEVEL		3.132	3.306	3.400	3.400	3.400		
EXISTING SURFACE LEVEL	2.846	2.850	2.850	2.850	2.850	2.850	2.780	2.69
CHAINAGE 0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	73.500

SECTION 3
HORIZONTAL SCALE 1:250
VERTICAL SCALE 1:50

LEGEND:
- DENOTES BULK EARTHWORKS PROFILE
- DENOTES EXISTING PROFILE
- DENOTES AREA IN CUT
- DENOTES AREA IN FILL

500mm 0 1 2 3 4 5m
SCALE 1:50 AT A1 SIZE SHEET

2m 0 5 10 15 20 25m
SCALE 1:250 AT A1 SIZE SHEET

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DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DW	RN	JUNE '22	MW	A1	AS SHOWN	C014585.00-DA35

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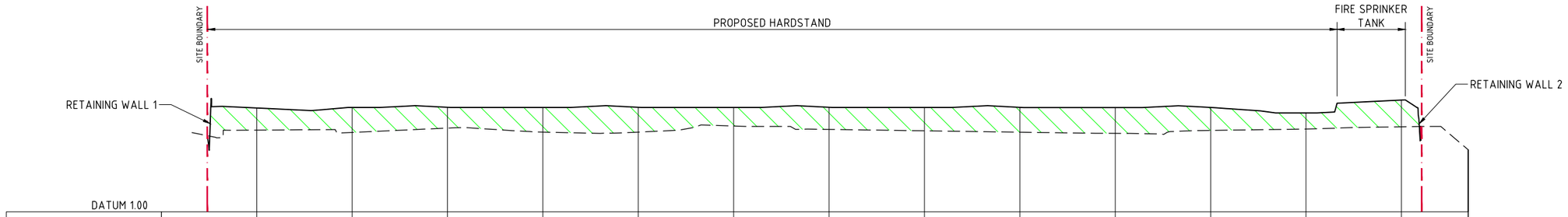
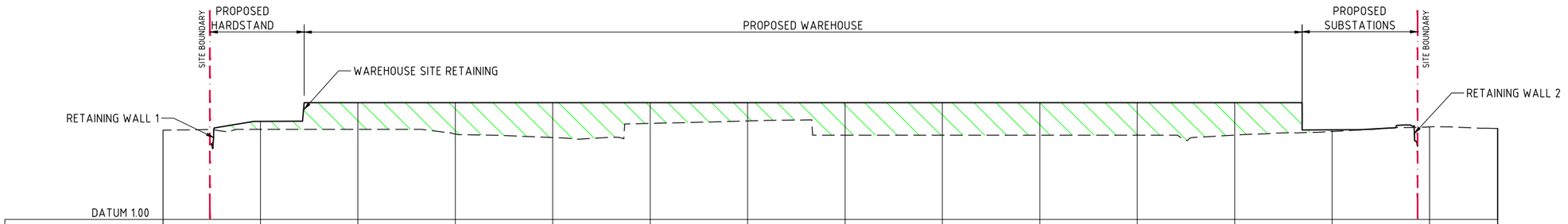
DRAWING TITLE: BULK EARTHWORKS SECTIONS SHEET 1
DRAWING No: C014585.00-DA35
ISSUE: B



CUT/FILL DEPTH	0.465	0.523	0.436	0.517	0.520	0.390	0.464	0.489	0.521	0.542	0.482	0.338	0.561	
BULK EARTHWORKS LEVEL	3.177	3.188	3.191	3.188	3.191	3.188	3.191	3.188	3.191	3.187	3.188	3.075	3.343	
EXISTING SURFACE LEVEL	2.712	2.664	2.756	2.671	2.671	2.798	2.728	2.699	2.670	2.645	2.706	2.737	2.782	2.30
CHAINAGE 0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	137.000

SECTION 4

HORIZONTAL SCALE 1:250
VERTICAL SCALE 1:50



CUT/FILL DEPTH	0.165	0.550	0.647	0.718	0.427	0.377	0.670	0.670	0.670	0.670	0.668	0.035		
BULK EARTHWORKS LEVEL	3.015	3.400	3.400	3.400	3.400	3.400	3.400	3.400	3.400	3.400	3.400	2.841		
EXISTING SURFACE LEVEL	2.850	2.850	2.753	2.682	2.973	3.023	2.730	2.730	2.730	2.730	2.732	2.806	2.901	2.87
CHAINAGE 0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	137.000

SECTION 5

HORIZONTAL SCALE 1:250
VERTICAL SCALE 1:50

LEGEND:

- DENOTES BULK EARTHWORKS PROFILE
- DENOTES EXISTING PROFILE
- DENOTES AREA IN CUT
- DENOTES AREA IN FILL

500mm 0 1 2 3 4 5m
SCALE 1:50 AT A1 SIZE SHEET

2m 0 5 10 15 20 25m
SCALE 1:250 AT A1 SIZE SHEET

FOR DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR SSDA	30.09.22	B
ISSUED FOR PRELIMINARY ONLY	01.07.22	A

ARCHITECT
PACE ARCHITECTS

CLIENT
LOGOS

PROJECT
QANTAS TRAINING CENTER
28-30 BURROWS ROAD, ST PETERS
NSW, 2044

CONSULT AUSTRALIA

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DW	RN	JUNE '22	MW	A1	AS SHOWN	C014585.00-DA36

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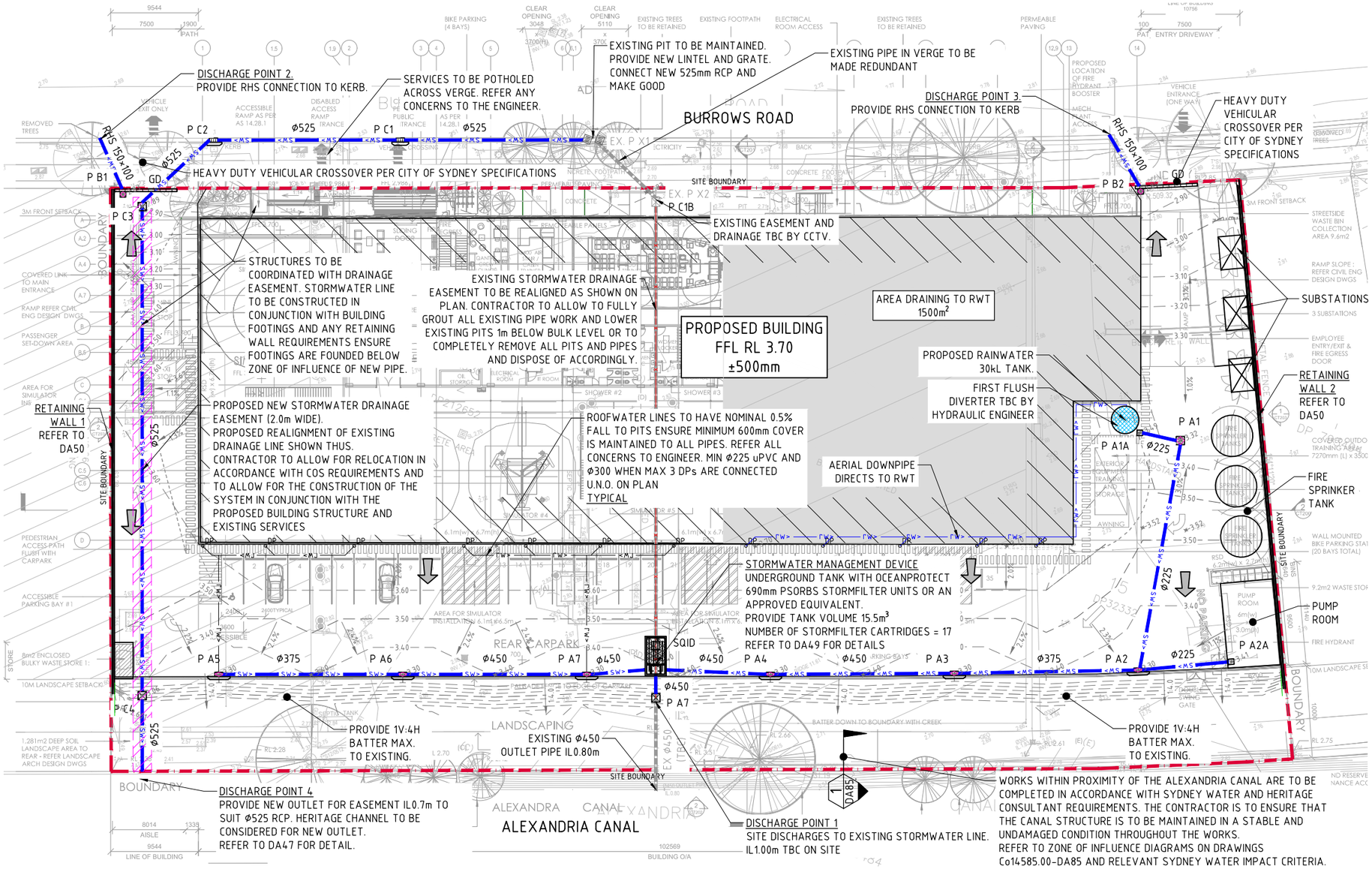
DRAWING TITLE
BULK EARTHWORKS SECTIONS
SHEET 2

DRAWING No C014585.00-DA36

ISSUE B



STORMWATER DRAINAGE PLAN
SCALE 1:250

TREATMENT NOTE:
PITS TO BE FITTED WITH OCEAN PROTECT OCEAN GUARD OG200 PIT INSERTS SHOWN THUS ◇

LEVELS NOTE:
LEVELS SHOWN TO BE +/-500mm FROM THOSE SHOWN. FINAL LEVELS SUBJECT TO FINAL GEOTECHNICAL INVESTIGATIONS, ARCHITECTURAL LAYOUT AND ACHIEVING A CUT TO FILL EARTHWORKS BALANCE OVER THE PROPERTY.

STORMWATER DRAINAGE NOTES:
1. ALL STORMWATER WORKS TO BE COMPLETED IN ACCORDANCE WITH AUSTRALIAN STANDARD AS3500.3 PLUMBING AND DRAINAGE, PART 3: STORMWATER DRAINAGE.
2. THE MINOR (PIPED) SYSTEM HAS BEEN DESIGNED FOR THE 1 IN 20 YEAR ARI STORM EVENT AND THE MAJOR (OVERLAND) SYSTEM HAS BEEN DESIGNED FOR THE 1 IN 100 YEAR ARI STORM EVENT.
3. ALL FINISHED PAVEMENT LEVELS SHALL BE AS INDICATED ON FINISHED LEVELS PLANS C014585.00-DA50.
4. PIT SIZES SHALL BE AS INDICATED IN THE SCHEDULE WHILE PIPE SIZES AND DETAILS ARE PROVIDED ON PLAN.
5. EXISTING STORMWATER PIT LOCATIONS AND INVERT LEVELS TO BE CONFIRMED BY SURVEY PRIOR TO COMMENCING WORKS ON SITE.
6. ALL STORMWATER PIPES Φ375 OR GREATER SHALL BE CLASS 2 (WITH HS2 SUPPORT) REINFORCED CONCRETE WITH RUBBER RING JOINTS UNLESS NOTED OTHERWISE.
7. ALL PIPES UP TO AND INCLUDING Φ300 TO BE uPVC GRADE SN8 UNO.
8. PIPE CLASS NOMINATED ARE FOR IN-SERVICE LOADING CONDITIONS ONLY. CONTRACTOR IS TO MAKE ANY NECESSARY ADJUSTMENTS REQUIRED FOR CONSTRUCTION CONDITIONS.
9. ALL CONCRETE PITS GREATER THAN 1000mm DEEP SHALL BE REINFORCED USING N12-200 EACH WAY CENTERED IN WALL AND BASE. LAP MINIMUM 300mm WHERE REQUIRED. ALL CONCRETE FOR PITS SHALL BE F'c=25 MPa. PRECAST PITS MAY BE USED WITH THE APPROVAL OF THE ENGINEER.
10. IN ADDITION TO ITEM 9 ABOVE, ALL CONCRETE PITS GREATER THAN 3000mm DEEP SHALL HAVE WALLS AND BASE THICKNESS INCREASED TO 200mm.
11. PIPES SHALL BE LAID AS PER PIPE LAYING DETAILS. PARTICULAR CARE SHALL BE TAKEN TO ENSURE THAT THE PIPE IS FULLY AND EVENLY SUPPORTED. RAM AND PACK FILLING AROUND AND UNDER BACK OF PIPES AND PIPE FAUCETS, WITH NARROW EDGED RAMMERS OR OTHER SUITABLE TAMPING DETAILS.
12. CONCRETE PIPES UNDER, OR WITHIN THE ZONE OF INFLUENCE OF PAVED AREAS SHALL BE LAID USING HS2 TYPE SUPPORT, AS A MINIMUM, IN ACCORDANCE WITH AS 3725. AGGREGATE BACKFILL SHALL NOT BE USED FOR PIPE BEDDING AND OR HAUNCH/SIDE SUPPORT.
13. WHERE PIPE LINES ENTER PITS, PROVIDE 2m LENGTH OF STOCKING WRAPPED SLOTTED Φ100 uPVC TO EACH SIDE OF PIPE.
14. ALL SUBSOIL DRAINAGE LINES SHALL BE Φ100 SLOTTED uPVC WITH APPROVED FILTER WRAP LAID IN 300mm WIDE GRANULAR FILTER UNLESS NOTED OTHERWISE. LAY SUBSOIL LINES TO MATCH FALLS OF LAND AND/OR 1 IN 200 MINIMUM. PROVIDE CAPPED CLEANING EYE (RODDING POINT) AT UPSTREAM END OF LINE AND AT 30m MAX. CTS. PROVIDE SUBSOIL LINES TO ALL PAVEMENT/ LANDSCAPED INTERFACES, TO REAR OF RETAINING WALLS (AS NOMINATED BY STRUCTURAL ENGINEER) AND AS SHOWN ON PLAN.
15. WHERE SUBSOIL DRAINAGE PASSES UNDER A PAVEMENT OR A SLAB, UNSLOTTED UPVC ARE TO BE PROVIDED UNLESS NOTED OTHERWISE.
16. ALL PIPE GRADES 1 IN 200 MINIMUM UNO.
17. PROVIDE STEP IRONS IN PITS DEEPER THAN 1000mm.
18. MIN. 600 COVER TO PIPE OBVERT BENEATH ROADS & MIN. 400 COVER BENEATH LANDSCAPED AND PEDESTRIAN AREAS.
19. PIT COVERS IN TRAFFICABLE PAVEMENT SHALL BE CLASS D 'HEAVY DUTY', THOSE LOCATED IN NON-TRAFFICABLE AREAS SHALL BE CLASS B 'MEDIUM DUTY' U.N.O.
20. PROVIDE CLEANING EYES (RODDING POINTS) TO PIPES AT ALL CORNERS AND T-JUNCTIONS WHERE NO PITS ARE PRESENT.
21. DOWN PIPES (DP) TO BE AS PER HYDRAULIC ENGINEERS DETAILS WITH CONNECTOR TO MATCH DP SIZE U.N.O. ON PLAN. PROVIDE CLEANING EYE AT GROUND LEVEL.
22. PIPE LENGTHS NOMINATED ON PLAN OR LONGSECTIONS ARE MEASURED FROM CENTER OF PITS TO THE NEAREST 0.5m AND DO NOT REPRESENT ACTUAL LENGTH. THE CONTRACTOR IS TO ALLOW FOR THIS.
23. WHERE CONNECTION TO EXISTING INGROUND DRAINAGE SYSTEMS, OPEN SWALES, CHANNELS OR ANY OTHER EXISTING SYSTEM, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE LOCATION AND INVERT ON SITE AT THE BEGINNING OF THE CONSTRUCTION PERIOD. REFER ANY VARIANCE FROM DOCUMENTATION OR SURVEYS TO THE ENGINEER FOR CLARIFICATION.

LEGEND:
LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON SURVEY INFORMATION SY075517.000.1.1 PROVIDED BY LANDPARTNERS DATED 18/03/22.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- KIP, KERB INLET PIT
- GD, GRATED DRAIN (300W x 225D UNO)
- SW> – PROPOSED DRAINAGE LINE
- EXISTING DRAINAGE LINE
- EXISTING DRAINAGE LINE TO BE REMOVED
- DP – ROOFWATER DOWNPIPE (INDICATIVE)
- RW> – ROOFWATER LINE
- SS> – SUBSOIL LINE
- OVERLAND FLOW DIRECTION
- 50.00 – FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- 50.10 – FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS

2m 0 5 10 15 20 25m
SCALE 1:250 AT A1 SIZE SHEET

FOR DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR SSDA	30.09.22	C
REVISED AS CLOUDED	26.07.22	B
ISSUED FOR PRELIMINARY ONLY	01.07.22	A

ARCHITECT: PACE ARCHITECTS
CLIENT: LOGOS
PROJECT: QANTAS TRAINING CENTER
28-30 BURROWS ROAD, ST PETERS
NSW, 2044

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DW	RN	JUNE '22	MW	A1	AS SHOWN	C014585.00-DA40

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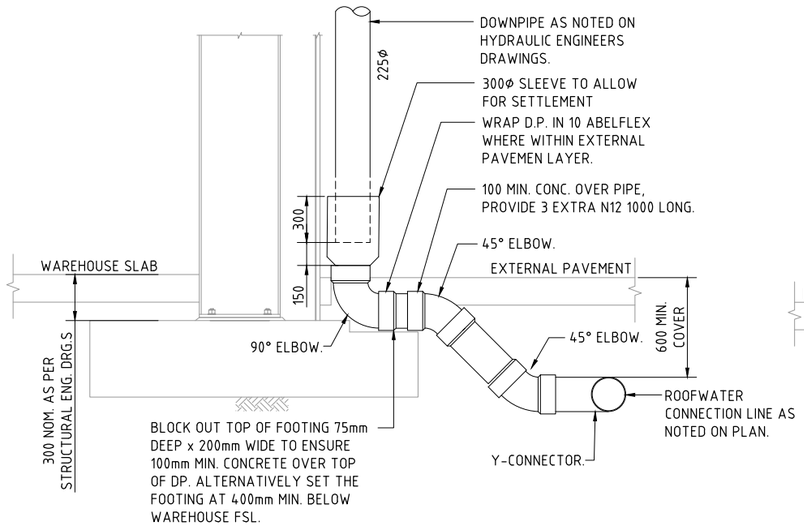
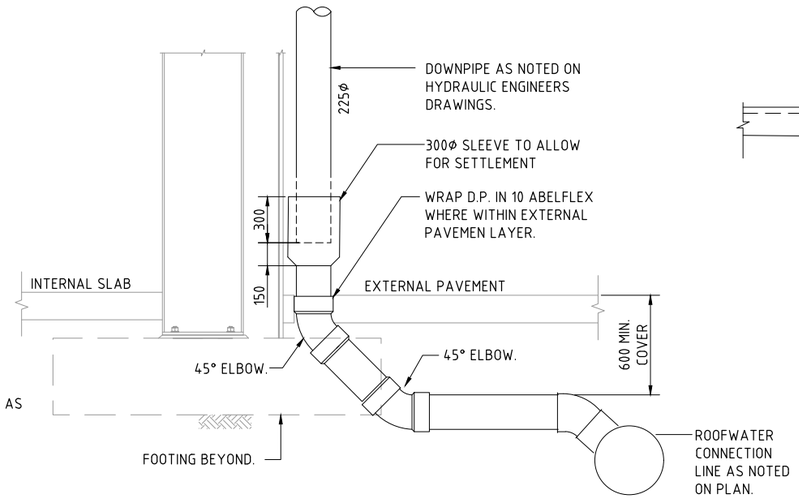
PRECISION | COMMUNICATION | ACCOUNTABILITY

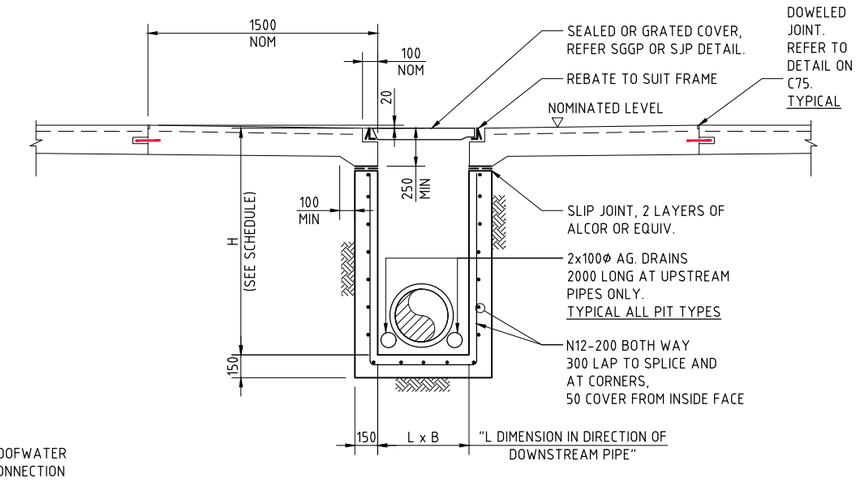
DRAWING TITLE: STORMWATER DRAINAGE PLAN
DRAWING No: C014585.00-DA40
ISSUE: C



DOWNPIPE TURN-UP DETAIL A
(AT FOOTING LOCATION)
SCALE 1:20



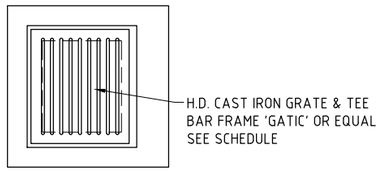
DOWNPIPE TURN-UP DETAIL B
(CLEAR OF FOOTING)
SCALE 1:20



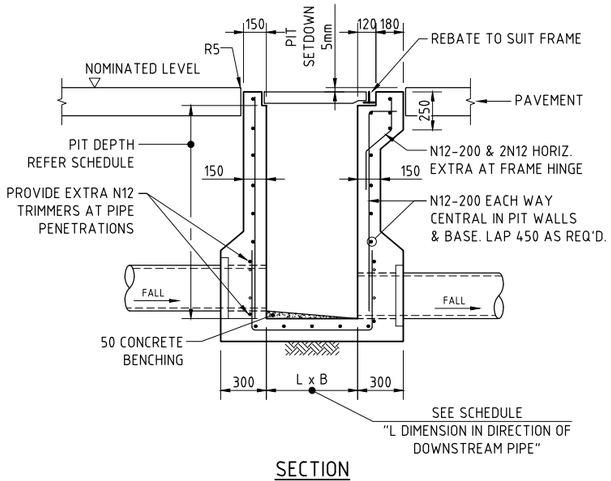
SECTION
SCALE 1:20

SJP/CIS & SGGP/CIS (CAST IN SLAB) PIT DETAIL
GRATE/COVER SUPPORT
CAST-INTO PAVEMENT SLAB IN GROUND IMPROVEMENT ZONE

(ADOPT IN CONCRETE PAVEMENTS FOR SGGP's & SJP's THAT ARE LOCATED IN THE GROUND IMPROVEMENT ZONES)

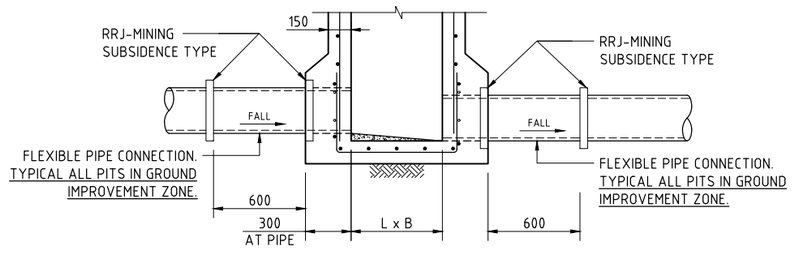


PLAN
SCALE 1:20



SECTION
SCALE 1:20

SINGLE GRATED GULLY PIT - SGGP



SECTION
SCALE 1:20

ROCKER PIPE TO PIT CONNECTION DETAIL

200mm 0 500 1000 1500 2000mm
SCALE 1:20 AT A1 SIZE SHEET

FOR DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR SSDA	30.09.22	A

ARCHITECT: PACE ARCHITECTS

CLIENT: LOGOS

PROJECT: QANTAS TRAINING CENTER
28-30 BURROWS ROAD, ST PETERS
NSW, 2044

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DW	RN	JUNE '22	MW	A1	AS SHOWN	C014585.00-DA44

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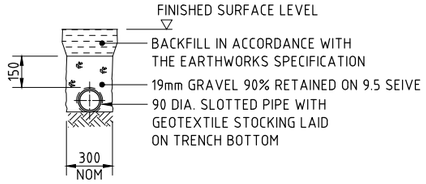
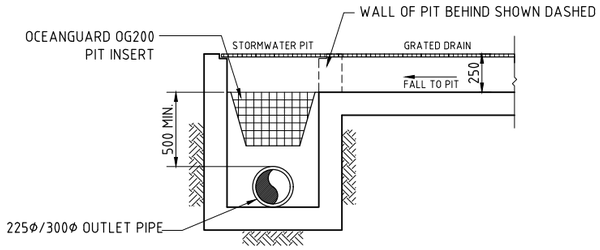
DRAWING TITLE: STORMWATER DRAINAGE DETAILS DIFFERENTIAL MOVEMENT

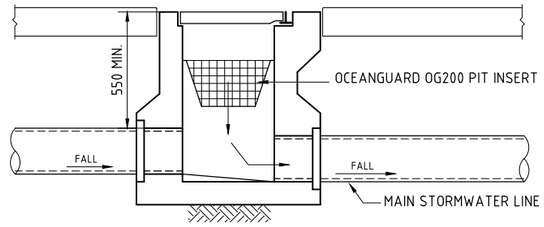
DRAWING No: C014585.00-DA44
ISSUE: A



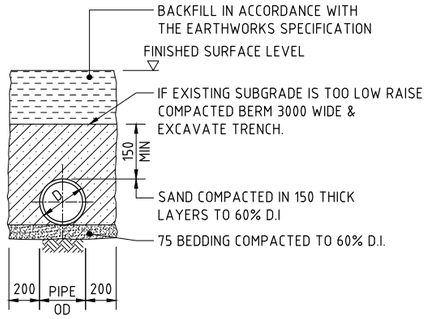
SUPPORT TO AGRICULTURAL DRAIN
SCALE 1:20



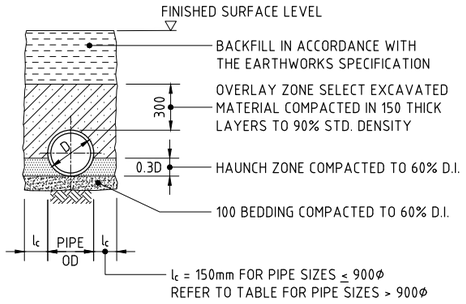
GRATED DRAIN/STORMWATER PIT WITH OCEANGUARD CONFIGURATION
SCALE 1:20



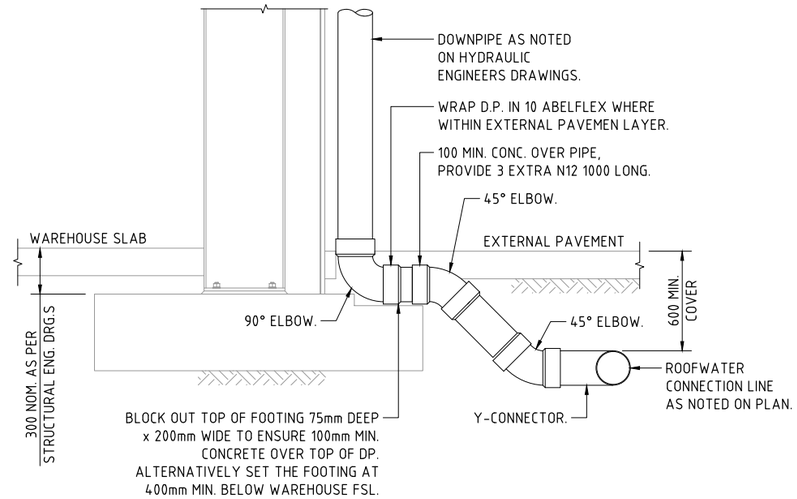
STORMWATER PIT WITH OCEANGUARD CONFIGURATION
SCALE 1:20



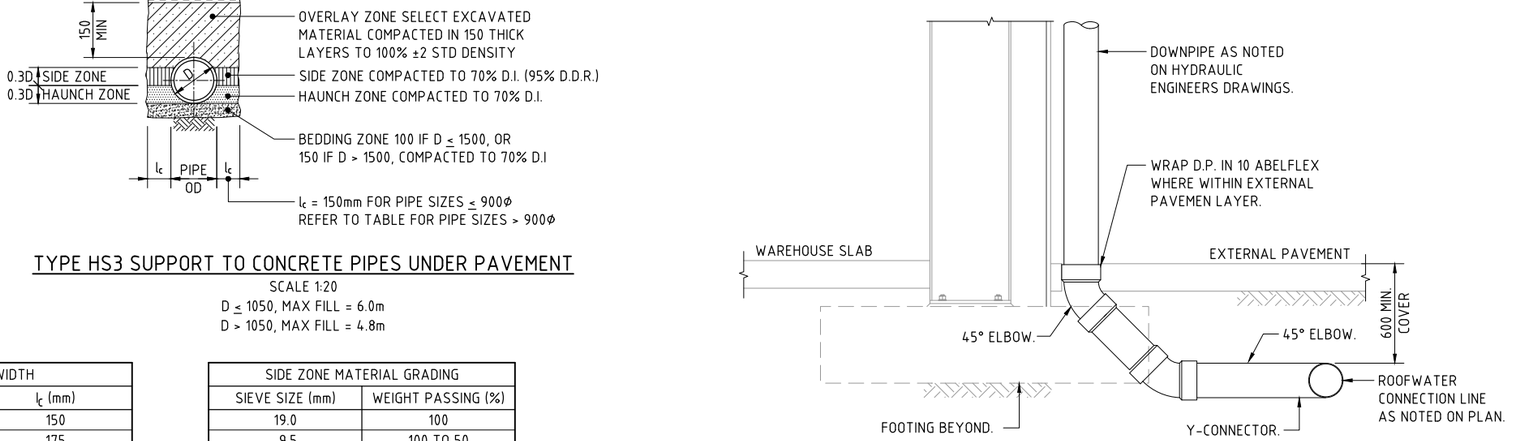
SUPPORT TO uPVC PIPES
SCALE 1:20



TYPE H1 SUPPORT TO CONCRETE PIPES AT LANDSCAPED AREAS
SCALE 1:20



DOWNPIPE TURN-UP DETAIL A
(AT FOOTING LOCATION)
SCALE 1:20



TYPE HS2 SUPPORT TO CONCRETE PIPES UNDER PAVEMENT
SCALE 1:20
D ≤ 1350, MAX FILL = 4.0m
D > 1350, MAX FILL = 3.0m

TYPE HS3 SUPPORT TO CONCRETE PIPES UNDER PAVEMENT
SCALE 1:20
D ≤ 1050, MAX FILL = 6.0m
D > 1050, MAX FILL = 4.8m

BEDDING & HAUNCH MATERIAL GRADING	
SIEVE SIZE (mm)	WEIGHT PASSING (%)
19.0	100
2.36	100 TO 50
0.60	90 TO 20
0.30	60 TO 10
0.15	25 TO 0
0.075	10 TO 0

SIDE ZONE WIDTH	
PIPE SIZE (mm)	l_c (mm)
≤ 900Ø	150
1050Ø	175
1200Ø	200
1350Ø	225
1500Ø	250
1650Ø	275
1800Ø	300
ENGINEER TO SPECIFY TRENCH WIDTHS FOR PIPE SIZES GREATER THAN 1800Ø	

SIDE ZONE MATERIAL GRADING	
SIEVE SIZE (mm)	WEIGHT PASSING (%)
19.0	100
9.5	100 TO 50
2.6	100 TO 30
0.60	50 TO 15
0.075	25 TO 0
SELECT FILL MATERIAL IN ACCORDANCE WITH TABLE 1 AS 3725	

DOWNPIPE TURN-UP DETAIL B
(CLEAR OF FOOTING)
SCALE 1:20

200mm 0 500 1000 1500 2000mm
SCALE 1:20 AT A1 SIZE SHEET

FOR DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR SSDA	30.09.22	B
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ARCHITECT: PACE ARCHITECTS

CLIENT: LOGOS

PROJECT: QANTAS TRAINING CENTER
28-30 BURROWS ROAD, ST PETERS
NSW, 2044

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DW	RN	JUNE '22	MW	A1	AS SHOWN	C014585.00-DA45

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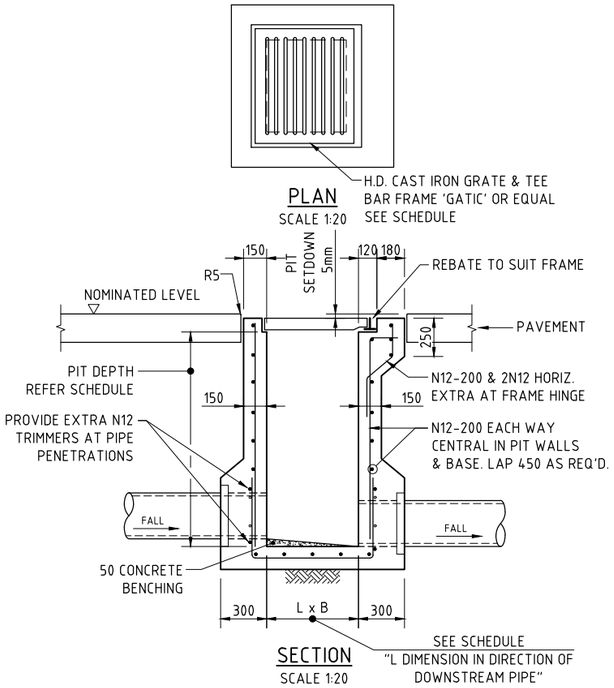
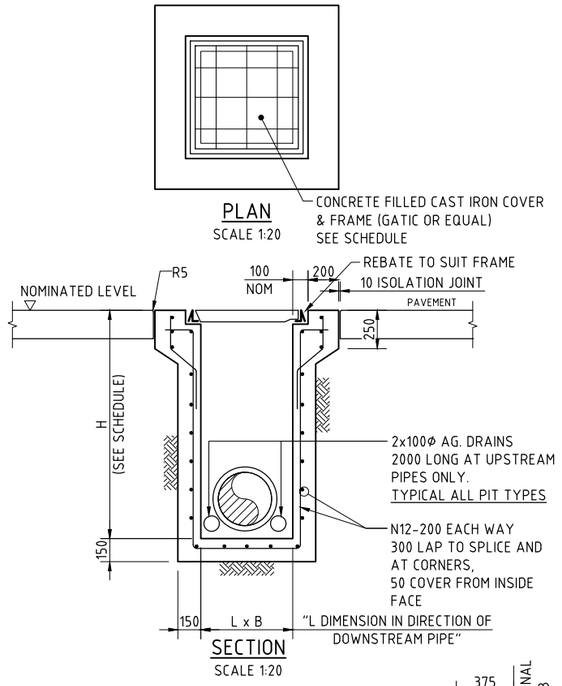
DRAWING TITLE: STORMWATER DRAINAGE DETAILS SHEET 1

DRAWING No: C014585.00-DA45

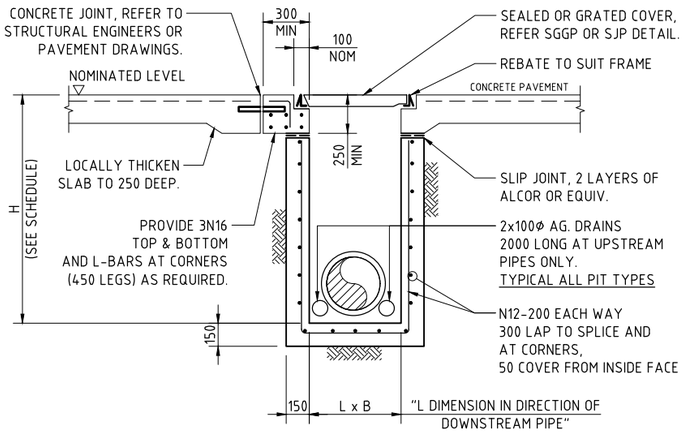
ISSUE: B



SINGLE GRATED GULLY PIT - SGGP

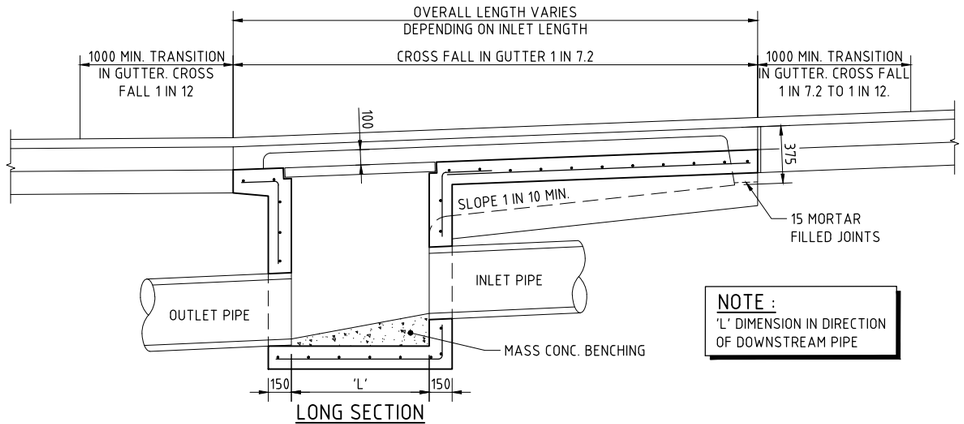


SEALED JUNCTION PIT - SJP



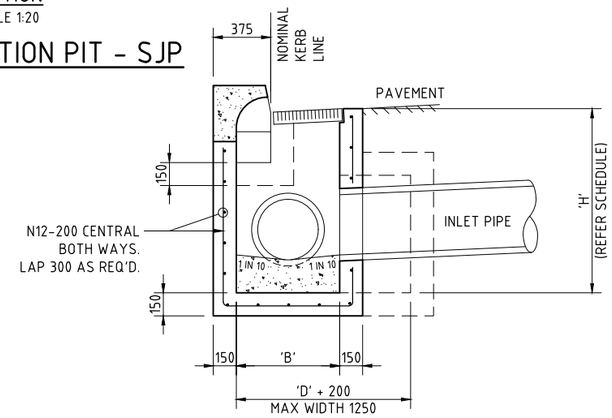
SJP/CIS & SGGP/CIS (CAST IN SLAB) PIT DETAIL GRATE/COVER SUPPORT CAST-INTO PAVEMENT SLAB

(ADOPT IN CONCRETE PAVEMENT FOR SGGP's & SJP's, WHERE PITS ARE LOCATED IN THE CORNER OF SLAB PANELS OR ADJACENT TO SLAB PANEL JOINTS)



NOTE :
'L' DIMENSION IN DIRECTION OF DOWNSTREAM PIPE

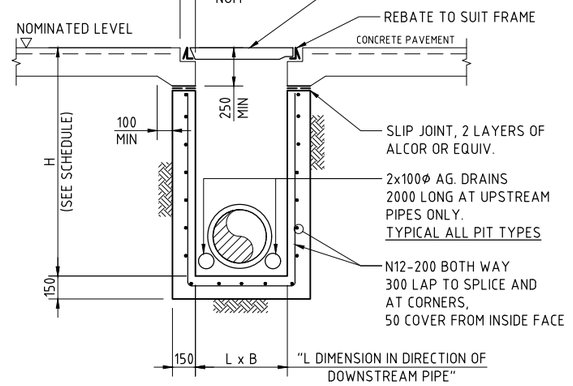
KERB INLET PIT - KIP



CONCRETE QUALITY					
ELEMENT	SLUMP	AGGREGATE (MAX. SIZE)	CEMENT TYPE	ADMIXTURE	F'c (MPa)
PIT	80	20	GP	NIL	32

NOTE :

1. WHERE GULLY PIT IS LOCATED ON KERB RETURNS OR BULB OF CUL-DE-SACS PROVIDE CURVED PRECAST CONCRETE LINTELS.
2. SAG PITS SHALL HAVE LINTEL PLACED CENTRALLY ABOUT THE GRATE.
3. ALL REINFORCING TO HAVE 30 MIN. CLAER CONCRETE COVER.
4. FOR PITS DEEPER THAN 1000mm CLIMB RAILS SHALL BE PROVIDED.



SJP/CIS & SGGP/CIS (CAST IN SLAB) PIT DETAIL GRATE/COVER SUPPORT CAST-INTO PAVEMENT SLAB

(ADOPT IN CONCRETE PAVEMENTS FOR SGGP's & SJP's, WHERE JOINTS ARE NOT LOCATED WITHIN PROXIMITY OF THE GRATE)

200mm 0 500 1000 1500 2000mm
SCALE 1:20 AT A1 SIZE SHEET

FOR DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
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REVISED AS CLOUDED	25.07.22	B
ISSUED FOR PRELIMINARY ONLY	01.07.22	A

ARCHITECT: PACE ARCHITECTS
CLIENT: LOGOS
PROJECT: QANTAS TRAINING CENTER
28-30 BURROWS ROAD, ST PETERS
NSW, 2044

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DW	RN	JUNE '22	MW	A1	AS SHOWN	C014585.00-DA46

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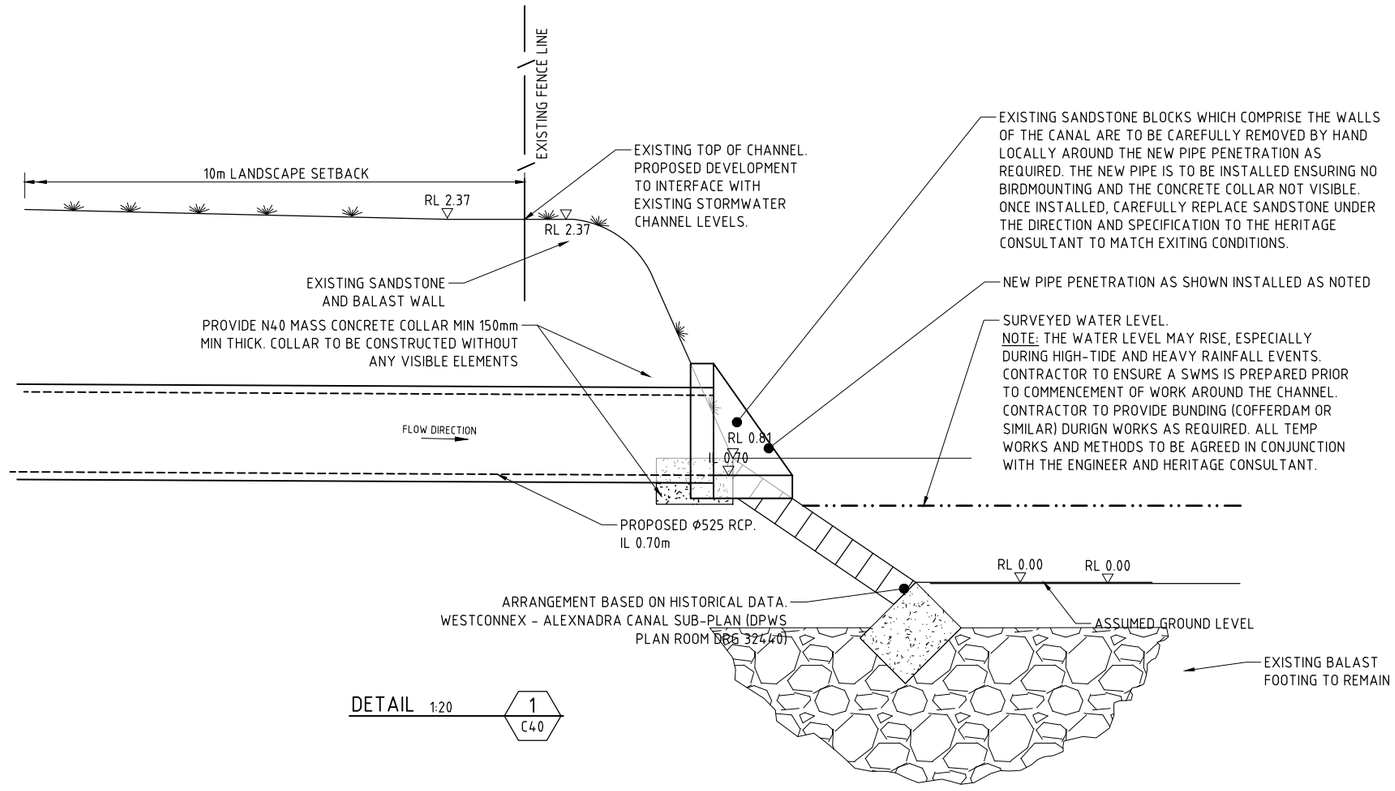
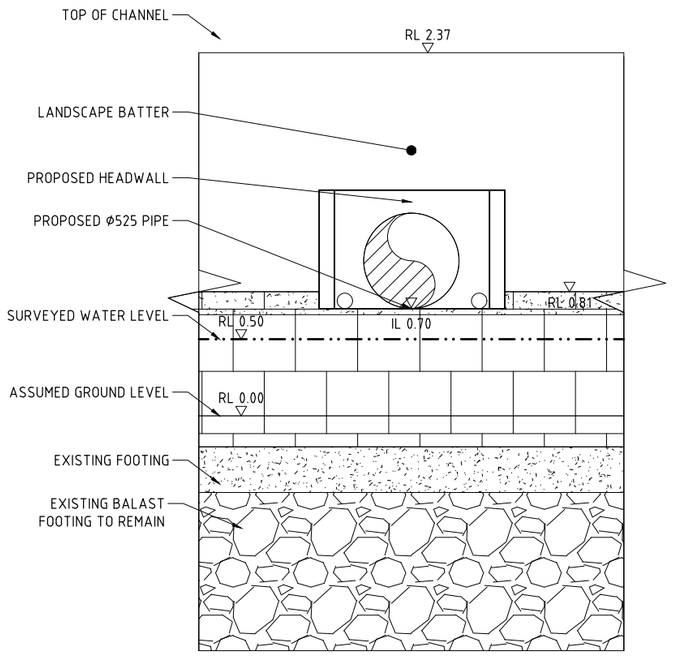
DRAWING TITLE: STORMWATER DRAINAGE DETAILS SHEET 2
DRAWING No: C014585.00-DA46
ISSUE: C



DETAIL 1:20 — 1 / C40



ELEVATION 1:20 — 1 / C40

PROPOSED STORMWATER DISCHARGE TO BE
CONSTRUCTED IN A MANNER TO MATCH EXISTING
DISCHARGES ALONG THE ALEXANDRA CHANNEL

200mm 0 500 1000 1500 2000mm

SCALE 1:20 AT A1 SIZE SHEET

FOR DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR SSDA	25.10.22	C
ISSUED FOR SSDA	30.09.22	B
ISSUED FOR PRELIMINARY ONLY	26.07.22	A

ARCHITECT: PACE ARCHITECTS

CLIENT: LOGOS

PROJECT: QANTAS TRAINING CENTER
28-30 BURROWS ROAD, ST PETERS
NSW, 2044

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DW	RN	JUNE '22	MW	A1	AS SHOWN	C014585.00-DA47

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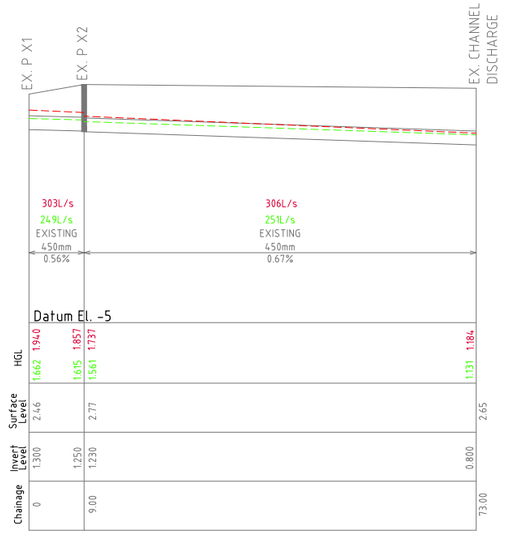
DRAWING TITLE: STORMWATER DRAINAGE DETAILS SHEET 3

DRAWING No: C014585.00-DA47

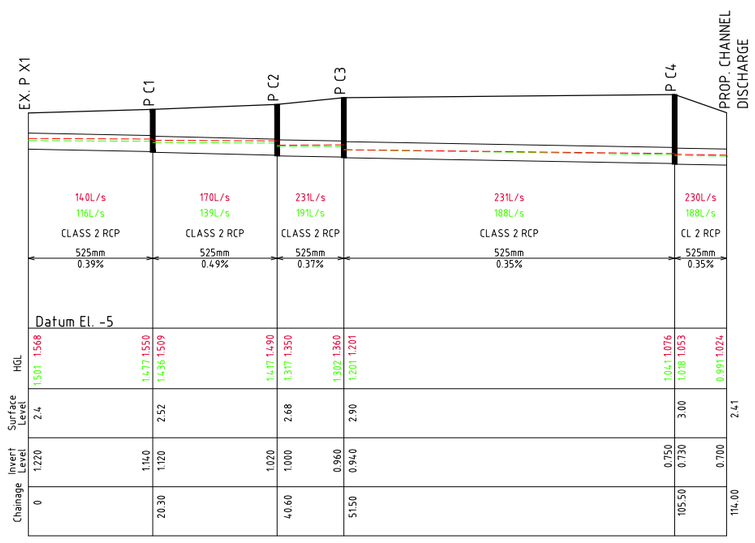
ISSUE: C



PIT EX. P X1 TO EX. CHANNEL DISCHARGE

PRE-DEVELOPED SCENARIO

SCALE 1:500 HORIZONTAL
SCALE 1:100 VERTICAL



PIT EX. P X1 TO PROP. CHANNEL DISCHARGE

POST-DEVELOPED SCENARIO

SCALE 1:500 HORIZONTAL
SCALE 1:100 VERTICAL

NOTE:

- H.G.L & FLOWRATE SHOWN FOR Q20 A.R.I STORM EVENT
- H.G.L & FLOWRATE SHOWN FOR Q100 A.R.I STORM EVENT

1m 0 1 2 3 4 5 6 7 8 9 10m
SCALE 1:100 AT A1 SIZE SHEET

5m 0 10 20 30 40 50m
SCALE 1:500 AT A1 SIZE SHEET

FOR DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR SSDA	30.09.22	B
ISSUED FOR PRELIMINARY ONLY	26.07.22	A

ARCHITECT
PACE ARCHITECTS

CLIENT
LOGOS

PROJECT
QANTAS TRAINING CENTER
28-30 BURROWS ROAD, ST PETERS
NSW, 2044

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DW	RN	JUNE '22	MW	A1	AS SHOWN	C014585.00-DA48

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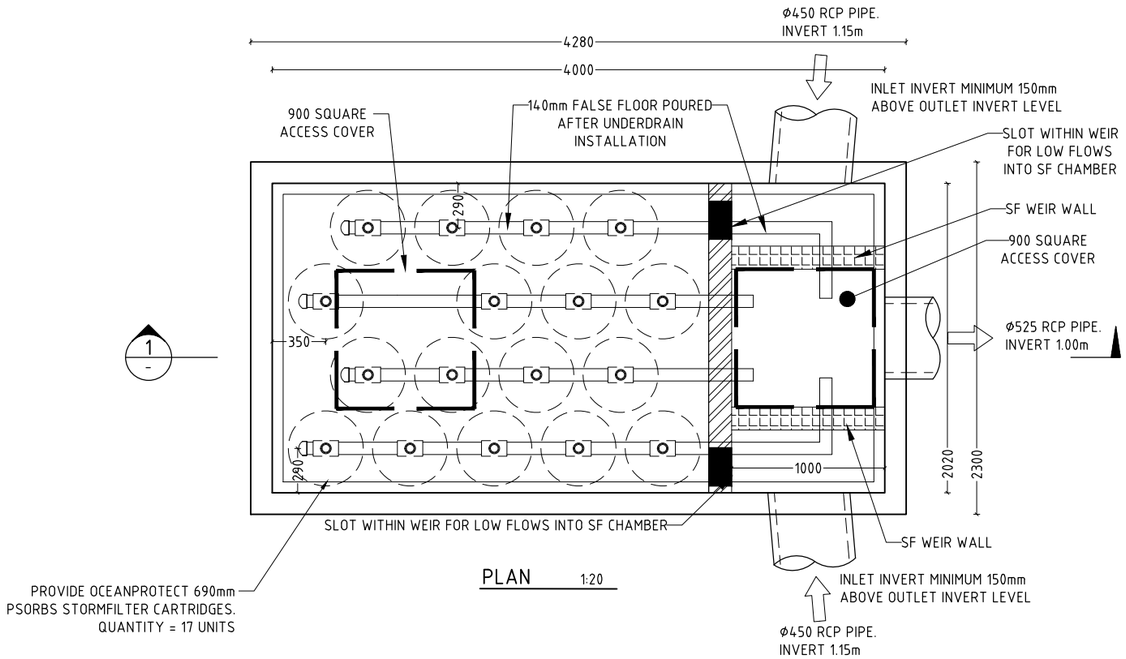
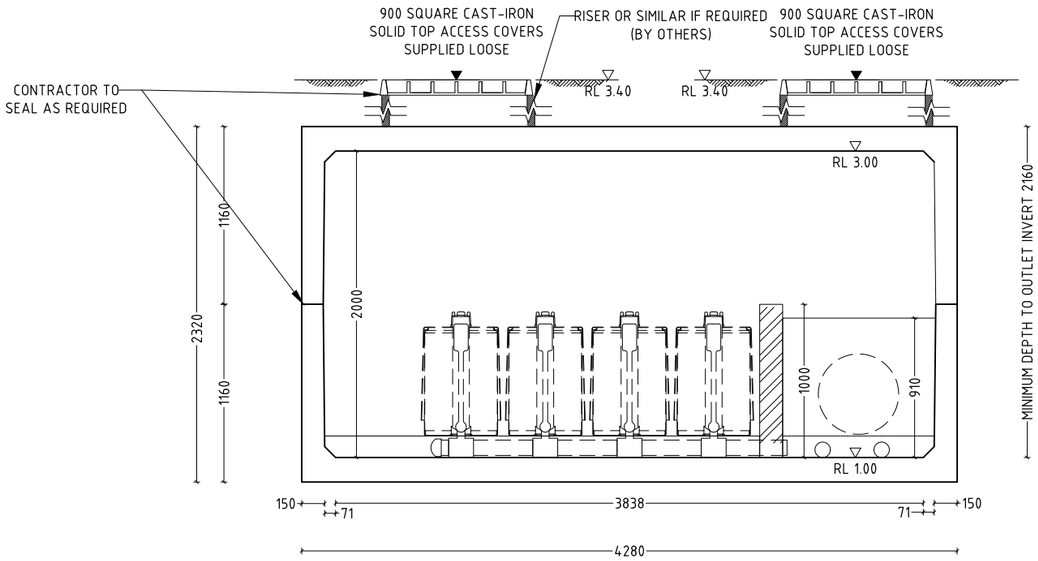
DRAWING TITLE
STORMWATER LONGSECTIONS
INTER-ALLOTMENT DRAINAGE

DRAWING No C014585.00-DA48
ISSUE B



PLAN 1:20



SECTION 1:20 1 -

200mm 0 500 1000 1500 2000mm

SCALE 1:20 AT A1 SIZE SHEET

FOR DEVELOPMENT APPLICATION

ISSUED FOR SSDA	30.09.22	A
AMENDMENTS	DATE	ISSUE

ARCHITECT PACE ARCHITECTS

CLIENT LOGOS

PROJECT
QANTAS TRAINING CENTER
28-30 BURROWS ROAD, ST PETERS
NSW, 2044

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DW	RN	JUNE '22	MW	A1	AS SHOWN	C014585.00-DA49

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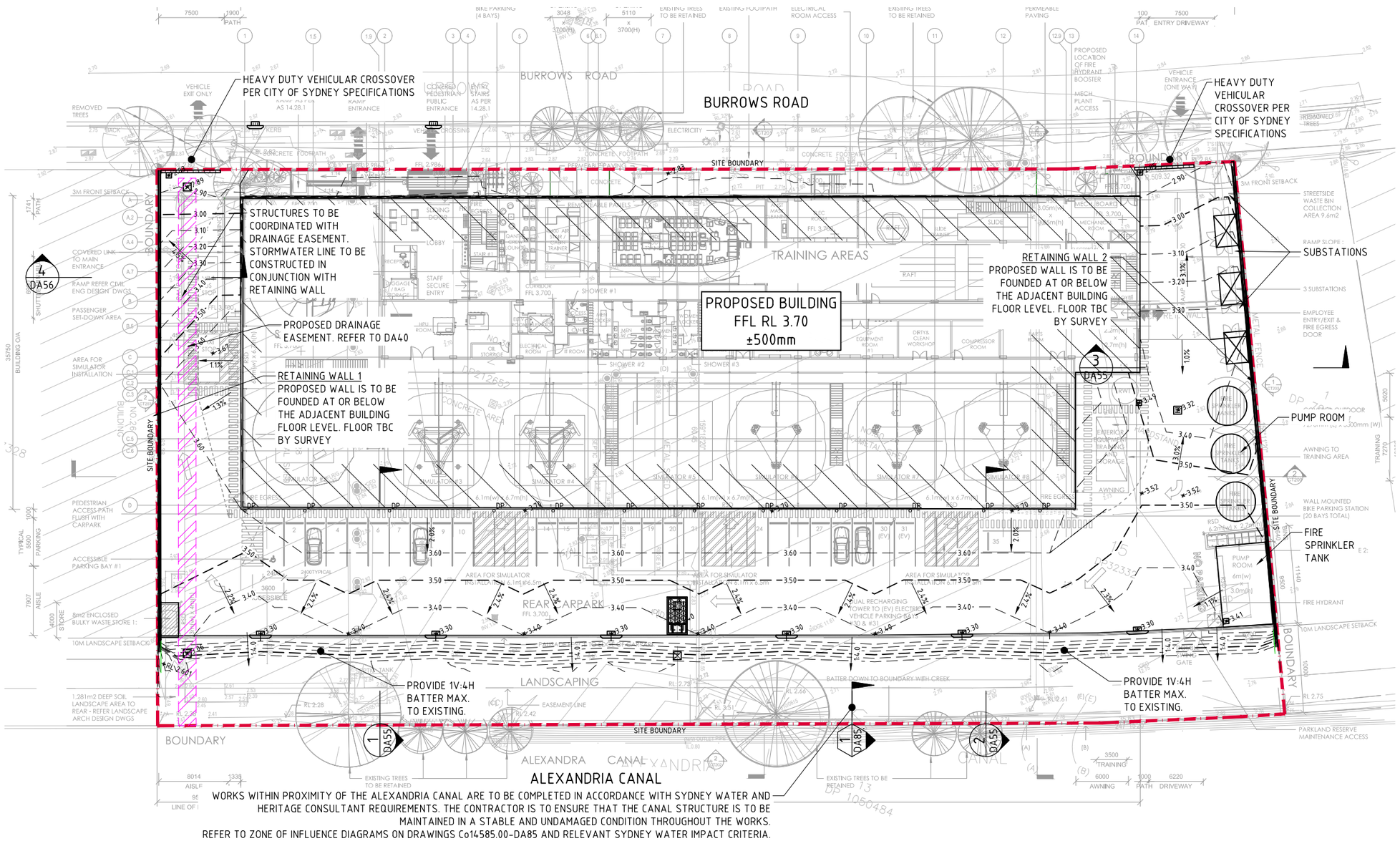
DRAWING TITLE
STORMWATER QUALITY
IMPROVEMENT DEVICE

DRAWING No C014585.00-DA49 ISSUE A



WORKS WITHIN PROXIMITY OF THE ALEXANDRIA CANAL ARE TO BE COMPLETED IN ACCORDANCE WITH SYDNEY WATER AND HERITAGE CONSULTANT REQUIREMENTS. THE CONTRACTOR IS TO ENSURE THAT THE CANAL STRUCTURE IS TO BE MAINTAINED IN A STABLE AND UNDAMAGED CONDITION THROUGHOUT THE WORKS. REFER TO ZONE OF INFLUENCE DIAGRAMS ON DRAWINGS C014585.00-DA85 AND RELEVANT SYDNEY WATER IMPACT CRITERIA.

FINISHED LEVELS PLAN
SCALE 1:250

FINISHED LEVELS PLAN NOTES:

1. LEVELS DATUM IS AUSTRALIAN HEIGHT DATUM (A.H.D.).
2. GRADING REQUIREMENTS TO BE COMPLETED IN ACCORDANCE WITH AUSTRALIAN STANDARD AS2890.1, AS2890.2 AND AS2890.6.
3. ALL CONTOUR LINES & SPOT LEVELS INDICATE FINISHED PAVEMENT LEVELS U.N.O. ON PLAN.
4. CONTOUR INTERVALS
   - THE MINOR CONTOUR INTERVAL IS 0.1m.
   - THE MAJOR CONTOUR INTERVAL IS 0.5m.
5. HARDSTAND GRADING
   - MINIMUM PAVEMENT GRADE IS TO BE 1:100 (1%).
   - GRADING OF ON-GRADE DOCKS TO BE 1:100 (1%) FALL AWAY FROM THE DOCK FACE FOR A LENGTH OF 15m U.N.O.
   - GRADING OF TRUCK CIRCULATION ZONES TO BE MINIMUM AS NOTED ABOVE, 3-4% NOMINAL AND MAX. 5%.
6. CAR PARKING AREA GRADES
   - MINIMUM PAVEMENT GRADE IS TO BE 1:100 (1%), DESIRABLE MINIMUM GRADE 1:50 (2%).
   - MAXIMUM PAVEMENT GRADE IS TO BE 1:20 (5%) N CARPARKING AREAS AND 1:25 (4%) ELSEWHERE.
   - DISABLED ACCESS PARKING ZONES AND SHARED SPACE TO BE MAXIMUM OF 1:33 (3%) IN ASPHALT PAVEMENT AND MAXIMUM OF 1:40 (2.5%) IN CONCRETE PAVEMENT.
   - CARPARK RAMP GRADES TO BE MAX 1:5 WITH 2.5m SMOOTH TRANSITION AT TOP AND BOTTOM U.N.O.
7. TRUCK RAMP GRADES
   - MAXIMUM B-DOUBLE OR 19.0m AV RAMP GRADES ARE TO BE 1:8.3 (12%) U.N.O. ON PLAN
   - PROVIDE MINIMUM 4.0m LONG TRANSITION WHERE CHANGES OF GRADE EXCEED 1:20 (5%) AT A CREST U.N.O.
   - PROVIDE MINIMUM 3.0m LONG TRANSITION WHERE CHANGE OF GRADE EXCEED 1:20 (5%) AT A SAG U.N.O.
   - TRANSITIONS ARE TO PROVIDE A SMOOTH CONTINOUS CIRCULAR AND TANGENTIAL CHANGE IN GRADE TO ENSURE NO SHARP OR ACUTE CHANGES IN GRADE ARE PRESENT.
8. WHERE FIRE BRIGADE ACCESS IS REQUIRED, MAXIMUM RAMP GRADIENTS ARE TO BE 1:6 (16.6%), DESIRABLE RAMP GRADIENTS ARE TO BE 1:8 (12.5%) WITH 7m TRANSITION TOP AND BOTTOM U.N.O. ON PLAN.
9. PERMANENT BATTER SLOPES ARE TO HAVE A MAXIMUM GRADE OF 1V:3H U.N.O. BASED ON GEOTECHNICAL ASSESSMENT. PROVIDE MINIMUM 0.5m BERM BETWEEN THE BACK OF KERB OR PAVEMENT EDGES AND THE TOP OR TOE OF A BATTER.
10. ALL BATTER SLOPE WITH GRADES AT OR EXCEEDING 1V:6H ARE TO BE TURFED IMMEDIATELY OR APPROPRIATE EROSION CONTROL IS TO BE PROVIDED TO THE SATISFACTION OF THE ENGINEER.
11. ALL FOOTPATHS ARE TO FALL AWAY FROM THE BUILDING AT 2.5% NOMINAL GRADE.
12. ALL PAVEMENTS ARE TO BE SET AT 30mm BELOW THE FINISHED FLOOR LEVEL OF THE WAREHOUSE AND OFFICE AREAS. PROVIDE LOCAL FEATHERING AT DOORWAYS OR ROLLER SHUTTERS TO PROVIDE FLUSH FINISH AS REQUIRED.
13. WHERE NEW AND EXISTING INTERFACING IS REQUIRED, MATCH EXISTING LEVELS AND PROVIDE SMOOTH INTERFACE BETWEEN NEW AND EXISTING GRADIENTS. REFER ANY CONCERNS TO THE ENGINEER.

LEGEND:

LEVELS DATUM IS AHD.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- KIP, KERB INLET PIT
- GD, GRATED DRAIN (300W x 225D UNO)
- 50.00 - FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- 50.10 - FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS

NOTE:

FOOTPATH AND KERBS TO BE REPLACED ALONG THE SITE FRONTAGE, AND ALL REDUNDANT DRIVEWAYS AND CROSSINGS TO BE REMOVED TO COUNCIL REQUIREMENTS.

LEVELS NOTE:

LEVELS SHOWN TO BE +/-500mm FROM THOSE SHOWN. FINAL LEVELS SUBJECT TO FINAL GEOTECHNICAL INVESTIGATIONS, ARCHITECTURAL LAYOUT AND ACHIEVING A CUT TO FILL EARTHWORKS BALANCE OVER THE PROPERTY.

2m 0 5 10 15 20 25m
SCALE 1:250 AT A1 SIZE SHEET

FOR DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR SSDA	30.09.22	C
REVISED AS CLOUDED	26.07.22	B
ISSUED FOR PRELIMINARY ONLY	01.07.22	A

ARCHITECT: PACE ARCHITECTS

CLIENT: LOGOS

PROJECT: QANTAS TRAINING CENTER
28-30 BURROWS ROAD, ST PETERS
NSW, 2044

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DW	RN	JUNE '22	MW	A1	AS SHOWN	C014585.00-DA50

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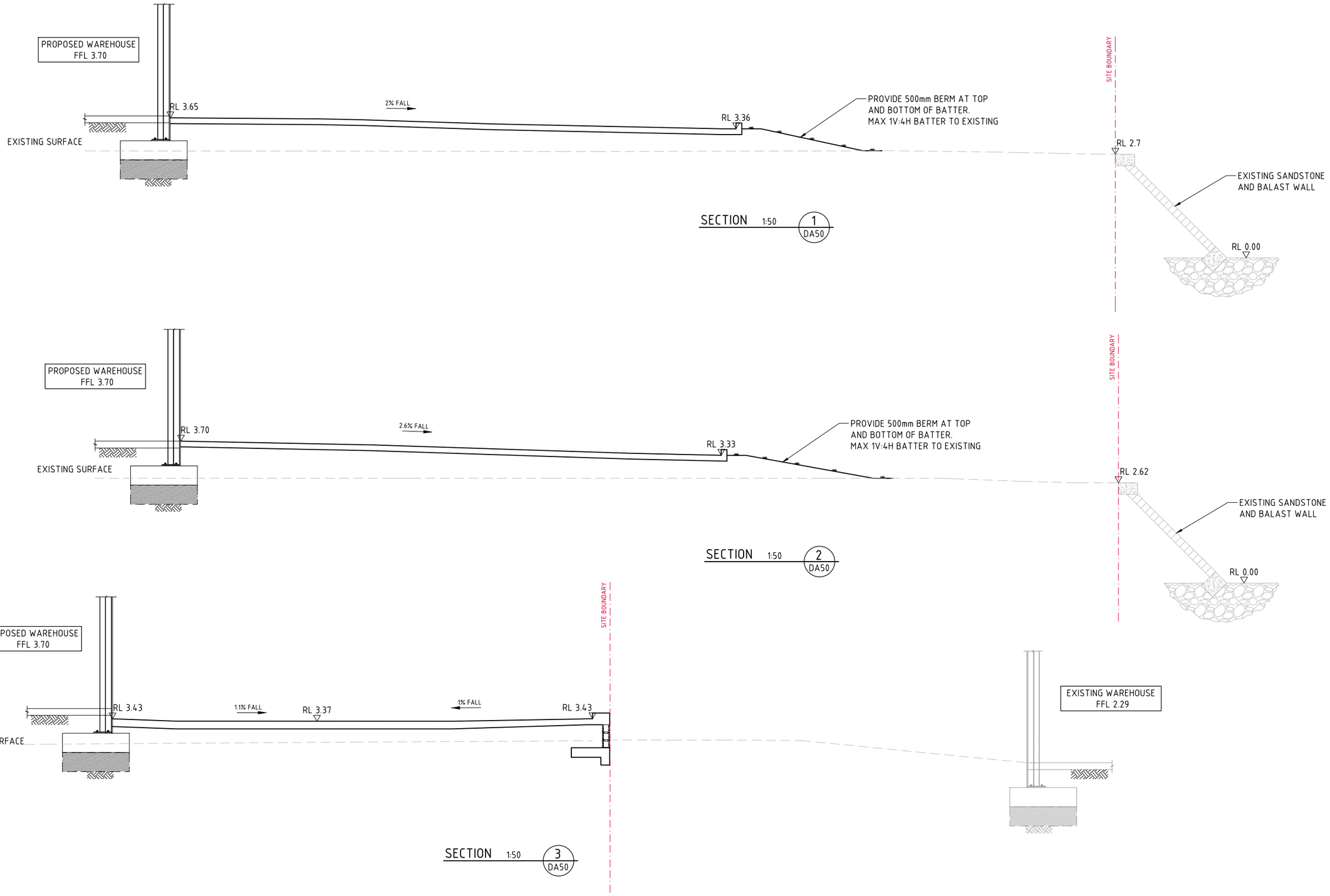
DRAWING TITLE: FINISHED LEVELS PLAN

DRAWING No: C014585.00-DA50

ISSUE: C



FOR DEVELOPMENT APPLICATION

ISSUED FOR SSDA	30.09.22	A
AMENDMENTS	DATE	ISSUE

ARCHITECT
PACE ARCHITECTS

CLIENT
LOGOS

PROJECT
QANTAS TRAINING CENTER
28-30 BURROWS ROAD, ST PETERS
NSW, 2044

CONSULT AUSTRALIA

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DW	RN	JUNE '22	MW	A1	AS SHOWN	C014585.00-DA55

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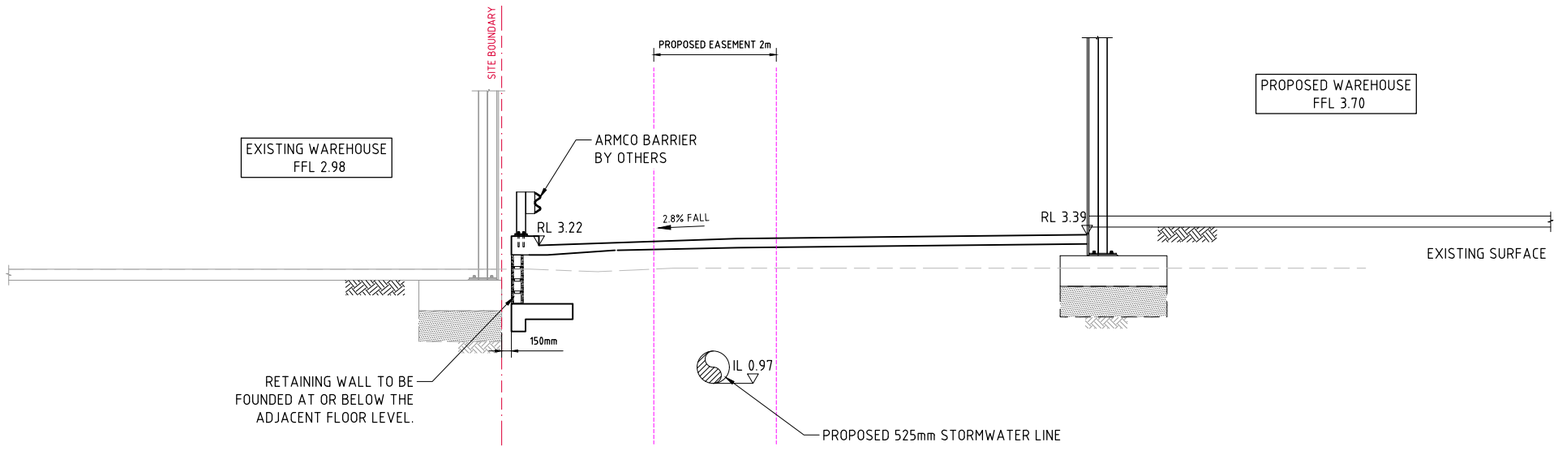
DRAWING TITLE
TYPICAL SECTIONS - SHEET 1

DRAWING No C014585.00-DA55

ISSUE A



SECTION 1:50 (4 / DA50)

500mm 0 1 2 3 4 5m

SCALE 1:50 AT A1 SIZE SHEET

FOR DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR SSDA	30.09.22	A

ARCHITECT: PACE ARCHITECTS

CLIENT: LOGOS

PROJECT: QANTAS TRAINING CENTER
28-30 BURROWS ROAD, ST PETERS
NSW, 2044

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DW	RN	JUNE '22	MW	A1	AS SHOWN	C014585.00-DA56

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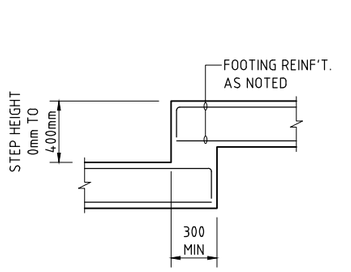
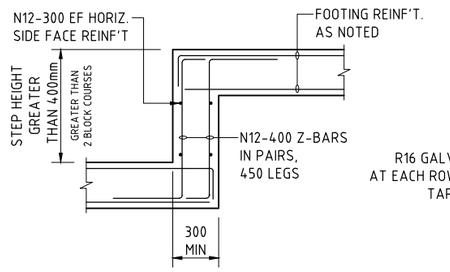
DRAWING TITLE: TYPICAL SECTIONS - SHEET 2

DRAWING No: C014585.00-DA56

ISSUE: A

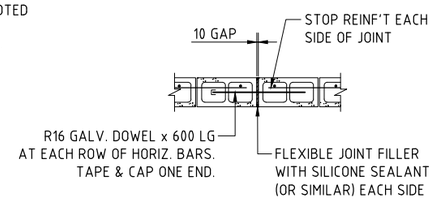


STEP HEIGHT
0mm TO 400mm

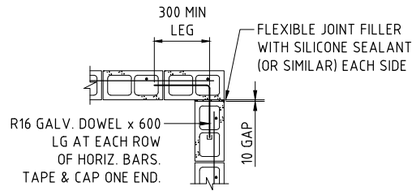


STEP HEIGHT
GREATER THAN 400mm

TYPICAL WALL FOOTING STEPS
1:20 SCALE



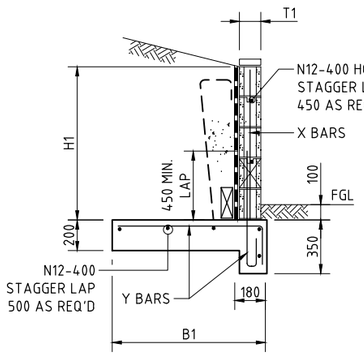
VERTICAL JOINT DETAIL
PROVIDE VERTICAL JOINTS IN
BLOCKWORK 8.0M MAX. CENTRES



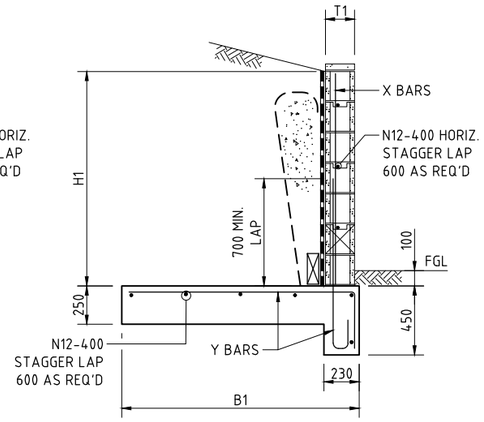
CORNER DETAIL

RETAINING WALL BLOCKWORK JOINTING DETAILS
1:20 SCALE

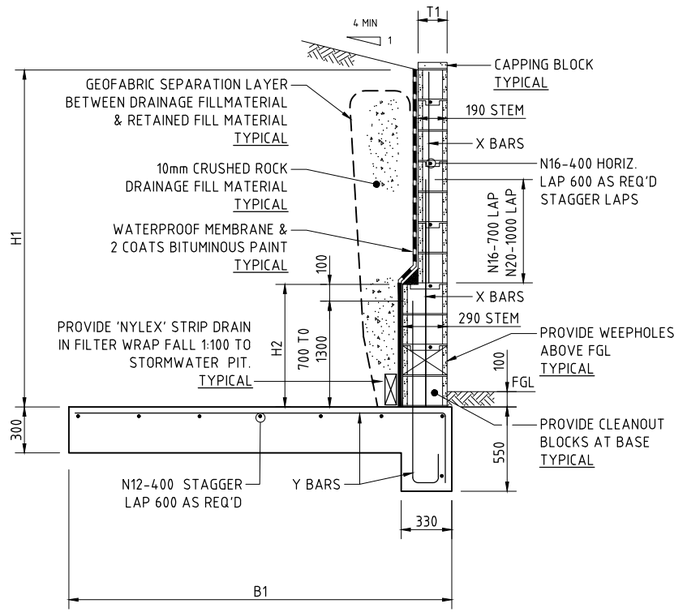
CONCRETE QUALITY					
ELEMENT	SLUMP	AGGREGATE (MAX. SIZE)	CEMENT TYPE	ADMIXTURE	F'c (MPa)
CORE FILL	230	10	GP	NIL	20



WALL WITH SINGLE STEM OF 140 BLOCK
1:20 SCALE



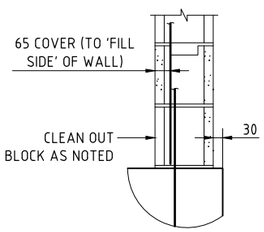
WALL WITH SINGLE STEM OF 190 BLOCK
1:20 SCALE



WALL WITH THIN STEM OF 190 BLOCK AND
THICK STEM OF 290 BLOCK
1:20 SCALE

NOTE :
ALL BLOCK CORES TO BE FULLY GROUTED.
NOTES SHOWN ARE TYPICAL FOR ALL WALLS.
ALL BASE KEYS TO BE POURED AGAINST
UNDISTURBED NATURAL GROUND.

NOTE :
INDICATIVE REINFORCEMENT LENGTHS SHOWN.
DESIGN TO BE CONFIRMED / PROVIDED BY D+C
CONTRACTOR.



WALL VERTICAL REINF'T DETAIL
TYPICAL
NOT TO SCALE

RETAINING WALL TYPE 1 SPECIFICATIONS FOR 20kPa SURCHARGE :

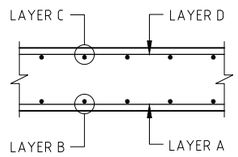
RETAINED HEIGHT H1	290 STEM HEIGHT H2	BASE WIDTH B1	(THIN) STEM THICKNESS T1	REINF'T. X BARS	REINF'T. Y BARS
2600	1000	2600	190	N16-200	N16-200
2400	1000	2400	190	N16-200	N16-200
2200	800	2200	190	N16-400	N16-400
2000	800	2000	190	N16-400	N16-400
1800	N/A	2000	190	N16-400	N16-400
1600	N/A	1800	190	N16-400	N16-400
1400	N/A	1800	190	N16-400	N16-400
1200	N/A	1600	190	N16-400	N16-400
1000	N/A	1400	190	N16-400	N16-400
800	N/A	1200	190	N16-400	N16-400
600	N/A	1000	190	N16-400	N16-400

REINFORCEMENT

R1 ALL REINFORCEMENT BARS ARE TO BE D500N U.N.O.

R2 ALL REINFORCEMENT WELDED MESHES TO BE GRADE 500L U.N.O.

R3 WELDING OF REINFORCEMENT SHALL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS OR APPROVED BY THE ENGINEER.



REINFORCEMENT PLACEMENT DETAIL

CONCRETE

C1 ALL WORKMANSHIP AND MATERIAL SHALL BE IN ACCORDANCE WITH AS3600 CURRENT EDITION WITH AMENDMENTS, EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.

C2 READYMIX CONCRETE SUPPLY SHALL COMPLY WITH AS1379.

C3 CONCRETE QUALITY
ALL THE REQUIREMENTS OF THE ACSE SPECIFICATION DOCUMENT 1 (EDITION 6) SHALL APPLY TO THE FORMWORK, REINFORCEMENT AND CONCRETE UNLESS NOTED OTHERWISE.

ELEMENT	STRENGTH GRADE (MPa)	SLUMP	MAX AGG SIZE	CEMENT TYPE

REFER TO PLANS

C4 PROJECT CONTROL TESTING SHALL BE CARRIED OUT IN ACCORDANCE AS1379.

C5 NO ADMIXTURES SHALL BE USED IN CONCRETE UNLESS APPROVED IN WRITING.

C6 CLEAR CONCRETE COVER TO ALL REINFORCEMENT FOR DURABILITY SHALL BE AS FOLLOWS UNLESS SHOWN OTHERWISE.

EXPOSURE CLASSIFICATION TO AS3600:	CONCRETE GRADE:	CAST AGAINST GROUND:	CAST IN FORMS AND EXPOSED:	CAST IN FORMS NOT EXPOSED:
A1&A2	25	50mm	30mm	20mm(A1)
B1	32	60mm	40mm	-
B2	40	65mm	45mm	-

COVER REQUIREMENTS MAY NEED TO BE INCREASED TO SUIT FIRE RATING. EXPOSURE CLASSIFICATION SHALL BE AS INDICATED ON THE DRAWING.

DURABILITY REQUIREMENTS FOR CONCRETE.

EXPOSURE CLASSIFICATION TO AS3600:	MINIMUM CEMENT CONTENT:	MAXIMUM W/C RATIO:
A1&A2	280	0.56
B1	320	0.56
B2	390	0.46
C	450	0.40

C7 ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED ON MILD STEEL PLASTIC TIPPED CHAIRS, PLASTIC CHAIRS OR CONCRETE CHAIRS AT 1 METRE CENTRES MAXIMUM BOTH WAYS. BARS SHALL BE TIED AT ALTERNATE INTERSECTIONS. USE PLASTIC CHAIRS IN EXPOSURE CONDITION GREATER THAN B1.

C8 CONCRETE SIZES DO NOT INCLUDE THICKNESSES OF APPLIED FINISHES.

C9 DEPTHS OF BEAMS ARE GIVEN FIRST AND INCLUDE SLAB THICKNESS.

C10 REFER TO ARCHITECT'S DETAILS, FOR CHAMFERS, DRIP GROOVES, REGLETS, ETC., MAINTAIN COVER TO REINFORCEMENT AT THESE DETAILS.

C11 NO HOLES, CHASES OR EMBEDMENT OF PIPES OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT THE PRIOR WRITTEN APPROVAL OF THE ENGINEER.

C12 CONSTRUCTION JOINTS WHERE NOT SHOWN SHALL BE LOCATED TO THE APPROVAL OF THE ENGINEER.

C13 ALL CONCRETE INCLUDING SLABS ON GROUND AND FOOTINGS SHALL BE COMPACTED WITH MECHANICAL VIBRATORS.

C14 USE ALIPHATIC ALCOHOLS SPRAYED OVER THE SURFACE PRIOR TO AND AFTER FINISHING TO REDUCE RATE OF EVAPORATION FROM THE SURFACE AND HELP CONTROL PLASTIC SHRINKAGE CRACKING. NOTE THAT THE USE OF ALIPHATIC ALCOHOLS IS NOT A SUBSTITUTE FOR CURING.

NOTE:
ATTENTION IS DRAWN TO THE FACT THAT DUE TO THE NATURE OF CONCRETE, CRACKING OF A NON-STRUCTURAL NATURE MAY OCCUR. REINFORCEMENT HAS BEEN ADDED TO THE SLABS TO MITIGATE THE EXTENT OF CRACKING, HOWEVER IT IS NOT POSSIBLE TO GUARANTEE COMPLETE ELIMINATION OF SLAB CRACKING.

CONCRETE CONTINUED

C15 COMMENCE CURING OPERATIONS PROMPTLY AFTER SURFACE FINISHING IS COMPLETE. CURING COMPOUNDS ARE TO BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS AND ARE TO BE CHECKED FOR COMPATIBILITY WITH PROPOSED FLOOR FINISHES. SOME COMPOUNDS MAY REQUIRE REMOVAL FOR GLUED DOWN FLOOR COVERINGS OR WET CURING AS DESCRIBED BELOW.

CONCRETE IS TO BE CURED BY KEEPING THE SURFACES CONTINUOUSLY WET FOR A PERIOD OF 3 DAYS, AND PREVENTING THE LOSS OF MOISTURE FOR A FURTHER 7 DAYS FOLLOWED BY A GRADUAL DRYING OUT.

C16 PROPPING WHICH SUPPORTS CONSTRUCTION OVER IS TO BE LEFT IN PLACE AS REQUIRED TO AVOID OVER STRESSING THE STRUCTURE DUE TO CONSTRUCTION LOADING

C17 THE ENGINEER SHALL BE GIVEN 48 HOURS NOTICE FOR REINFORCEMENT INSPECTIONS AND CONCRETE SHALL NOT BE DELIVERED UNTIL ENGINEERS APPROVAL IS OBTAINED.

C18 CONDUITS, PIPES ETC. SHALL ONLY BE LOCATED IN THE MIDDLE ONE THIRD OF SLAB DEPTH AND SPACED AT NOT LESS THAN 3 DIAMETERS OF THE CONDUIT, PIPES ETC. PIPES OR CONDUITS SHALL NOT BE PLACED WITHIN THE COVER TO REINFORCEMENT.

MASONRY BLOCKWORK

M1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS3700.

M2 CLASS OF BLOCKS AND TYPE OF MORTAR SHALL BE AS LISTED BELOW :

MATERIAL:	CHARACTERISTIC UNCONFINED COMPRESSIVE STRENGTH, F'_{uc}	MORTAR CLASSIFICATION:
CONCRETE BLOCKS	15 MPa	M3

M3 MORTAR ADMIXTURES SHALL NOT BE USED WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.

M4 ALL MASONRY WALLS AND PIERS SUPPORTING SLABS AND BEAMS SHALL HAVE A PRE-GREASED GALVANISED STEEL SLIP JOINT BETWEEN CONCRETE SOFFIT AND THE TOP OF OF THE MASONRY ELEMENT U.N.O.

M5 ALL MASONRY SUPPORTING OR SUPPORTED BY CONCRETE FLOORS SHALL BE PROVIDED WITH VERTICAL JOINTS TO MATCH ALL CONTROL JOINTS IN THE CONCRETE.

M6 NON LOAD BEARING WALLS SHALL BE SEPARATED FROM CONCRETE ABOVE BY A 12mm THICK CLOSED CELL POLYETHYLENE STRIP.

M7 NO CHASES OR RECESSES ARE PERMITTED IN LOAD BEARING MASONRY WITHOUT THE APPROVAL OF THE ENGINEER.

M8 PROVIDE CLEANOUT HOLES AT BASE OF ALL WALLS. ROD CORE HOLES TO REMOVE PROTRUDING MORTAR FOLLOWING APPROVAL FROM THE ENGINEER.

M9 CORE FILLING GROUT TO HAVE A CHARACTERISTIC STRENGTH OF 20 MPa, 10mm AGGREGATE, 230mm SLUMP, MINIMUM CEMENT CONTENT = 300 kg/m^3. GROUT FILL ALL BLOCK CORES.

M10 PROVIDE 65mm COVER TO REINFORCING BARS FROM THE OUTSIDE FACE OF THE BLOCKWORK IF REINFORCEMENT IS NOT TO BE PLACED CENTRALLY.

M11 PROVIDE VERTICAL CONTROL JOINTS AT 10 METRE MAX CENTRES, AND AT 5 METRE MAXIMUM FROM CORNERS IN ALL BRICKWORK WALLS

M12 PROVIDE VERTICAL CONTROL JOINTS AT 8 METRE MAX CENTRES, AND AT 4 METRE MAXIMUM FROM CORNERS IN ALL CONCRETE BLOCK WALLS.

M13 BACKFILL TO RETAINING WALLS TO BE FREE DRAINING GRANULAR MATERIAL U.N.O. PROVIDE SUBSOIL DRAIN BEHIND WEEP HOLES.

M14 DO NOT CONSTRUCT MASONRY WALLS ON SUSPENDED CONCRETE UNTIL SLAB HAS BEEN STRIPPED AND DE-PROPPED.

M15 ALL CAVITY CONSTRUCTION TO HAVE GALVANISED OR STAINLESS STEEL WALL TIES INSTALLED AS PER AS3700

FOR DEVELOPMENT APPLICATION

ISSUED FOR SSDA	30.09.22	A
AMENDMENTS	DATE	ISSUE

ARCHITECT: PACE ARCHITECTS

CLIENT: LOGOS

PROJECT: QANTAS TRAINING CENTER
28-30 BURROWS ROAD, ST PETERS
NSW, 2044

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DW	RN	JUNE '22	MW	A1	AS SHOWN	C014585.00-DA65

Costin Roe Consulting Pty Ltd.
Consulting Engineers ACN 003 696 448
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 9251-7699 Fax: (02) 9241-3731
email: mail@costinroe.com.au ©

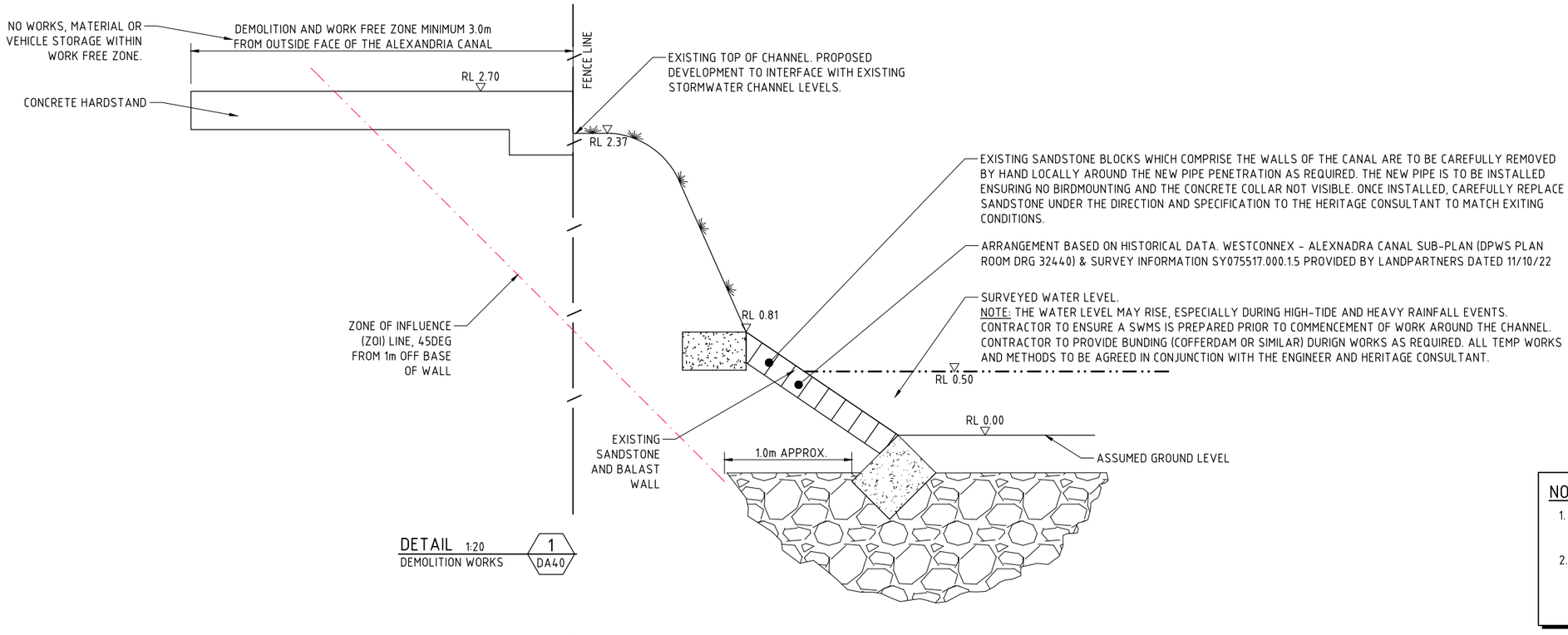
Costin Roe Consulting

PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE: RETAINING WALL DETAILS

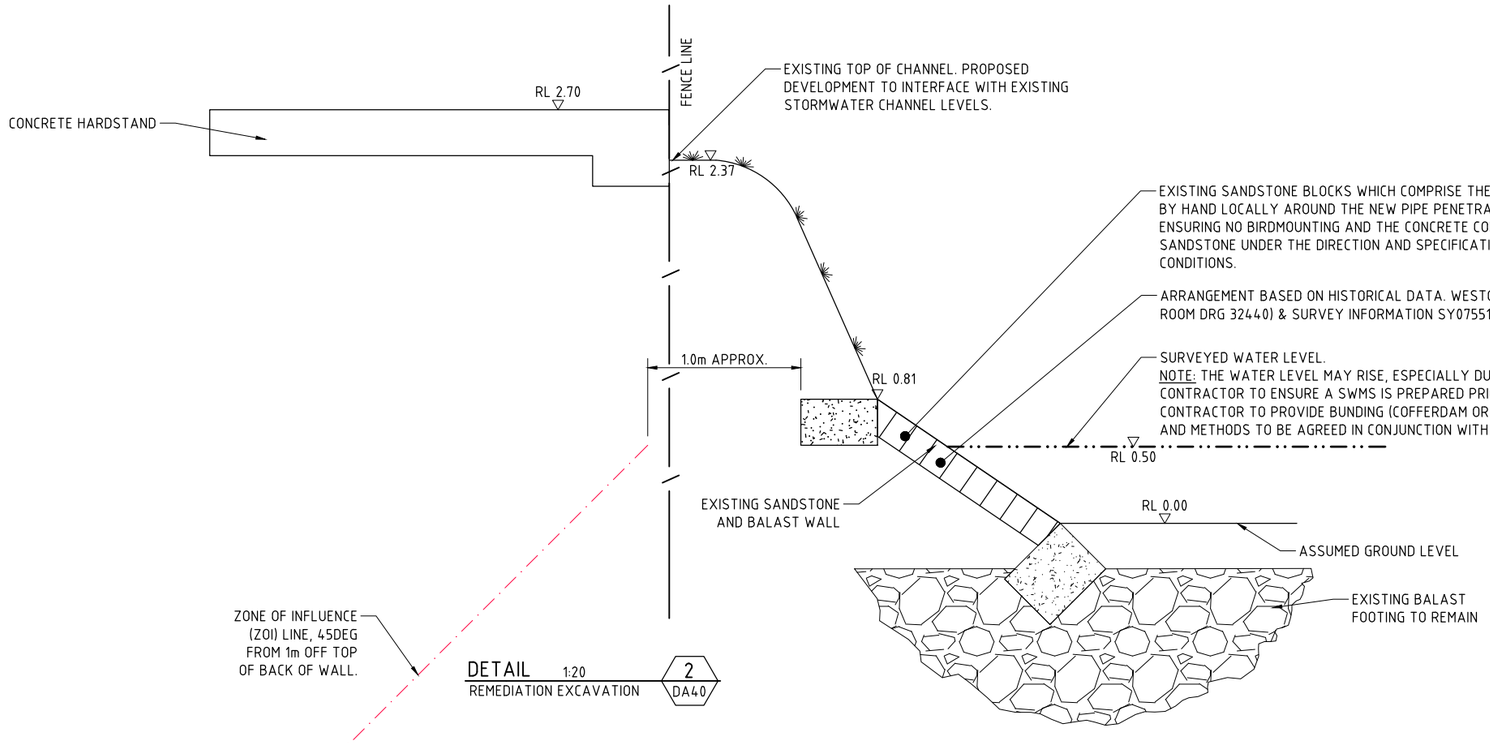
DRAWING No: C014585.00-DA65

ISSUE: A



NOTE

1. PRELIMINARY ONLY - ALL ZOI DISTANCES & REQUIREMENTS SUBJECT TO SURVEY AND DETAILED ASSESSMENT.
2. WORKS WITHIN 3m FROM OUTSIDE FACE OF THE ALEXANDRIA CANAL REQUIRES APPROVAL FROM SYDNEY WATER HERITAGE SECTION AND HERITAGE COUNCIL OF NSW



200mm 0 500 1000 1500 2000mm

SCALE 1:20 AT A1 SIZE SHEET

FOR DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR SSDA	25.10.22	C
REVISED PER SURVEY	17.10.22	B
ISSUED FOR SSDA	30.09.22	A

ARCHITECT
PACE ARCHITECTS

CLIENT
LOGOS

PROJECT
QANTAS TRAINING CENTER
28-30 BURROWS ROAD, ST PETERS
NSW, 2044

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DW	RN	JUNE '22	MW	A1	AS SHOWN	C014585.00-DA85

Costin Roe Consulting Pty Ltd.
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Costin Roe Consulting

PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE
CIVIL WORKS DETAILS

DRAWING No C014585.00-DA85

ISSUE C

Appendix B

MUSIC MODEL CONFIGURATION & PARAMETERS

B.1 Introduction

The MUSIC modelling software was chosen to model water quality. This model has been released by the Cooperative Research Centre for Catchment Hydrology (CRCCH) and is a standard industry model for this purpose. MUSIC (the Model for Urban Stormwater Improvement Conceptualisation) is suitable for simulating catchment areas of up to 100 km^2 and utilises a continuous simulation approach to model water quality.

By simulating the performance of stormwater management systems, MUSIC can be used to predict if these proposed systems and changes to land use are appropriate for their catchments and are capable of meeting specified water quality objectives (CRC 2002). The water quality constituents modelled in MUSIC and of relevance to this report include Total Suspended Solids (TSS), Total Phosphorus (TP) and Total Nitrogen (TN).

The pollutant retention criteria set out in Section 3 of City of Sydney's DCP2012 and nominated in **Section 6.1** of this report were used as a basis for assessing the effectiveness of the selected treatment trains.

The MUSIC model "*14585.00-Rev1.sqz*" was set up to examine the effectiveness of the water quality treatment train and to predict if council requirements have been achieved. The model was set up using the latest City of Sydney Council *MUSICLINK* parameters for sandy soil and the layout of the MUSIC model is presented in **Appendix B.8**.

Modelling parameters used are based on those nominated in the Sydney Catchment Management Authority (SCA) document *Using Music in Sydney's Drinking Water Catchment – A Sydney Catchment Authority Standard (2012)* and *Draft NSW MUSIC Modelling Guidelines (2011).*

B.2 Rainfall Data

As per the recommendation of Table 3-1 of *Draft NSW MUSIC Modelling Guidelines (2011),* six-minute pluviographic data for the Sydney Meteorological Office Station was sourced from the Bureau of Meteorology (BOM) as nominated below. Evapo-transpiration data for the period was sourced from the Sydney Monthly Areal PET data set supplied with the MUSIC software.

Input	**Data Used**
Rainfall Station	66062 Sydney
Rainfall Period	1 January 1982 – 31 December 1986 (4 years)
Mean Annual Rainfall (mm)	1278
Evapo- transpiration	Sydney Monthly Areal PET
Model Time step	6 minutes

B.3 Rainfall Runoff Parameters

Parameter	**Value**
Rainfall Threshold for roads/paths	1.50
Rainfall Threshold for roofs	0.30
Soil Storage Capacity (mm)	195
Initial Storage (% capacity)	30
Field Capacity (mm)	135
Infiltration Capacity Coefficient a	250
Infiltration Capacity exponent b	1.3
Initial Depth (mm)	10
Daily Recharge Rate (%)	60

Daily Baseflow Rate (%)	45
Daily Seepage Rate (%)	0

B.4 Pollutant Concentrations & Source Nodes

Pollutant concentrations for source nodes are based on parameters adopted by the SCA as per **Table B.1**.

Flow Type	Surface Type	TSS (log_{10} values)		TP (log_{10} values)		TN (log_{10} values)	
		Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.
Baseflow	Roof	-*	-*	-*	-*	-*	-*
	Roads	-*	-*	-*	-*	-*	-*
	Other Impervious Areas	-*	-*	-*	-*	-*	-*
	Pervious Areas	1.20	0.17	-0.85	0.19	0.11	0.12
Stormflow	Roof	1.30	0.32	-0.89	0.25	0.30	0.19
	Roads	2.43	0.32	-0.30	0.25	0.34	0.19
	Other Impervious Areas	2.15	0.32	-0.60	0.25	0.30	0.19
	Pervious Areas	2.15	0.32	-0.60	0.25	0.30	0.19

Table B.1. Pollutant Concentrations

The MUSIC model has been setup with a treatment train approach based on the pollutant concentrations in **Table B.1** above.

The relevant stormwater catchment sizes are listed below in **Table B.2** and their configuration within the MUSIC model.

Catchment	Area (Ha)	Source Node	% Impervious
CAT 1 – Roof	0.406	Roof	100
CAT 1 – Hardstand	0.015	Sealedroad	100
CAT 1 – Landscape	0.021	Mixed	100
CAT 2 – Carpark	0.818	Mixed	100
CAT 3 - Carpark	0.550	Mixed	100
BYPASS - Landscape	0.087	Bypass	0
Total			

Table B.2. Music Model Source Nodes

B.5 Treatment Nodes

Gross Pollutant Trap and Siphon-Actuated Filtration device treatment nodes have been used in the modelling of the development as provided by the suppliers of the products based on testing completed by the product manufacturers. Detention basin nodes were also introduced to the model using typical parameters contained in MUSIC modelling guidelines.

Pit Baskets – OceanGaurd

Parameter	**Value**
Treatable Flow	0.02m^3/s (per Filter)
Pollutant Reductions	
Per Technical Guidelines	

Filtration Device (StormFilters)

Parameter	**Value**
Treatable Flow	0.0009m^3/s (per PSorb Cartridge)
Pollutant Reductions	
Per Technical Guidelines	

B.6 Results

Table B.3 shows the results of the MUSIC analysis. The reduction rate is expressed as a percentage and compares the post-development pollutant loads without treatment versus post-development loads with treatment.

	Source	**Residual Load**	**% Reduction**
Total Suspended Solids (kg/yr)	785	99.7	87.3
Total Phosphorus (kg/yr)	1.83	0.624	65.9
Total Nitrogen (kg/yr)	18.7	9.54	49
Gross Pollutants (kg/yr)	203	0.00197	100

Table B.3. MUSIC analysis results

The model results indicate that, through the use of the STM in the treatment train, pollutant load reductions for Total Suspended Solids, Total Phosphorous, Total Nitrogen and Gross Pollutants will meet the requirements of Council's *DCP 2012* on an overall catchment basis.

B.7 Modelling Discussion

MUSIC modelling has been performed to assess the effectiveness of the selected treatment trains and to ensure that the pollutant retention requirements of Council have been met.

The MUSIC modelling has shown that the proposed treatment train of STM will provide stormwater treatment which will meet Councils requirements in an effective and economical manner.

Hydrocarbon and oil & grease removal cannot be modelled with MUSIC software. As an industrial development with users, the exact levels of hydrocarbons would not be known however given the expected use of the site as a industrial building these pollutants would not be expected to be large. Potential sources of hydrocarbons and/or oil & grease which drain to the stormwater system would be limited to leaking engine sumps or for accidental fuel spills/leaks and leaching of bituminous pavements (car parking only). The potential for these pollutants is low and published data from the CSIRO indicates that average concentrations from industrial sites are in the order of 10mg/L and we would expect

source loading from this site to be near to or below this concentration. Hydrocarbon pollution would also be limited to surface areas which will be treated via OceanProtect OceanGuard absorbent material which are predicted to reduce this pollutant.

Given the expected low source loadings of hydrocarbons and oil/grease and removal efficiencies of the treatment devices and bio-retention systems we consider that the requirements of the Council have been met.

B.8 MUSIC Model Layout

The model was set up using the latest City of Sydney Council *MUSICLINK* parameters for sandy loam soil and the layout of the MUSIC model is presented below.

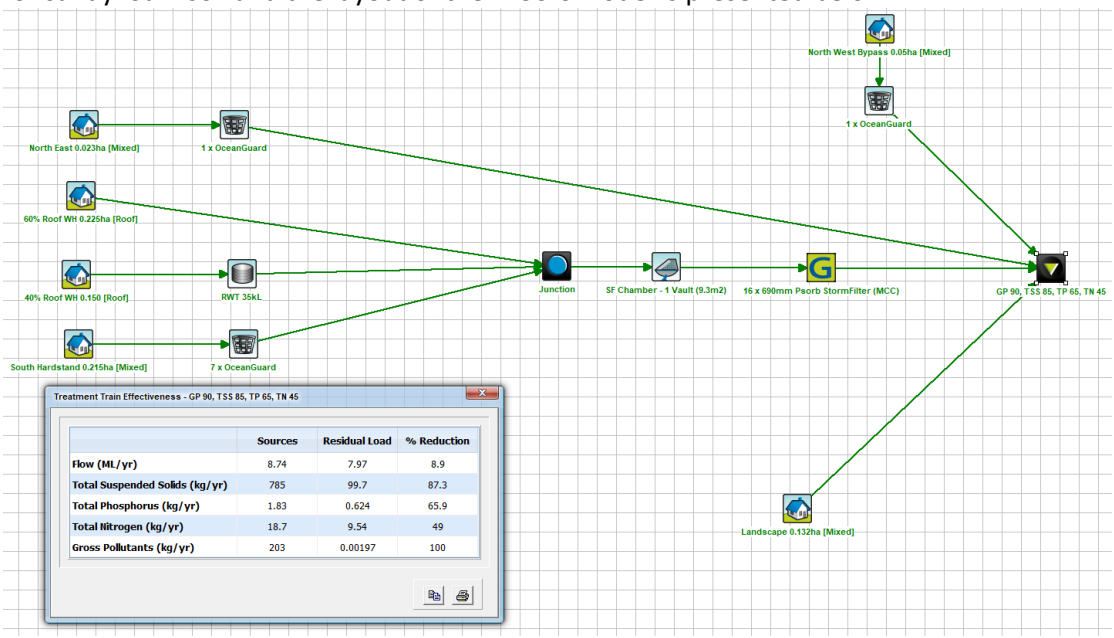

Figure B.8 MUSIC Model Layout

Appendix C

DRAFT SOIL AND WATER MANAGEMENT PLAN

C.1 Introduction

An erosion and sediment control plan (ESCP) is shown on drawing **Co14585.00-DA20** with details on **DA25**. These are conceptual plans only providing sufficient detail to clearly show that the works can proceed without undue pollution to receiving waters. A detailed plan will be prepared once consent is given and before works start.

The Staged ESCP considers initial site establishment, requirements during construction of development, completion of development.

C.2 General Conditions

1. The ESCP will be read in conjunction with the engineering plans, and any other plans or written instructions that may be issued in relation to development at the subject site.
2. Contractors will ensure that all soil and water management works are undertaken as instructed in this specification and constructed following the guidelines stated in *Managing Urban Stormwater, Soils and Construction (1998) "The Blue Book"* and Penrith City Council specifications.
3. All subcontractors will be informed of their responsibilities in minimising the potential for soil erosion and pollution to down slope areas.

C.3 Land Disturbance

1. Where practicable, the soil erosion hazard on the site will be kept as low as possible and as recommended in Table C.1.

Land Use	Limitation	Comments
Construction areas	Limited to 5 (preferably 2) metres from the edge of any essential construction activity as shown on the engineering plans.	All site workers will clearly recognise these areas that, where appropriate, are identified with barrier fencing (upslope) and sediment fencing (downslope), or similar materials.
Access areas	Limited to a maximum width of 5 metres	The site manager will determine and mark the location of these zones onsite. They can vary in position so as to best conserve existing vegetation and protect downstream areas while being considerate of the needs of efficient works activities. All

		site workers will clearly recognise these boundaries.
Remaining lands	Entry prohibited except for essential management works	

Table C.1 Limitations to access

C.4 Erosion Control Conditions

1. Clearly visible barrier fencing shall be installed as shown on the plan and elsewhere at the discretion of the site superintendent to ensure traffic control and prohibit unnecessary site disturbance. Vehicular access to the site shall be limited to only those essential for construction work and they shall enter the site only through the stabilised access points.
2. Soil materials will be replaced in the same order they are removed from the ground. It is particularly important that all subsoils are buried and topsoils remain on the surface at the completion of works.
3. Where practicable, schedule the construction program so that the time from starting land disturbance to stabilisation has a duration of less than six months.
4. Notwithstanding this, schedule works so that the duration from the conclusion of land shaping to completion of final stabilisation is less than 20 working days.
5. Land recently established with grass species will be watered regularly until an effective cover has properly established and plants are growing vigorously. Further application of seed might be necessary later in areas of inadequate vegetation establishment.
6. Where practical, foot and vehicular traffic will be kept away from all recently established areas
7. Earth batters shall be constructed in accordance with the Geotechnical Engineers Report or with as law a gradient as practical but not steeper than:
   - 2H:1V where slope length is less than 7 metres
   - 2.5H:1V where slope length is between 7 and 10 metres
   - 3H:1V where slope length is between 10 and 12 metres
   - 4H:1V where slope length is between 12 and 18 metres
   - 5H:1V where slope length is between 18 and 27 metres
   - 6H:1V where slope length is greater than 27 metres
8. All earthworks, including waterways/drains/spillways and their outlets, will be constructed to be stable in at least the design storm event.
9. During windy weather, large, unprotected areas will be kept moist (not wet) by sprinkling with water to keep dust under control. In the event water is not

available in sufficient quantities, soil binders and/or dust retardants will be used or the surface will be left in a cloddy state that resists removal by wind.

C.5 Pollution Control Conditions

1. Stockpiles will not be located within 5 metres of hazard areas, including likely areas of high velocity flows such as waterways, paved areas and driveways. Silt/ sediment fences and appropriate stabilisation of stockpiles are to be provided as detailed on the drawings.
2. Sediment fences will:
   a) Be installed where shown on the drawings, and elsewhere at the discretion of the site superintendent to contain the coarser sediment fraction (including aggregated fines) as near as possible to their source.
   b) Have a catchment area not exceeding 720 square meters, a storage depth (including both settling and settled zones) of at least 0.6 meters, and internal dimensions that provide maximum surface area for settling, and
   c) Provide a return of 1 metre upslope at intervals along the fence where catchment area exceeds 720 square meters, to limit discharge reaching each section to 10 litres/second in a maximum 20-year t_c discharge.
3. Sediment removed from any trapping device will be disposed in locations where further erosion and consequent pollution to down slope lands and waterways will not occur.
4. Water will be prevented from directly entering the permanent drainage system unless it is relatively sediment free (i.e. the catchment area has been permanently landscaped and/or likely sediment has been treated in an approved device). Nevertheless, stormwater inlets will be protected.
5. Temporary soil and water management structures will be removed only after the lands they are protecting are stabilised.

C.6 Waste Management Conditions

Acceptable bind will be provided for any concrete and mortar slurries, paints, acid washings, lightweight waste materials and litter. Clearance service will be provided at least weekly.

C.7 Site Inspection and Maintenance

1. A self-auditing program will be established based on a Check Sheet. A site inspection using the Check Sheet will be made by the site manager:
   - At least weekly.
   - Immediately before site closure.

- Immediately following rainfall events in excess of 5mm in any 24-hour period.

The self-audit will include:

- Recording the condition of every sediment control device
- Recording maintenance requirements (if any) for each sediment control device
- Recording the volumes of sediment removed from sediment retention systems, where applicable
- Recording the site where sediment is disposed
- Forwarding a signed duplicate of the completed Check Sheet to the project manager/developer for their information

2. In addition, a suitably qualified person will be required to oversee the installation and maintenance of all soil and water management works on the site. The person shall be required to provide a short monthly written report. The responsible person will ensure that:
   - The plan is being implemented correctly
   - Repairs are undertaken as required
   - Essential modifications are made to the plan if and when necessary

The report shall carry a certificate that works have been carried out in accordance with the plan.

3. Waste bins will be emptied as necessary. Disposal of waste will be in a manner approved by the Site Superintendent.
4. Proper drainage will be maintained. To this end drains (including inlet and outlet works) will be checked to ensure that they are operating as intended, especially that,
   - No low points exist that can overtop in a large storm event
   - Areas of erosion are repaired (e.g. lined with a suitable material) and/or velocity of flow is reduced appropriately through construction of small check dams of installing additional diversion upslope.
   - Blockages are cleared (these might occur because of sediment pollution, sand/soil/spoil being deposited in or too close to them, breached by vehicle wheels, etc.).
5. Sand/soil/spoil materials placed closer than 2 meters from hazard areas will be removed. Such hazard areas include and areas of high velocity water flows (e.g. waterways and gutters), paved areas and driveways.
6. Recently stabilised lands will be checked to ensure that erosion hazard has been effectively reduced. Any repairs will be initiated as appropriate.
7. Excessive vegetation growth will be controlled through mowing or slashing.

8. All sediment detention systems will be kept in good, working condition. In particular, attention will be given to:

   a) Recent works to ensure they have not resulted in diversion of sediment laden water away from them

   b) Degradable products to ensure they are replaced as required, and

   c) Sediment removal, to ensure the design capacity or less remains in the settling zone.

9. Any pollutants removed from sediment basins or litter traps will be disposed of in areas where further pollution to down slope lands and waterways should not occur.

10. Additional erosion and/or sediment control works will be constructed as necessary to ensure the desired protection is given to down slope lands and waterways, i.e. make ongoing changes to the plan where it proves inadequate in practice or is subjected to changes in conditions at the work site or elsewhere in the catchment.

11. Erosion and sediment control measures will be maintained in a functioning condition until all earthwork activities are completed and the site stabilised

12. Litter, debris and sediment will be removed from the gross pollutant traps and trash racks as required.

EROSION AND SEDIMENT CONTROL
WEEKLY SITE INSPECTION SHEET

LOCATION .....
INSPECTION OFFICER ..... **DATE** .....
SIGNATURE .....

Legend: □ OK □ Not OK N/A Not applicable

Item	Consideration	Assessment
1	Public roadways clear of sediment.	.....
2	Entry/exit pads clear of excessive sediment deposition.	.....
3	Entry/exit pads have adequate void spacing to trap sediment.	.....
4	The construction site is clear of litter and unconfined rubbish.	.....
5	Adequate stockpiles of emergency ESC materials exist on site.	.....
6	Site dust is being adequately controlled.	.....
7	Appropriate drainage and sediment controls have been installed prior to new areas being cleared or disturbed.	.....
8	Up-slope "clean" water is being appropriately diverted around/through the site.	.....
9	Drainage lines are free of soil scour and sediment deposition.	.....
10	No areas of exposed soil are in need of erosion control.	.....
11	Earth batters are free of "rill" erosion.	.....
12	Erosion control mulch is not being displaced by wind or water.	.....
13	Long-term soil stockpiles are protected from wind, rain and stormwater flow with appropriate drainage and erosion controls.	.....
14	Sediment fences are free from damage.	.....
15	Sediment-laden stormwater is not simply flowing "around" the sediment fences or other sediment traps.	.....
16	Sediment controls placed up-slope/around stormwater inlets are appropriate for the type of inlet structure.	.....
17	All sediment traps are free of excessive sediment deposition.	.....
18	The settled sediment layer within a sediment basin is clearly visible through the supernatant prior to discharge such water.	.....
19	All reasonable and practicable measures are being taken to control sediment runoff from the site.	.....
20	All soil surfaces are being appropriately prepared (i.e. pH, nutrients, roughness and density) prior to revegetation.	.....
21	Stabilised surfaces have a minimum 70% soil coverage.	.....
22	The site is adequately prepared for imminent storms.	.....
23	All ESC measures are in proper working order.	.....

Appendix D

STORMWATER SYSTEM

DRAFT MAINTENANCE SCHEDULE

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
SWALES/ LANDSCAPED AREAS			
Check density of vegetation and ensure minimum height of 150mm is maintained. Check for any evidence of weed infestation	Six monthly	Maintenance Contractor	Replant and/or fertilise, weed and water in accordance with landscape consultant specifications
Inspect swale for excessive litter and sediment build up	Six monthly	Maintenance Contractor	Remove sediment and litter and dispose in accordance with local authorities' requirements.
Check for any evidence of channelisation and erosion	Six monthly/ After Major Storm	Maintenance Contractor	Reinstate eroded areas so that original, designed swale profile is maintained
Weed Infestation	Three Monthly	Maintenance Contractor	Remove any weed infestation ensuring all root ball of weed is removed. Replace with vegetation where required.
Inspect swale surface for erosion	Six Monthly	Maintenance Contractor	Replace top soil in eroded area and cover and secure with biodegradable fabric. Cut hole in fabric and revegetate.
INLET & JUNCTION PITS			
Inside of pits	Six Monthly	Maintenance Contractor	Remove grate and inspect internal walls and base, repair where required. Remove any collected sediment, debris, litter.
Outside of pits	Four Monthly/ After Major Storm	Maintenance Contractor	Clean grate of collected sediment, debris, litter and vegetation.

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
PROPRIETARY TREATMENT DEVICES (OceanProtect Stormfilter)			
Refer to Manufacturers Operation and Maintenance Manuel	Annually	Maintenance Contractor	Refer to Manufacturers Operation and Maintenance Manuel
FUTURE RAINWATER TANK			
Check for any clogging and blockage of the first flush device	Monthly	Maintenance Contractor	First flush device to be cleaned out
Check for any clogging and blockage of the tank inlet -leaf/litter screen	Six monthly	Maintenance Contractor	Leaves and debris to be removed from the inlet leaf/litter screen
Check the level of sediment within the tank	Every two years	Maintenance Contractor	Sediment and debris to be removed from rainwater tank floor if sediment level is greater than the maximum allowable depth as specified by the hydraulic consultant
STORMWATER SYSTEM			
General Inspection of complete stormwater drainage system	Bi-annually	Maintenance Contractor	Inspect all drainage structures noting any dilapidation in structures and carry out required repairs.
TANKS			
Inspect and remove any blockage from orifice	Six Monthly	Maintenance Contractor/ Owner	Remove grate and screen to inspect orifice.
Inspect trash screen and clean	Six Monthly	Maintenance Contractor/ Owner	Remove grate and screen if required to clean it.

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
Inspect flap valve and remove any blockage.	Six Monthly	Maintenance Contractor/ Owner	Remove grate. Ensure flap valve moves freely and remove any blockages or debris.
Inspect pit sump for damage or blockage.	Six Monthly	Maintenance Contractor/ Owner	Remove grate & screen. Remove sediment/ sludge build up and check orifice and flap valve are clear.
Inspect storage areas and remove debris/ mulch/ litter etc likely to block screens/ grates.	Six Monthly	Maintenance Contractor/ Owner	Remove debris and floatable materials.
Check attachment of orifice plate and screen to wall of pit	Annually	Maintenance Contractor	Remove grate and screen. Ensure plate or screen mounted securely, tighten fixings if required. Seal gaps if required.
Check orifice diameter is correct and retains sharp edge.	Five yearly	Maintenance Contractor	Compare diameter to design (see Work-as-Executed) and ensure edge is not pitted or damaged.
Check screen for corrosion	Annually	Maintenance Contractor	Remove grate and screen and examine for rust or corrosion, especially at corners or welds.
Inspect overflow weir and remove any blockage	Six monthly	Maintenance Contractor/ Owner	Ensure weir is free of blockage.
Inspect walls for cracks or spalling	Annually	Maintenance Contractor	Remove grate to inspect internal walls, repair as necessary.
Check step irons	Annually	Maintenance Contractor	Ensure fixings are secure and irons are free from corrosion.

Appendix E

TUFLOW FLOOD ASSESSMENT TECHNICAL INFORMATION

E.1 INTRODUCTION

E.1.1 Introduction

This Appendix to **Section 7** is provided to confirm technical parameters adopted in the *Overland Flow Assessment* for the proposed industrial estate development. The *Study Area* has been identified by City of Sydney Council, as being affected by overland flow from Burrows Road to the Alexandra Canal.

The scope and primary objectives of the overland flow assessment, are as follows:

- Determine the design flows generated by the contributing external catchments for a range of storms (5%, 1%, 0.5%, 0.2% AEP & PMF); Hydrology is based on DRAINS modelling.
- Assess the pre-development overland flow path through the development site for the listed range of storms including 1% AEP storm event;
- Assess the post-development levels on the effect of overland flow through the development site for the listed range of storms including 1% AEP storm event so that potential impacts on the development can be assessed and mitigated;
- Confirm that there is adverse impact to upstream, downstream and adjacent properties as a result of the development; and
- Confirm flood planning levels applicable to the development.

Appendix E provides technical detail to the summary and conclusions discussed in the **Section 7** of this report.

E.1.2 Survey/ DTM

Survey is required to define the physical attributes of the floodplain topography including the channel cross sections and the associated floodplain levels.

The pre-development scenario survey has been compiled based on a detail site survey for areas within the site, and for areas external to the site where detail survey is not available, digital terrain information has been obtained through government sources in the form of ALS survey. The on-ground survey information was completed in and around the study area to properly define the existing overland flow path cross section and features. Our assessment considers 2022 conditions and TfNSW works.

For assessment of the post-development scenario, the proposed development levels and drainage system (where appropriate) were then added to the pre-developed survey surface to create a post developed surface to use in the TUFLOW model and scenario modelling. This DTM was imported to the TUFLOW model to simulate land filling and proposed compensation areas in and around the flood affected land.

The surveys and design surfaces were used as the basis for the digital terrain model (DTM) used in the hydraulic modelling of the pre and post development scenario respectively.

E.2 CATCHMENT INVESTIGATION & HYDROLOGY

E.2.1 Contributing Catchment Definition

The contributing catchment comprises industrial land use and landscaped areas around the motorway interchange.

For the pre-development condition, the catchment has been divided into 2 contributing sub-catchments with an area of 0.556 Ha and 0.672 Ha respectively. These catchments are shown below in **Figure E2.1**.

As noted, the Councils model and catchments are based on 2013 conditions and direct a much larger catchment to the area than current conditions. As such their model output depicts larger amounts of runoff than those modelled by Costin Roe Consulting. Refer **Figure 7.11** and **7.12** for comparison.

Figure E2.1. Pre-Development Contributing Catchment.

For the post development condition, the catchment are slightly different being 0.504 Ha and 0.723 Ha respectively. These catchments are shown below in **Figure E2.2**.

Figure E2.2. Post Development Contributing Catchment.

E.2.2 Hydrological Assessment of Existing Catchment

Flood hydrographs were assessed using a DRAINS model based on the contributing catchment. The inflow hydrograph for catchments in the pre & post development conditions were extrapolated from the DRAINS model for the 5%, 1%, 0.5%, 0.2% AEP & PMF events. Inflow hydrographs for the 1% AEP event is shown in **Figure E2.3 to E2.6.** Rainfall intensities and temporal patterns were derived from the Bureau of Meteorology online IFD tool and Australian Rainfall and Runoff. It was determined that the critical storm duration which produces peak flows for the contributing catchments is the 30 minute storm event.

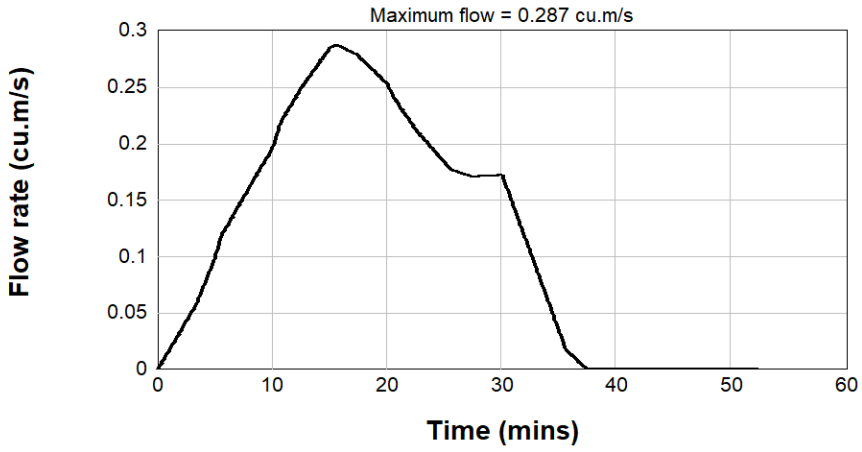

Figure E2.3: Pre-Development 1% AEP Inflow Hydrograph - Catchment 1

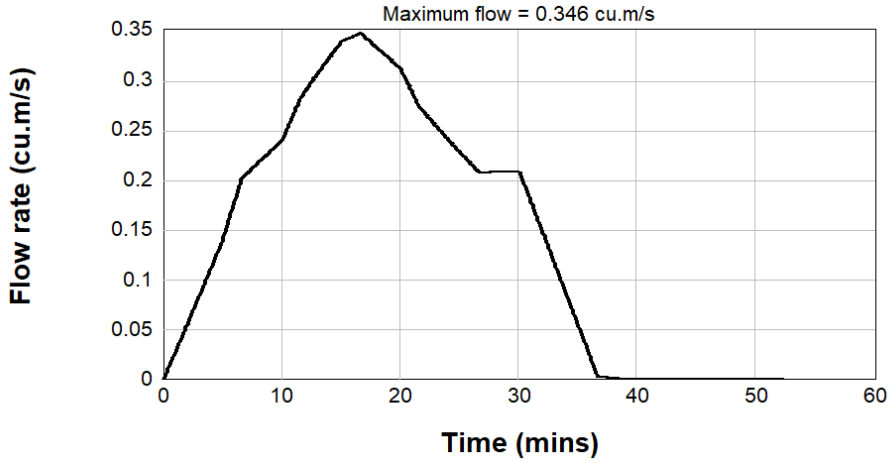

Figure E2.4: Pre-Development 1% AEP Inflow Hydrograph - Catchment 2

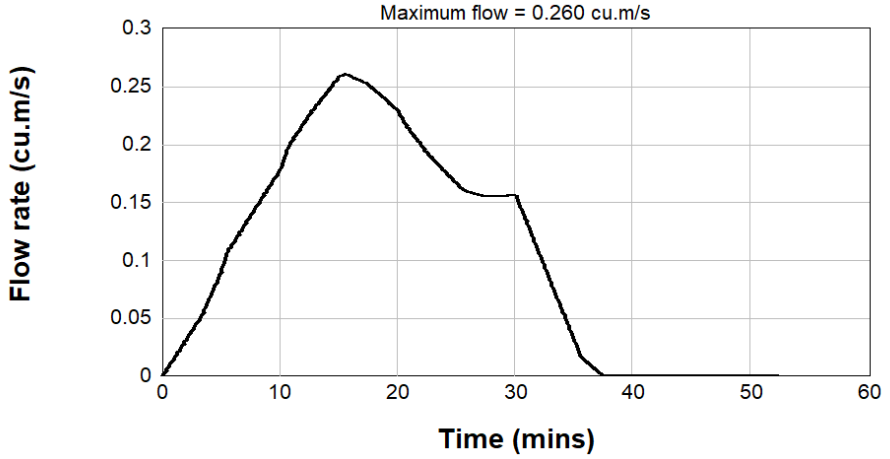

Figure E2.5: Post Development 1% AEP Inflow Hydrograph - Catchment 1

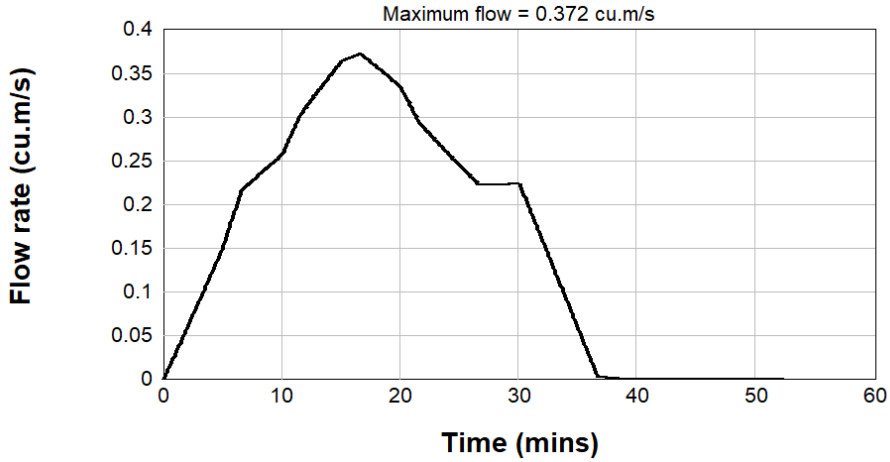

Figure E2.6: Post Development 1% AEP Inflow Hydrograph - Catchment 2

E.3 HYDRODYNAMIC MODEL DEVELOPMENT

E 3.1 Extent and Topography

The model extent is shown in **Figure E3.1** of this appendix. The model begins approximately 50m upstream of the development and extending approximately 100m downstream of the development.

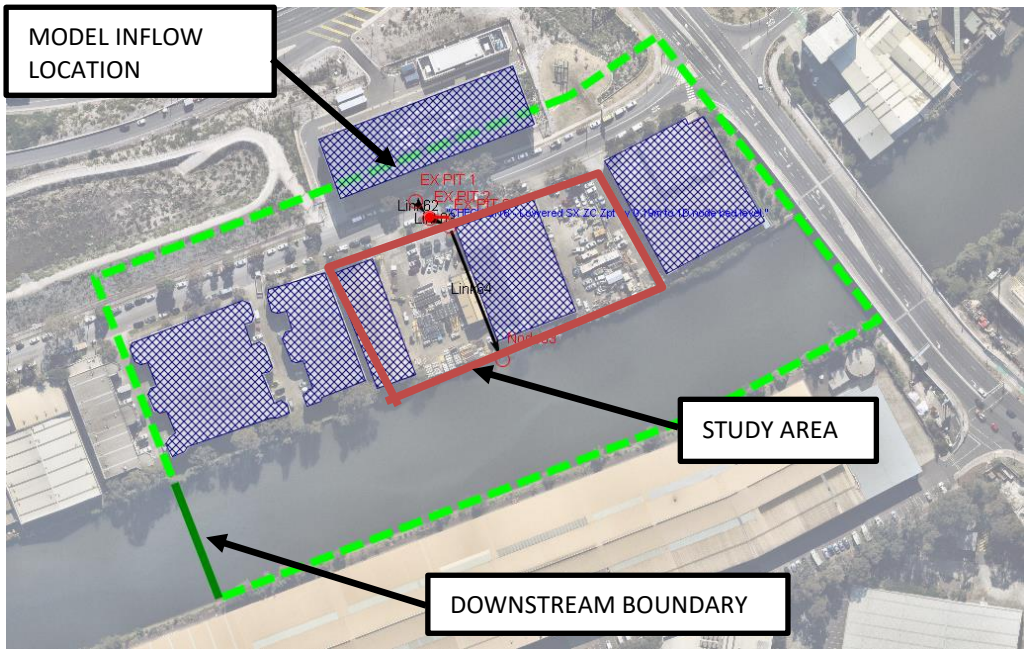

Figure E3.1: Model Extent and Model Boundary Locations

E.3.2 Boundary Conditions

Inflow Boundaries

Design inflow hydrographs for the model have been included at the location approximately 50m upstream of the property. Flows are based on hydrology as discussed in **Section E.2.2** of this Appendix.

The upstream boundary was located sufficiently upstream of the development to ensure the extent of predicted impacts from the development would be covered and any modelling iterations would be resolved clear of the development affectation zone.

Downstream Water Level Boundaries

The downstream water levels in Alexandra Canal have been based on normal outflow and design gradient of 1%, and water levels for the various storm events assessed based on the City of Sydney 2020 flood study as shown in **Table E3.1**.

AEP (%)	Downstream Boundary Level (m)
1	2.5
PMF	3.95

E.3.3 Channel and Floodplain Roughness

Roughness values adopted in the model are contained in **Table E2** below. These roughness values are generally consistent with similar studies completed within the area and have been adopted in this overland flow study.

Table E2. Adopted TUFLOW Element Roughness Values

Model Element	Description	Roughness Parameter Value
1	Grassed	0.04
2	Roads (Default)	0.02
3	Alexandra Canal	0.018
4	Buildings	(blockout)

A figurative representation of where the above roughness values have been applied can be found in **Figures E3.2 & E3.3.**

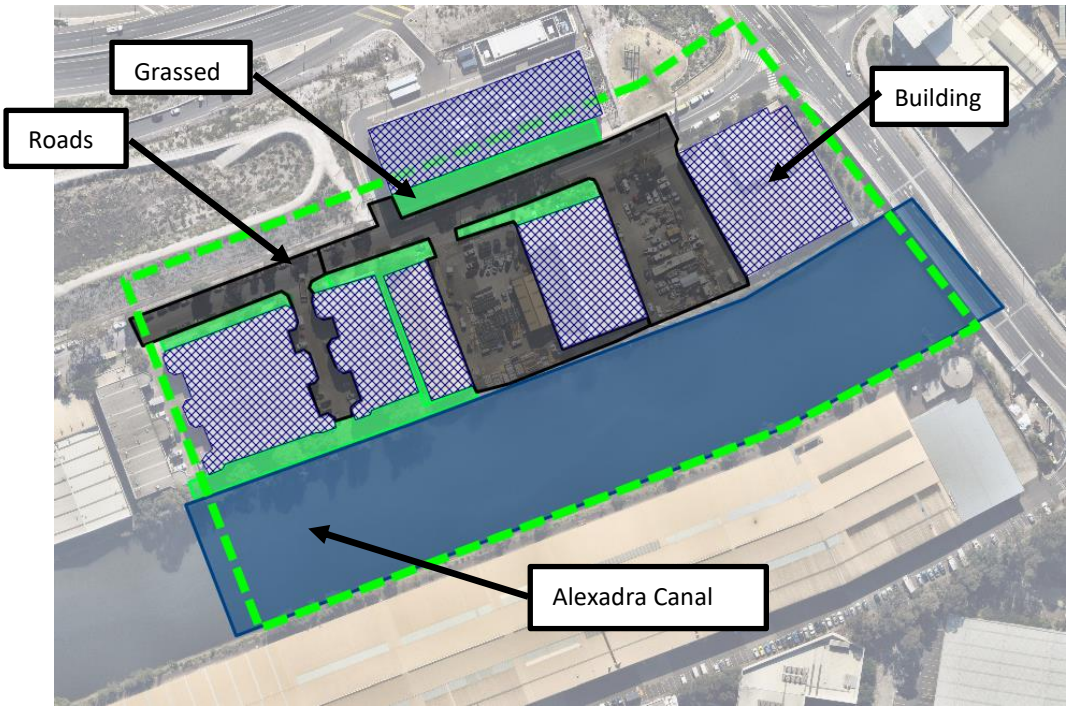

Figure E3.2: Manning's Roughness Surface Areas (Pre-Development)

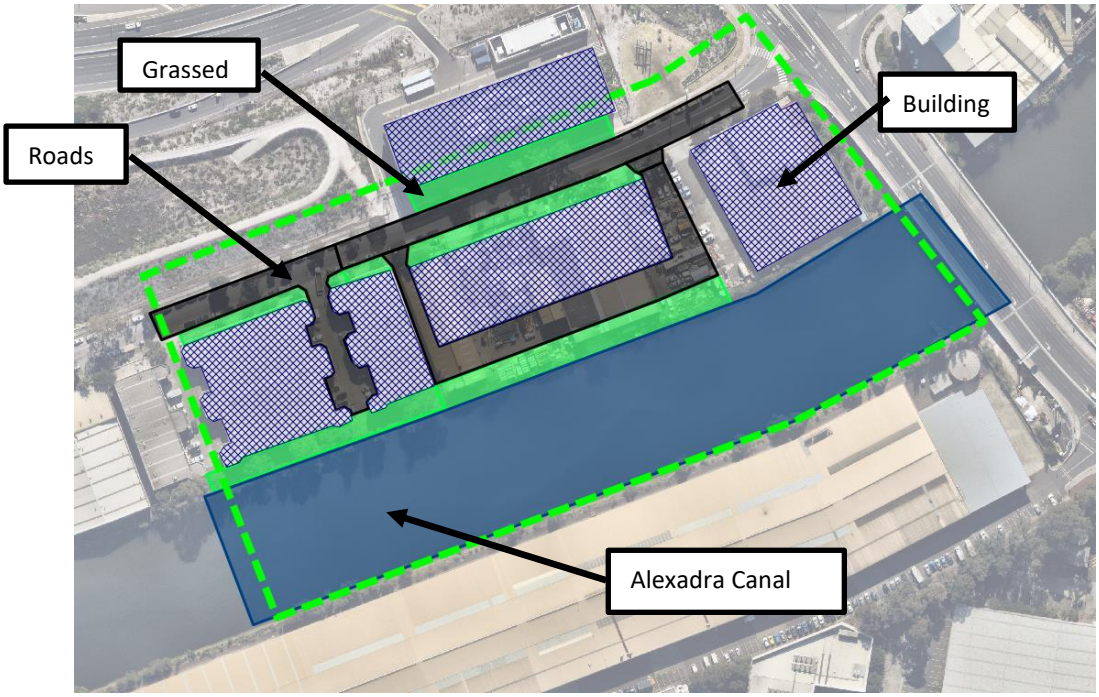

Figure E3.3: Manning's Roughness Surface Areas (Post-Development)

E.4 MODEL OUTPUT

Model output for pre and post development conditions for the Catchment flooding events on site as discussed in earlier sections have been included in the following Figures.

We note figures represent predicted values at the peak of each event. The figures represent predicted values at the peak of the 1% AEP. Further figures for the 5%, 0.5% and 0.2% AEP and PMF event can be found in **Appendix E2** of this report.

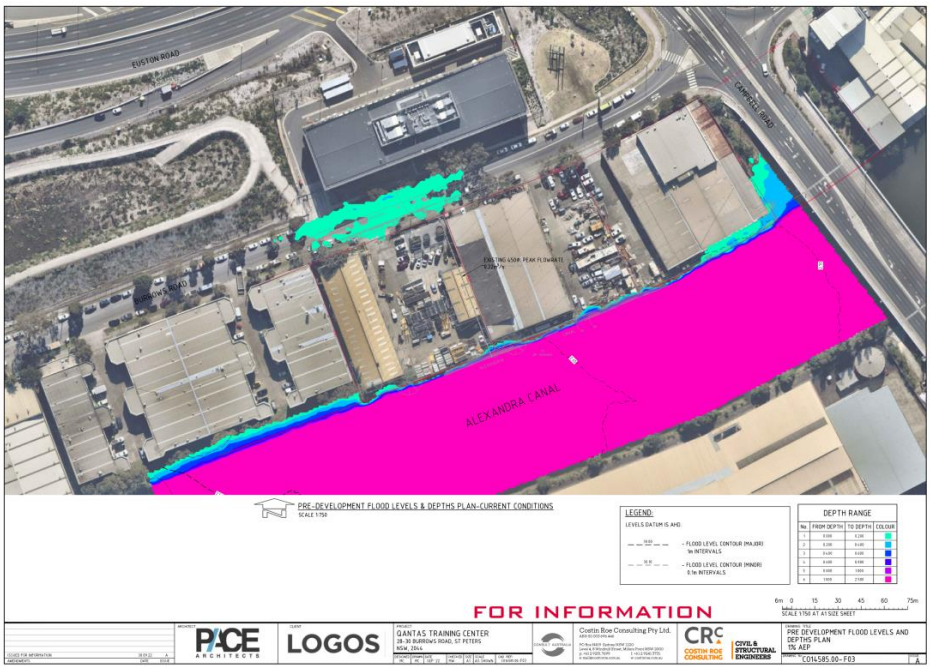

Figure E4.1: 1% AEP Flood Depths – Pre-Development

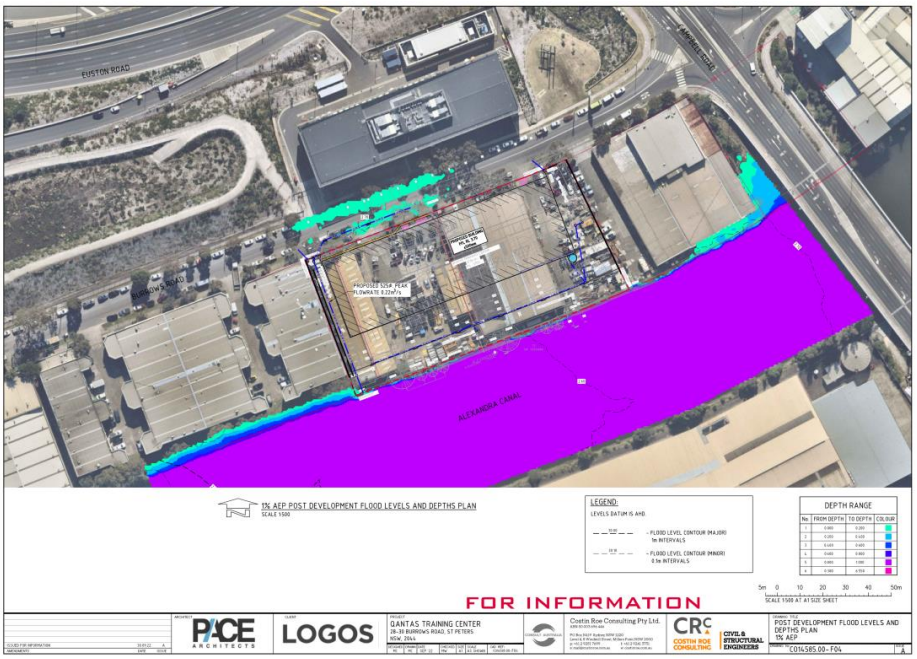

Figure E4.2: 1% AEP Flood Depths – Post Development

Figure E4.3: 1% AEP Flood Afflux Plan

E.5 FLOOD ASSESSMENT DISCUSSION

This Appendix to the *Civil Engineering Report* for 28-30 Burrows Road, NSW, has been prepared to assess the effect of flooding on the proposed development, and also to confirm no affectation on upstream downstream or adjoining properties.

A TUFLOW hydrodynamic flood model has been completed and the pre and post development flood events assessed for the 5%, 1%. 0.5%, 0.2% AEP and PMF rainfall event.

The assessment shows a reduction in post development 1% AEP flood levels, hence meeting impact requirements.

The assessment shows the proposed building achieves flood planning and freeboard requirements

This Appendix confirms the technical input and detailed output completed as part of the assessment. **Appendix E** is to be read in conjunction with **Section 7** of this report.

Appendix F1

SYDNEY WATER OSD REQUIRMENTS/ CONSULTATION

RE: [External] 28-30 Burrows Road, Alexandria OSD

S Stormwater <Stormwater@sydneywater.com.au>
To Denis Webber

Denis,

On Site Detention is not required for any development at 28-30 Burrows Road, Alexandria.

Best Regards

Planning and Technical
City Growth and Development
Business Development

Level 13, 1 Smith Street
Parramatta NSW 2150

Sydney WATER

Sydney Water respectfully acknowledges the traditional custodians of the land and waters on which we work, live and learn. We pay respect to Elders past and present.
Read more about our commitment to reconciliation.

Appendix F2

CITY OF SYDNEY CONSULTATION

From: Paul Brisby <PBrisby@cityofsydney.nsw.gov.au>
Sent: Tuesday, 13 September 2022 9:41 AM
To: Mark Linfoot <MarkLinfoot@logosproperty.com>
Cc: Stuart McTaggart <SMcTaggart@cityofsydney.nsw.gov.au>; Marie Burge <mburge@cityofsydney.nsw.gov.au>; Jane Grant <JGrant@cityofsydney.nsw.gov.au>
Subject: RE: CAE Stormwater Solution

Hi Mark

Stuart and I discussed the issue yesterday and can provide the following comments.

- Request to build over existing easement / pipe
    - The easement terms require Council approval of any build over.
    - Although there is currently part of an existing building over the easement, the form of the existing building is different (open portal frame ancillary building) and does not significantly impede access to the pipe as the proposed new building would.
    - The pipe services a trapped low point on Burrows Road and is a critical asset; where a more accessible route for this pipe is available it should be taken.
- Proposed realignment of Council pipe through the western edge of the site
    - The section of the realigned pipe running parallel to Burrows Road should be located under the kerb in Burrows Road where possible. This will increase maintenance accessibility, reduce the area of the site burdened by the easement and allow more deep soil space in the building setback for screening planting.
    - Proposed easement shall comply with the Sydney Streets Technical Specification.
- Flood risk
    - Flood model results currently show shallow overland flow through the site below the 150mm depth threshold mapped in the reports on the City's website.
    - The flood impact assessment of the proposal shall consider the change in site levels and the realignment to the pipe draining Burrows Road. Flood modelling shall be used to demonstrate compliance with the City's Interim Floodplain Management Policy.

Council would not support any new building over the storm water pipe. Council will however consider a relocation of the pipe and associated easement subject to appropriate flood modelling demonstrating the impacts of the relocation are acceptable in terms of Council's Interim Floodplain Management Policy.

From: Mark Linfoot <MarkLinfoot@logosproperty.com>
Sent: Monday, 12 September 2022 12:23 PM
To: Paul Brisby <PBrisby@cityofsydney.nsw.gov.au>
Subject: CAE Stormwater Solution

Understood Paul,

Shall we leave the meeting in the diary for tomorrow and if Stuart is still waiting on the advice, we just cancel the meeting.

What do you think?

Regards,

Mark Linfoot

General Manager Development - NSW

M. +61 414 403 625

MarkLinfoot@logosproperty.com

logosproperty.com

LOGOS

From: Mark Wilson
Sent: Thursday, 8 September 2022 12:36 PM
To: Paul Brisby <PBrisby@cityofsydney.nsw.gov.au>
Cc: Erin Dethridge <edethridge@urbis.com.au>; Athlene Kyle <AthleneKyle@logosproperty.com>
Subject: RE: St Peters flight Training Centre (28-30 Burrows Road St Peters) - Easement

Thanks for the response Paul,

The early concept shows the relocation you noted, however we are looking at opportunity to keep the pipe and easement in its current location due to the issues with new connections to the heritage canal and having the visibility of the terms of the easement (which permit structures subject to approval) which weren't known when the earlier plans you have seen were produced.

If you can let me know who from water assets has been included, thankyou and appreciate the assistance.

Mark Wilson
Director

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Level 4, 8 Windmill Street, Millers Point
PO Box N419, Sydney, NSW 1220 Australia
p: +61 2 9251 7699

m: +61 421 847 808
e: Mark@costinroe.com.au
w: costinroe.com.au

Offices in Sydney, Adelaide, Brisbane, Melbourne, Newcastle and Wollongong.

From: Paul Brisby <PBrisby@cityofsydney.nsw.gov.au>
Sent: Thursday, 8 September 2022 11:44 AM
To: Mark Wilson <Mark@costinroe.com.au>
Subject: RE: St Peters flight Training Centre (28-30 Burrows Road St Peters) - Easement

Hi Mark

Thanks for the information however it appears to differ what has been submitted to us from the planning section. The submission we have been requested to consider is relocation of the pipe/easement to the sites southern boundary.

Clarification will be needed of which option is being proposed.

I am the civil engineer working in Councils public domain unit that assesses DA's, however I do not have authority to relocate councils storm water assets. This lies with Councils water assets team who are aware of the application and will be attending tomorrow's meeting.

I have forwarded your email to them for consideration.

From: Mark Wilson <Mark@costinroe.com.au>
Sent: Thursday, 8 September 2022 10:28 AM
To: Paul Brisby <PBrisby@cityofsydney.nsw.gov.au>
Cc: Athlene Kyle <AthleneKyle@logosproperty.com>; Erin Dethridge <edethridge@urbis.com.au>; Mark Linfoot <MarkLinfoot@logosproperty.com>; Marie Burge <MBurge@cityofsydney.nsw.gov.au>; Denis Webber <denis.webber@costinroe.com.au>
Subject: St Peters flight Training Centre (28-30 Burrows Road St Peters) - Easement

Good Morning Paul,

We are the civil engineers working on the design of an upcoming state significant development application at 28-30 Burrows Road. We were provided your contact via Marie Burge as the relevant person from Council regarding engineering queries on this site.

We provide this email prior to the pre-development application meeting (scheduled tomorrow at 11am) regarding a query we have on the existing easement on the property which drains local runoff from Burrows Road to the Alexandra Canal.

There is an existing inter-allotment stormwater drainage line (450mm RCP) which is located on the site (refer attached survey sketch). The new development footprint crosses the existing easement line.

The terms of the easement (refer also to attached sketch for terms, Lot 2 DP212652, Book 880 No 2596) permits "*erection of a building upon in or over the land provided the foundations of any such building shall be constructed in accordance with plans approved by and to the satisfaction of the grantee*".

We note the Council DCP states that "*structures in the vicinity of the stormwater network shall not impose any load onto the pipe*".

We note an existing structure is currently constructed over the pipe and easement.

It is proposed for the pipe and easement to remain in its current alignment, noting the permissibility of the terms of the easement and existing building construction currently on the easement. We request in principle agreement that the easement and existing pipe can remain in its current alignment for the new development proposed. We note this would be subject to the provision of a suitable engineering solution to ensure adequate protection of the pipe and having the pipe continuing to drain the Burrows Road drainage system.

It would be appreciated if you could please review for discussion in the pre-development application meeting tomorrow.

Your assistance is appreciated.

Mark Wilson
Director

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