ARCADIS

Design & Consultancy
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Moorebank Precinct East Stage 2 Proposal Response to Submissions

Appendix E3: EIS Stormwater and Flooding Assessment Appendix C - MUSIC Modelling

SIMTA

SYDNEY INTERMODAL TERMINAL ALLIANCE

Part 4, Division 4.1, State Significant Development

APPENDIX C

MUSIC Modelling Information

C.1 Music Modelling Data & Parameters

The MUSIC models proposed for the Existing and Developed scenarios of the proposed SIMTA Moorebank Intermodal Terminal Facility Site are as indicated in **Figure C1** and **Figure C2** respectively.
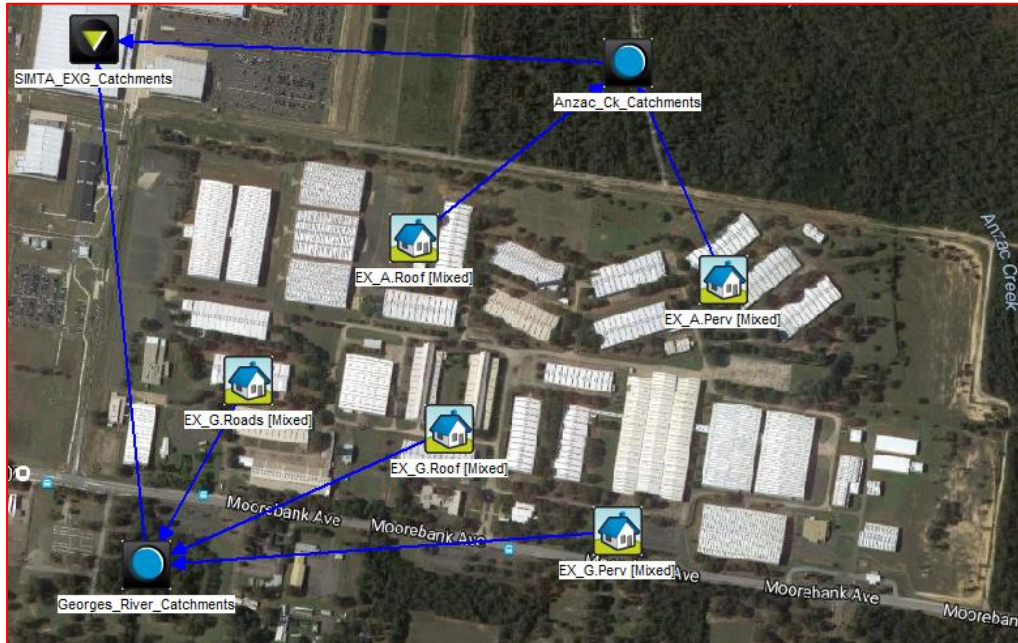

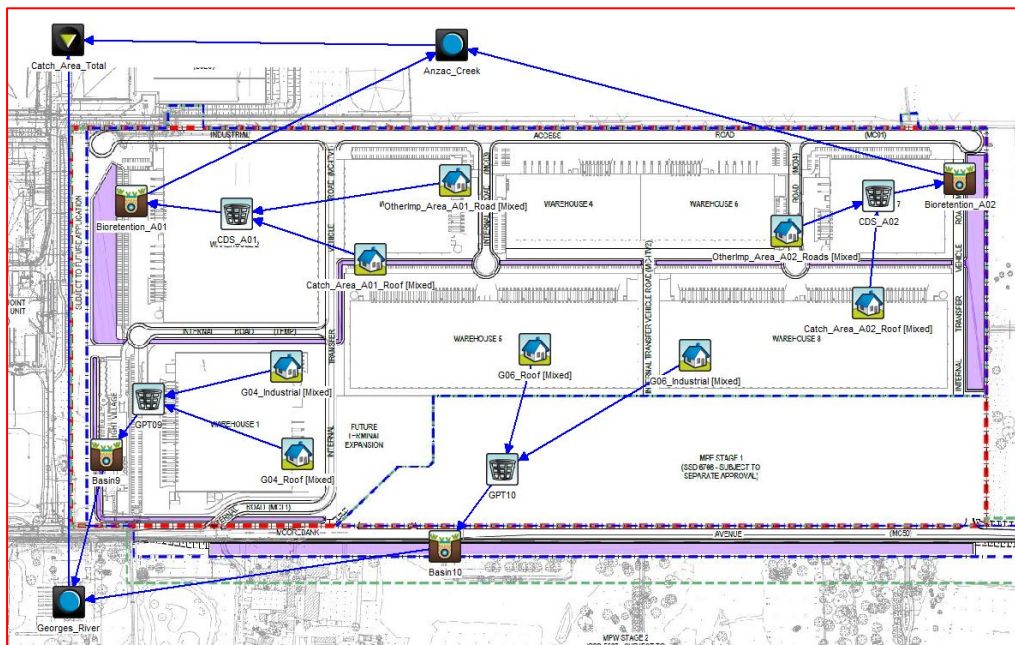Figure C1: MUSIC Model Layout for Stage 2 Site - Existing Conditions

Figure C2: MUSIC Model Layout for Stage 2 Site - Developed Conditions

The same input data and parameters were used in both Existing and Developed MUSIC models. A discussion of these input data and parameters is given below.

C.2 Rainfall Data

A 6-minute interval pluviograph data from Liverpool's Whitlam Centre (Station No. 067035), which is situated about 3 km north of the SIMTA site, was used in the MUSIC model. Pluviograph record from 1 January 1967 until 31 December 1976 was selected for the MUSIC modelling. The mean annual rainfall for this data period is 857mm, while the 40-year average annual rainfall for Liverpool is 868 mm.

A summary of the rainfall data is given in **Table F1** while a plot of the 10-year pluviograph data is shown in **Figure F3**.

Table C1: Rainfall data used in the model

Station No.	Location	Years of Record	Type of Data
067035	Liverpool	1967-1976 (10 years)	6 minute

C.3 Evapotranspiration Data

Monthly average potential evapotranspiration (PET) data for Sydney was used in the MUSIC model. These PET values are shown in **Table F2** and plotted in **Figure F3**.
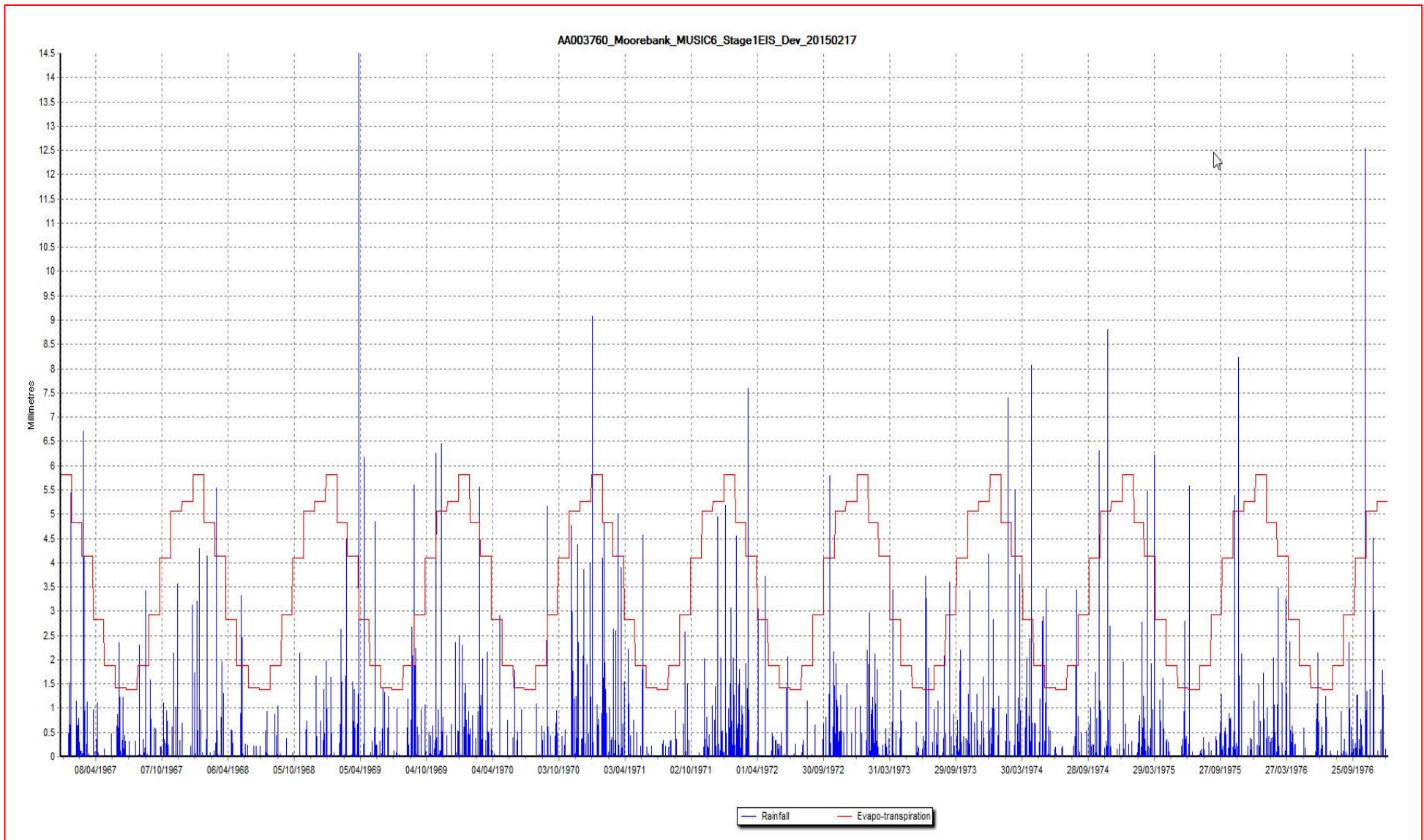
Table C2: Monthly potential evapotranspiration (PET) values for Sydney

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PET (mm)	180	135	128	85	58	43	43	58	88	127	152	163

C.4 Rainfall-Runoff Parameters and Pollutant Loading Rates

The upper soil profile within the Stage 2 site has been generally classified as Clayey Sand (Golder Associates' Geotechnical Report, 2014). The rainfall-runoff parameters corresponding to Clayey Sand adopted for MUSIC model are consistent with the values recommended by SCA's *Using MUSIC in Sydney's Drinking Water Catchment (2012)*. The rainfall-runoff parameters are summarised in **Table C3**.

The pollutant loading rates adopted for TSS, TP and TN for various land use categories are also based on SCA's *Using MUSIC in Sydney's Drinking Water Catchment (2012)*. The event mean concentration values (EMC) and standard deviation values for TSS, TP and TN adopted for both dry and wet weather are summarised in **Table C4**.

Figure C3 Rainfall and potential evapotranspiration data used in MUSIC for the 1967-1976 period

Table C3: Adopted rainfall-runoff properties for the site

Parameter	Units	Urban
Impervious Areas		
Rainfall Threshold	mm	0.3 (Roofs) 1.5 (Roads) 1.5 (Industrial)
Pervious Areas		
Soil Storage Capacity	mm	107
Initial Storage	% of Storage Capacity	30
Field Capacity	mm	75
Infiltration Capacity Coefficient – a	-	250
Infiltration Capacity Coefficient – b	-	1.3
Groundwater Properties		
Initial Depth	mm	10
Daily Recharge Rate	%	60
Daily Baseflow Rate	%	45
Daily Deep Seepage Rate	%	0

Table C4: : Adopted mean pollutant concentration & standard deviation values for MUSIC source nodes

Pollutant	Pollutant Concentration (log mg/L)*					
	Roads / Carparks		Roofs		Industrial	
	Wet Weather	Dry Weather	Wet Weather	Dry Weather	Wet Weather	Dry Weather
TSS	2.43 (0.32)	1.20 (0.17)	1.30 (0.32)	-	2.15 (0.32)	1.20 (0.17)
TP	-0.3 (0.25)	-0.85 (0.19)	-0.85 (0.25)	-	-0.60 (0.25)	-0.85 (0.19)
TN	0.34 (0.19)	0.11 (0.12)	0.30 (0.19)	-	0.30 (0.19)	0.11 (0.12)

 * Standard deviation values are in brackets below the log concentration values

C.5 STORMWATER TREATMENT DEVICES PROPERTIES

The sizes of the proposed bioretention systems, and the properties of the bioretention systems and gross pollutant traps used in the Developed MUSIC model for Stage 2 are summarised in **Table C5, Table C6** and **Table C7** respectively.

Table C5: Proposed Bio-retention Treatment Measures

Catchment	Treatment Measure	Catchment Area (ha)	Bio-retention Filter Area (m²)
A01	Raingarden	15.0	3500
A02	Raingarden	27.6	1800
G04	Raingarden	12.2	1900
G06	Raingarden	14.0	2000

Table C6: Properties of the bioretention systems

Property	Value
Inlet Properties	
Low Flow Bypass (m³/s)	0
High Flow Bypass (m³/s)	100
Storage Properties	
Extended Detention Depth (m)	0.30
Filter and Media Properties	
Unlined Filter Media Perimeter (m)	0.01
Saturated Hydraulic Conductivity (mm/hr)	100
Filter Depth (m)	0.40
TN Content of Filter Media (mg/kg)	600
Orthophosphate Content of Filter Media (mg/kg)	9
Infiltration Properties	
Exfiltration Rate (mm/hr)	0
Lining Properties	
Is base lined?	Yes
Vegetation Properties	
Vegetated with Effective Nutrient Removal Plants	Yes
Outlet Properties	
Overflow Weir Width (m)	5.0
Underdrain present?	Yes
Submerged Zone with Carbon Present	No

Table C7: Properties of the gross pollutant trap

Property	Value
General Properties	
CDS Vortex type	-
High Flow Bypass (m^3/s)	> 3 month flow
Transfer Function	
Total Suspended Solids (TSS) for concentrations > 75 mg/L	75%
Total Phosphorus (TP) for concentrations > 0.5 mg/L	15%
Total Nitrogen (TN)	14%
Gross Pollutants	90%