

19.01.2024

204087

Tract
Wurundjeri Country
Level 6, 6 Riverside Quay
Southbank VIC 3006 Australia

Attention: Mia Zar

NVVM

TTW-Civ-Memo-001 - Current site functional layout and site stormwater management

Dear Mia,

This memo is in relation to the Stormwater Management Strategy Report developed for the National Vietnam Veterans Museum.

TTW have reviewed the new scheme, taking into consideration the relocation of the building within the same area and the general lack of significant changes to catchments and related factors.

After thorough analysis, we can confirm that the proposed amendments to the site scheme will not have any substantial impact on the existing drainage strategy. The key elements of the strategy remain applicable and effective in the context of the new scheme.

If you have any questions or require further clarification, please do not hesitate to reach out.

Yours faithfully,
TTW (VIC) PTY LTD



Jake Barnes
Civil Associate Director

**ADVERTISED
PLAN**

\\TTW\dfs\ttwCold\2020\204087\Jobfiles\Memo Out\CIV Memo 001- SWMSR and current scheme.docx

**ADVERTISED
PLAN**

Stormwater Management Strategy Report

National Vietnam Veterans Museum

Prepared for Architectus / 30 August 2021

204087

Document Revisions

AUTHOR	REVIEWED BY	APPROVED BY	ISSUE	STATUS	DATE
AAH	JDB	JDB	Issue for Information	DRAFT	27/07/21
AAH	JDB	JDB	Issue for Information	REV 02	03/08/21
AAH	JDB	JDB	Issue for Information	REV 03	30/08/21
JDB	EC	EC	Issue for Information	REV 04	24/01/22
JDB	EC	EC	Issue for Approval	REV 05	01/02/22
JDB	EC	ADL	Issue for Information	REV 06	20/12/22
JDB	EC	EC	Issue for Approval	REV 07	19/01/23
JDB	EC	EC	Issue for Approval	REV 08	22/01/24

**ADVERTISED
PLAN**

Contents

1.0	Introduction	4
2.0	Previous Planning Application.....	4
3.0	Site Overview	5
3.1	External Catchment	5
3.2	Ground Conditions.....	7
3.3	Catchment Characteristics.....	7
3.4	Surface Runoff.....	11
4.0	Stormwater Drainage Design.....	13
4.1	Minor Flows	13
4.2	Major Flows	14
5.0	Wetland Storage.....	14
5.1	Data	14
5.2	Runoff Simulation	14
5.3	Storage Model	15
5.4	On-Site Detention	17
6.0	Stormwater Quality	20
7.0	Conclusions.....	22
	Appendix A	23
	Appendix B	24
	Appendix C.....	25
	Appendix D.....	26

**ADVERTISED
PLAN**

ADVERTISED PLAN

1.0 Introduction

TTW has been engaged by Architectus to prepare a Stormwater Management Strategy for the site of the new National Vietnam Veterans Museum. This report aims to demonstrate that the proposed development meets the drainage requirements for flood mitigation, water quality and runoff quantity, in accordance with the appropriate authority guidelines and standards.

The subject land has an area of approximately total 40ha, and local council is Bass Coast Shire Council. The site is located in LOT 1 PS729804 next to Phillip Island Road (Figure 1). There is an existing wetland within the site with no underground services. The overland flow from the 1 in 100-year Average Recurrence Interval (ARI) storm event the site gap flows ultimately drain into the Fisher's wetland to the north of the site and then outfall into Westernport Bay.

The site is identified as having potential Aboriginal Cultural Heritage Sensitivity and identified as being within a Bushfire Prone Areas Area. However, there are no Flooding/Inundation overlays that would typically require a pre-development advice application and assessment from Melbourne Water.



Figure 1 – National Vietnam Veterans Museum Location (Nearmap)

2.0 Previous Planning Application

The development of this Site by the NVVM was originally proposed in 2021. Melbourne Water comments for the proposed development for Lot 1, 24 Churchill Road, Newhaven 3925 were received in June 2021. In the document, MW expressed concerns that the works were inconsistent with their drainage and waterway management guidelines.

Two waterways denominated “Creek 3261” and a tributary of Creek 3261 are referenced in the MW letter, which are mapped in VicPlan as indicated in the referral letter (Appendix B).

The key issues from the Melbourne Water correspondence that are to be addressed in the stormwater management plan are as follows:

- The potential environmental and water quality impacts from the proposed development into the downstream properties, including Fisher's Wetlands and Western Port Bay.
- The increase of the stormwater flows and discharges as a consequence on the change in impervious surface from the proposed development.
- The comments from Council's drainage engineers as captured in email correspondence "210094 - Development Services request for further information" dated 27th April 2021

TTW has developed this Stormwater Strategy Report to demonstrate that the proposed development has implemented the necessary steps to comply with the Stormwater Management Policy (2009) from Bass Coast Shire Council. This includes

- Flows from site limited to predevelopment conditions
- 100-year ARI detention provided for the site
- Best Practice Storm Management.

Meeting was held with Melbourne Water, Bass Coast, Tract and TTW on the 8th July 2021 to discuss the site in it's current condition and it was agreed by all parties that the two waterways nominated as Creek 3261 were man made formalised channels to control runoff through the site and held no environmental significance.

3.0 Site Overview

3.1 External Catchment

Preliminary review of available lidar information suggests that an external catchment south of Phillip Island Road (Figure 2) discharges approximately 200m the west of the proposed development works with the proposed works having no influence on this flow path. The size of the catchment is defined and controlled by the elevated road adjacent. The catchment is bounded by Phillip Island Road to the north, the existing airport runway to the southeast and fall of the land to the north west. The estimated catchment area is 46Ha.

It catchment discharges into the property land parcel via a culvert system below the main road, approximately 175m west of the development works. The road is elevated up to 1.0m, with the 1200 x 350 culvert spanning under. The culvert discharges to an open swale that is located approximately 175m west of the area of the subject site proposed for development. Recent site visit measurements suggest it is approximately 2.5m wide and 500mm deep. The site works have no influence on the capacity of the swale and the swale will be un disturbed during the works.

The incoming flow from the southern catchment depends on the size of the culvert and the level of the road. Phillip Island Road is higher than the downstream and upstream catchments, therefore high flow events from the downstream catchment will be conveyed parallel to the road and directed towards the west, effectively diverted around the subject site prior to discharging under Phillip Island road.

TTW will endeavour to attenuate flows from the proposed development to lessen the site runoff to predevelopment condition. As noted above any proposed detention system may result in a decrease of runoff from the current condition if the site is currently saturated. Detention options are explored in detail in Section 3.4 of the report.

**ADVERTISED
PLAN**

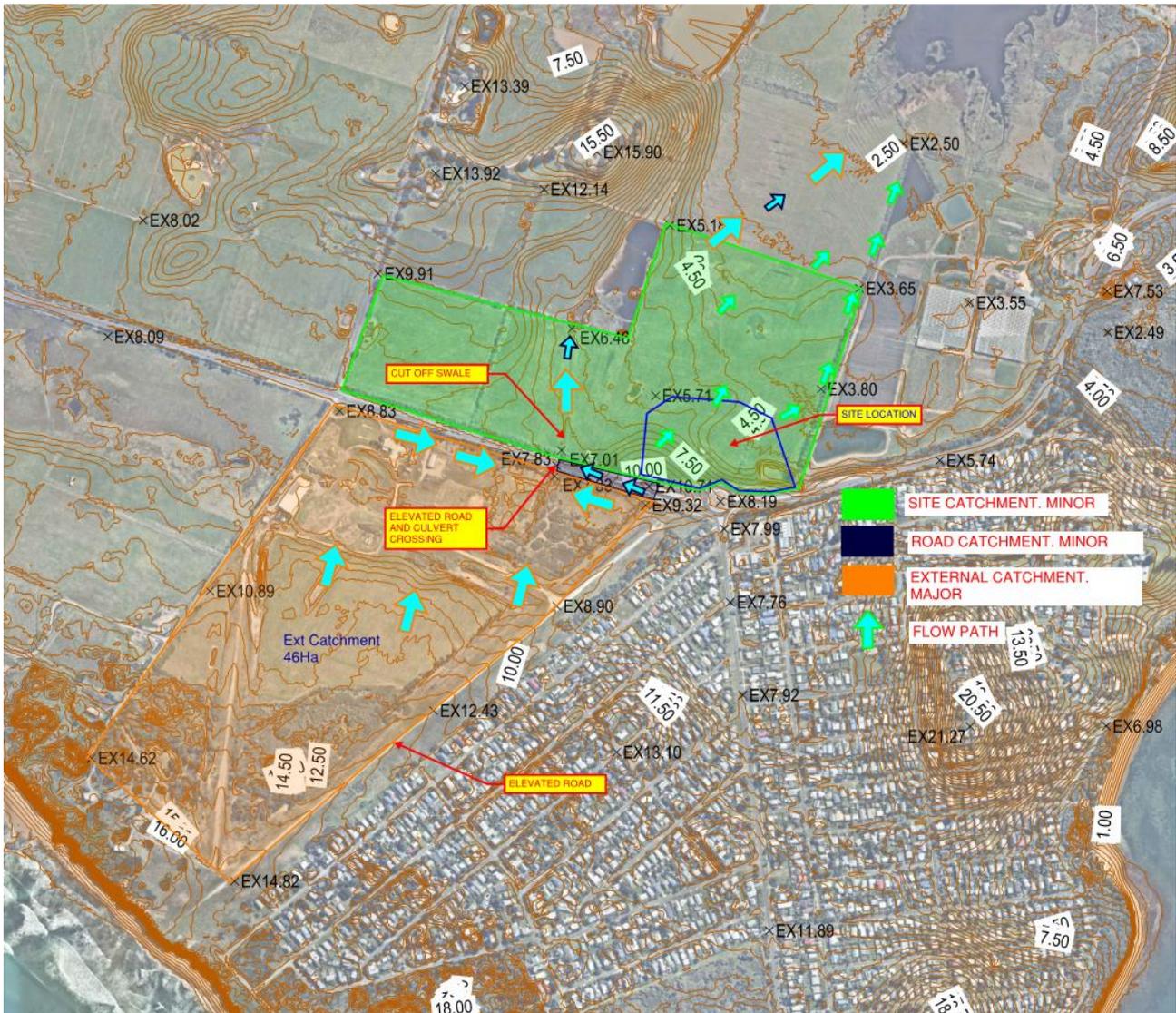


Figure 2 - External Catchment entering property 175m west of site works

The potential external flow discharged through the site (west of the development) from the southern catchment has been estimated with drains with a peak flow of 2.74 m³/s for a 1 in 10-year event. A preliminary analysis of the Lidar data suggests the culvert (1200 x 350 mm under the road carriage) has a slope of approximately 1.5%. This analysis was carried out and estimated that 1.44 m³/s from the estimated peak flow is conveyed through the culvert and into the open drainage system. The model also shows that the water depth in the proposed existing channel will be 0.495 m which is 0.04 m higher than the safe limit. This is all theoretical and additional survey of the culvert will be required. TTW can also look to re-establish the swale such that it meets the appropriate guidelines for flood safety.

The amount of flow that enters the land north of Phillip Island Rd via the existing culvert will require further assessment. Additionally, the existing open drainage channel characteristics will also need to be defined to produce an accurate analysis of the external flows. TTW assumes that the existing channel conveys the incoming flows and confirm that the proposed works will not interfere with the current hydraulics of the area.

**ADVERTISED
PLAN**

3.2 Ground Conditions

According to an existing Geotechnical Investigation Report from 2003 provided for the current Veteran's Museum, the existing conditions of the site (located on the south side of Phillip Island Road) indicate that the soil composition consists mainly of silt and silty clay with a high level of moisture. This underlying geology is older volcanic clays that have an extremely low infiltration rate.

During the site visit in 2020, it was observed that the soil was highly saturated, and as such the contributing runoff from the site is likely high. Initial consideration was the site being flat was contributing to the saturation, however, lidar mapping indicates that there is sufficient fall toward the tidal wetlands for sheet flow. Therefore, it is likely the site is saturated due to the water table and effectively acting as an impervious site.

If the site is saturated, it is likely all rainfall will become surface runoff and any proposed development may have little impact on the increased runoff.



Figure 3 - Existing Cut Off Drainage

3.3 Catchment Characteristics

The existing site is zoned as agricultural land and its naturally low-lying area. The site falls from north-east to south-east, then falling away to the north with flows being clearly directed into the existing wetland/dam system located towards to Churchill Island north-west of the property. GIS data (Figure 4) shows an approximate 1:60 to 1:120 slopes and a 7-meter fall across the site from south to east, approximately.

**ADVERTISED
PLAN**

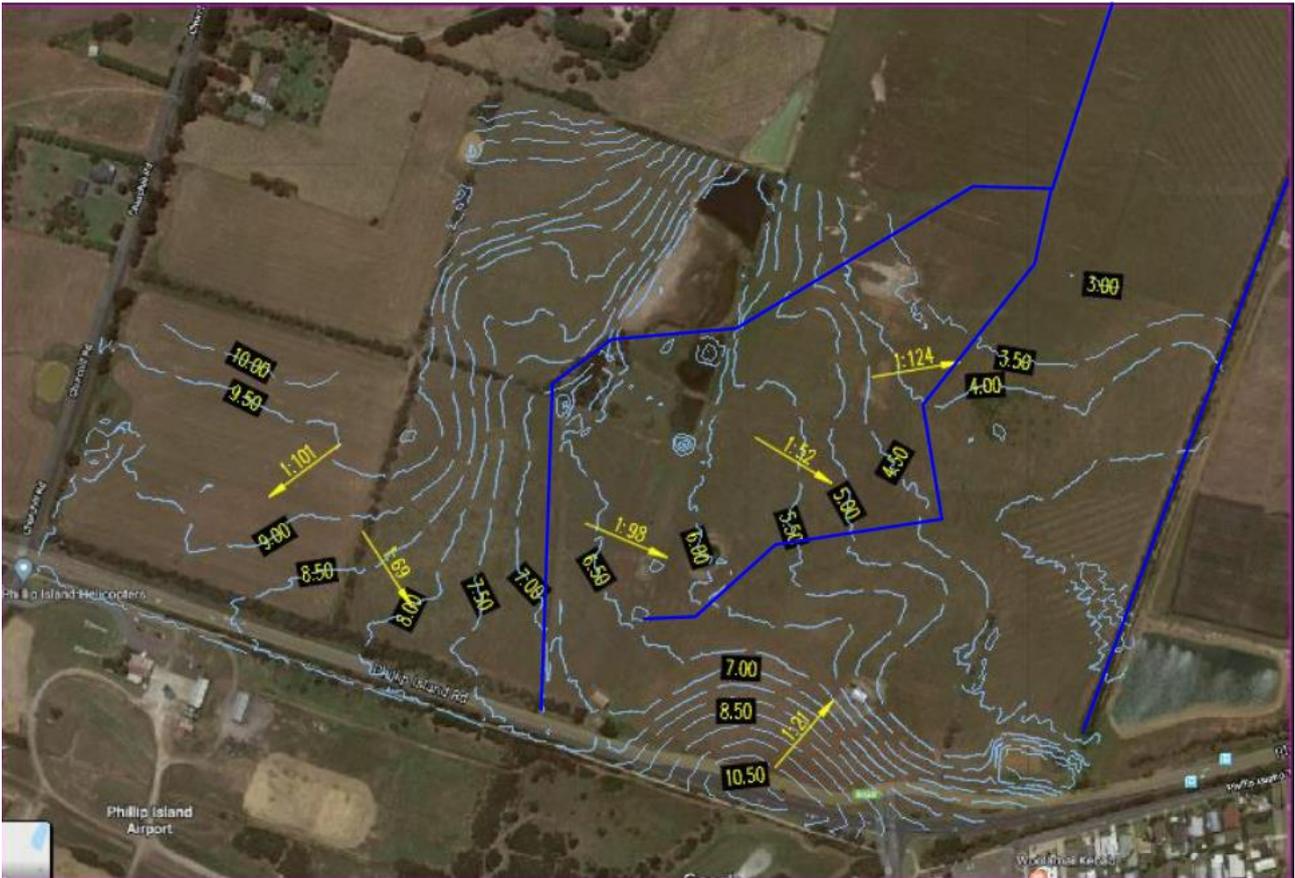


Figure 4 - Catchment Areas for MUSIC Model

The design team carried out an inspection on July 6, 2020, to assess the current conditions of the site and observe the existing open channel system. The channels within the site appear to be artificial drainage channels (swales) that are constructed to convey external in internal flows through the site (Appendix B). The GIS image (Figure 4) shows the location of the drainage channels. There are 3 in total. Western channel through the site, conveys flows from the major catchment south of Phillip Island Road. The central channel, another artificial channel, collects internal flow and directs it north through the site and another main drain outside the east boundary collects the western portion of the site.

The land does not fall within the Land Subject to Inundation Overlay, however it's adjacent to an existing open channel that ultimately discharges into the bay, therefore TTW is required to perform a catchment analysis to assess the development in its proposed/future condition and demonstrate that flows are restricted to predevelopment conditions.

Design site levels have been developed to adhere to DDA compliance guidelines and address all site constrains. The floor level has been set at RL5.75. This is approximately 1.0m below the cut off swale level that conveys the major southern catchment through the parcel of land, 175m to the west.

**ADVERTISED
PLAN**



Figure 5: Main Cutoff Swale 175m west of site works

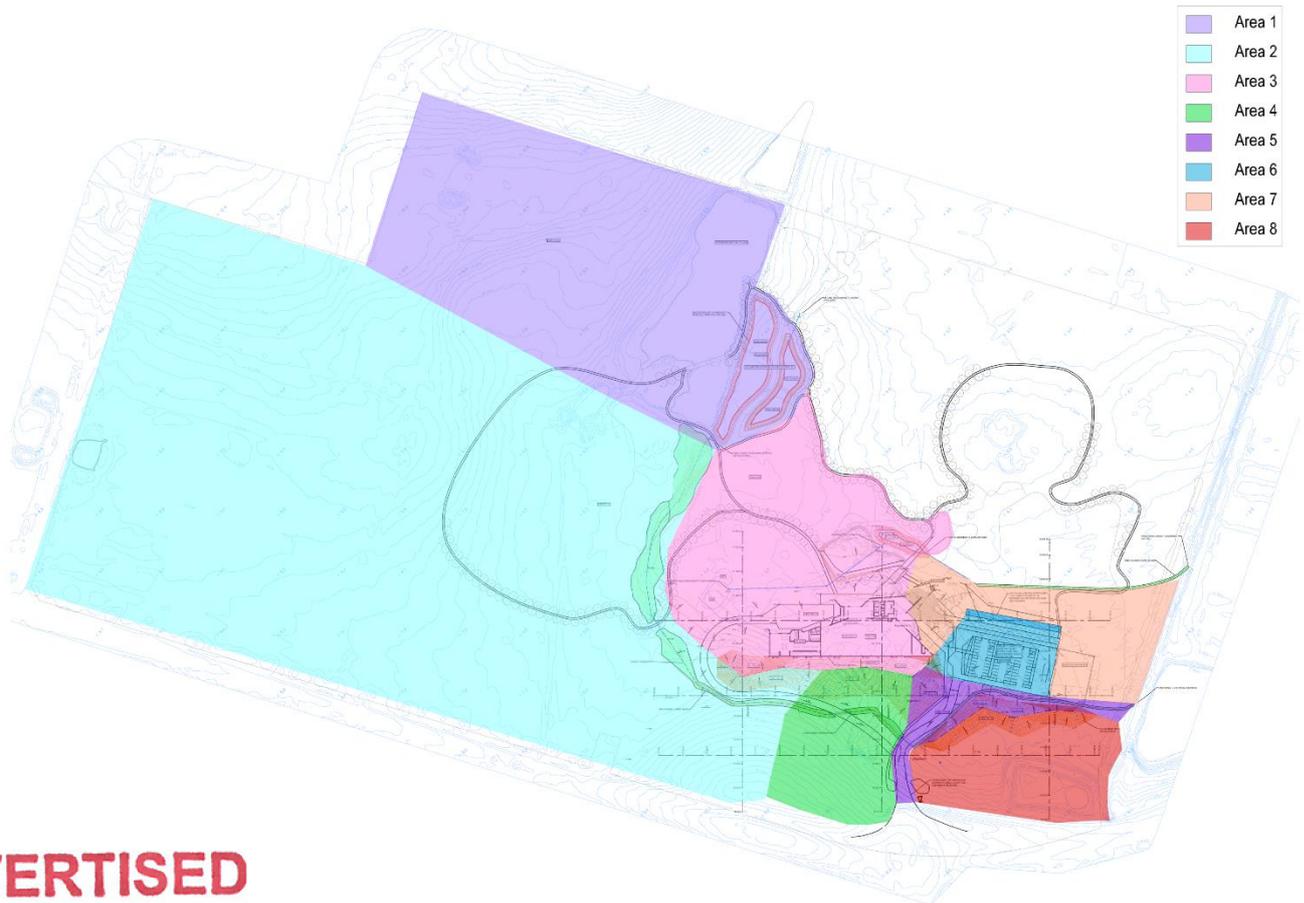
The proposed development results in a minor change to the natural runoff conditions in the immediate area of works (minor catchment). This includes, discharge into the existing wetland/dam and the open drain at the east side of the property.

As discussed in above, external flows and the majority of internal flows from the west portion of the site are currently directed to the existing wetland/dam on the northern boundary via the main cutoff drain through the centre of the site (175m west of the site works). A second smaller internal catchment discharges to an existing open drain east of the main cutoff drain and the remainder of the site is falling NE to eastern boundary and another major swale outside the eastern site boundary.

The proposed development will result in some change to the natural runoff conditions in the immediate area of works (minor catchment), however, broadly speaking the change to internal site catchments will be minimal, and mostly follow existing conditions. Notwithstanding, a small portion of the site (approximately 1Ha) north of the structure within Catchment Area 3 (see Figure 5 below) will be redirected east (central swale), to the new internal wetland, located adjacent the existing internal dam, with a top of water level approximately 0.5m below the existing dam top of water level (see appendix a). This accounts for less than 1% over the overall catchment area flowing through and around the site, and any additional flow will be attenuated to predevelopment conditions.

**ADVERTISED
PLAN**

The following figure (Figure 5) shows the catchment areas in which the site has been divided and the Effective Impervious Areas that correspond to each one of the outlets.



ADVERTISED PLAN

Figure 6 - Catchment Areas for MUSIC Model

The catchment areas have been established from the different stormwater systems and drainage networks proposed within the site. The catchment characteristics are described as follows:

- **Area 1** is a greenfield area that flows into the existing dam and overflows into the 2 new wetlands system adjacent.
- **Area 2** consist of a greenfield area that flows into the existing cut off swale and to a proposed swale system and finally outfalls into the wetland systems.
- **Area 3** consists of an internal catchment with a combination of roof, pavement and landscape/greenfield areas that discharges into a detention pond with outlet directed to the existing major swale along the eastern boundary of the site.
- **Area 4** is a combination of greenfield and mound and the runoff is directed into an open swale and it partially discharges under the proposed access road into the swale to the proposed detention pond adjacent the proposed car park.
- **Area 5** captures the flows from catchment 4 and directs the flows under the road and finally outfalls into a third swale through the proposed detention pond.

- **Area 6** only includes the proposed carpark area, and the runoff is discharged into a proposed bio-swale system that incorporates a filter media and an underground infiltration On-Site Detention (OSD) tank that captures the filtered water. The treated flows and overland flows from this area are also discharged into one of the proposed swales and ultimately outfall into the existing open drain.
- **Area 7** consist of a combination of open paved and greenfield areas that discharge into a fourth swale that discharges into the open channel.
- **Area 8** incorporates a mound and greenfield area that outfalls into the same channel without any additional treatment.

The catchment areas from Figure 3 are presented in Table 1 along with the impervious area and their EIA.

Table 1 - NVVM Catchment Areas

Catchment	Area (Ha)	EIA (%)
1	6.35	0
2	17.5	0
3	3.5	24
4	1.18	0
5	0.54	24
6	0.54	100
7	1.26	12
8	1.31	0

The catchments highlighted in Table 1 are used to calculate the stormwater pollutant increase from the proposed development.

3.4 Surface Runoff

During TTW's site visit in June 2020 it was observed by the team that the ground seemed to be highly saturated and localised flooding was observed along the site (Figure 6).

**ADVERTISED
PLAN**



Figure 7 - Photo from site visit back in June 2020, showing overland flooding throughout the existing site.

As part of this study, TTW has undertaken a preliminary conceptual assessment on the impact of the saturation level within the soil for the 10-year ARI peak flows. A geotechnical study for the existing NVVM site south of Phillip Island indicates that approximately the top 1.0m is silty/sandy clays that overlays older basaltic clays, which are essentially impervious, see below figure. It is assumed that the soil parameters will be those for a silty clay under current existing conditions.

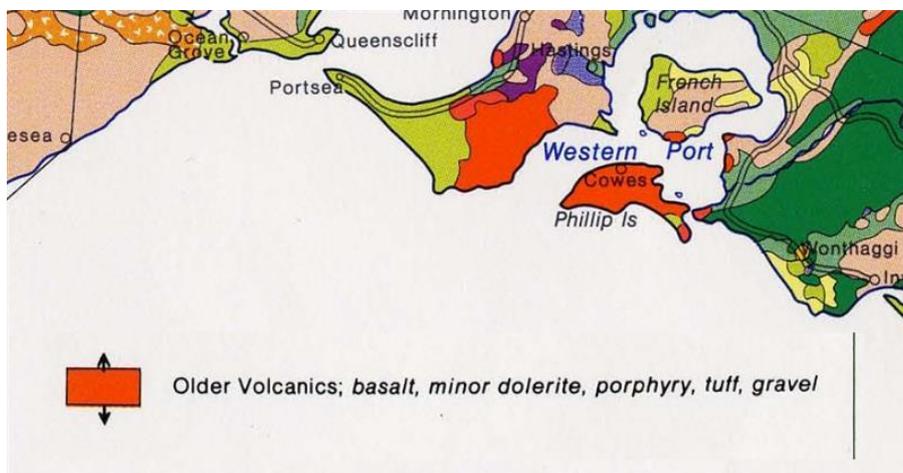


Figure 8 - Area Geology.

A preliminary flow study has been undertaken by TTW to assess the impact of the saturation level of soil on the different peak flow events. The analysis was undertaken using a DRAINS model for the pre-developed and post-developed conditions. It is estimated that from the 40-ha site area, only around 4% will consist of new impervious surfaces (roof, pavements, and mounds) that will be contributing to the runoff from the proposed plan.

**ADVERTISED
PLAN**

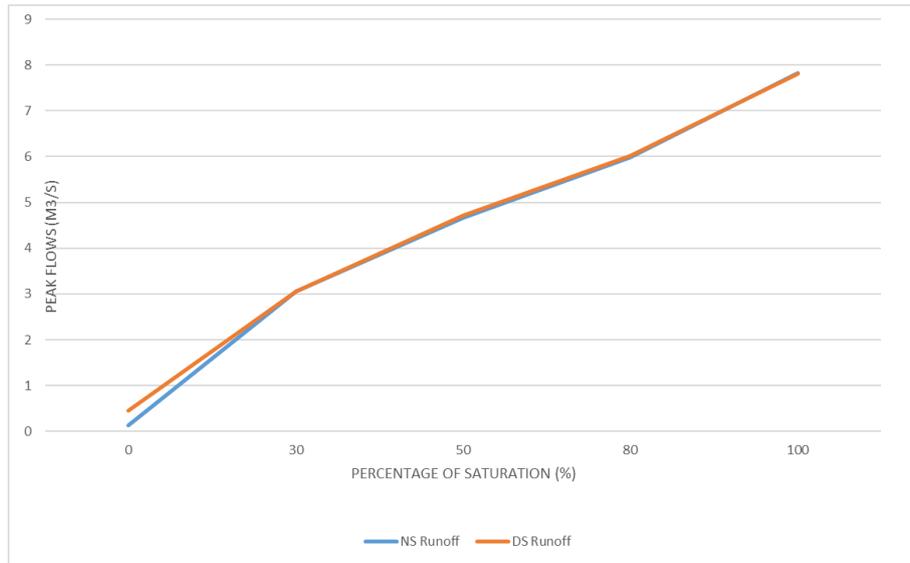


Figure 9 - Level of Saturation vs 10-year ARI Peak flow for Pre and Post Developed Conditions

The analysis was undertaken by modifying the Initial Loss-Constant Loss model on DRAINS. The IL is the amount of rainfall that occurs before the start of the surface runoff and the CL is the average loss rate through the rest of the event (infiltration). The IL parameter was changed in terms of percentage until it reaches 0 which is assumed to be equal to the 100% saturation, in other words, at the beginning of the storm there wouldn't be any losses due to soil intake and everything will become runoff due to saturation.

The model illustrates how the increase of impervious areas within the site will not have any significant impact on the amount of runoff as, it is assumed that the site is already highly saturated. It is TTW's estimation that the development won't have any impact in the downstream wetland system, as in its current saturated condition acts as a largely impervious site. Further geotechnical investigation may be required to properly assess the surface runoff and impacts to the downstream systems. Geotechnical investigation will be provided for the detailed design of the site.

4.0 Stormwater Drainage Design

The subject site drains into the existing wetland and open drain and ultimately flows into Fisher's Wetland and outfalls into the Westernport Bay. The 100-year ARI flows from undeveloped areas and permissible site discharge from the development are accommodated in the proposed WSUD systems and overland flow paths.

The internal drainage relies heavily in sheet runoff from the property and overland flows from the proposed buildings and carpark into a series of WSUD systems and 100-year on-site detention systems, including inground tank and detention basins.

4.1 Minor Flows

The internal drainage from the from the proposed site consists of roof drainage systems, downpipes and any rainwater harvesting tank overflow that are connected proposed small detention pond north of the building. Surface runoff flows are controlled by a series of swales and discharge that also discharge into the wetland. The wetland and ponds act as a detention system that also treats water before it reaches the open channel and existing wetland systems further to the north.

The small number of formal inground stormwater drainage networks from the proposed buildings are designed to cater for a minimum of 100-year Average Recurrence Interval (ARI) in accordance with AS/NZ 3500.3-2018 Stormwater pit covers shall comply with AS3996 and Council Drainage guidelines. All pits within the site are junction pits with bolt down covers.

**ADVERTISED
 PLAN**

4.2 Major Flows

All major flows will be controlled and detained onsite. The stormwater network will be designed to have 100-year ARI capacity which will discharge to detention systems with 100-year storage capacity. All detention systems will discharge to slow dispersion, free draining open swales that connect to the existing formalised open channel drainage network.

The flows from the site are treated to achieve the Best Practice Environmental Management Guidelines Water Quality Targets via the swale and wetland network in accordance with Melbourne Water's Water Sensitive Urban Design Guidelines South-Eastern Councils

5.0 Wetland Storage

A storage model has been prepared for NVVM site. The model was developed to show the storage capacity of the proposed detention pond and augmented wetlands north of the site development area. The aim of this analysis is to determine the size of the permanent pool volume of the systems, this is the expected volume of water that needs to be hold for a period of 1 year for it to hold its aesthetic and environmental value.

The methodology used for the storage analysis is described in the sections below including the type of data, software and model development to estimate the volume of water of the 3 proposed wetlands. The On-Site detention calculations are presented in the following section to demonstrate how the extended detention depth proposed for the wetlands will help to attenuate the 100-year ARI event to keep the flows to pre-development levels.

5.1 Data

Rainfall and evapotranspiration (ET) data was obtained from the Bureau of Meteorology from station number 086373 located in Rhyll, VIC that is found approximately 6.9 km away from Newhaven. The rain and ET data consists of 10 years of continuous climate data information from 2010 to 2020 using a daily timestep.

5.2 Runoff Simulation

The simulation of runoff was completed using Monte Carlo Simulation software and the Australian Water Balance Model (AWBM). The program uses Monte Carlo simulation solution for modelling the different rainfall and ET scenarios based on existing historical data.

The AWBM is a catchment water balance model (Figure 6) that simulates runoff from daily rainfall and evapotranspiration data. The model calculates the moisture balance for different partial areas that constitute the catchment in a daily time step. The storage is incremented with rainfall events and evapotranspiration is extracted simultaneously. When the moisture exceeds the capacity then this becomes runoff from either baseflow or surface runoff. A one-year data of runoff produced from the existing rainfall and ET data is used to create a storage model developed by TTW to illustrate the inflows and outflows into the proposed wetlands.

**ADVERTISED
PLAN**

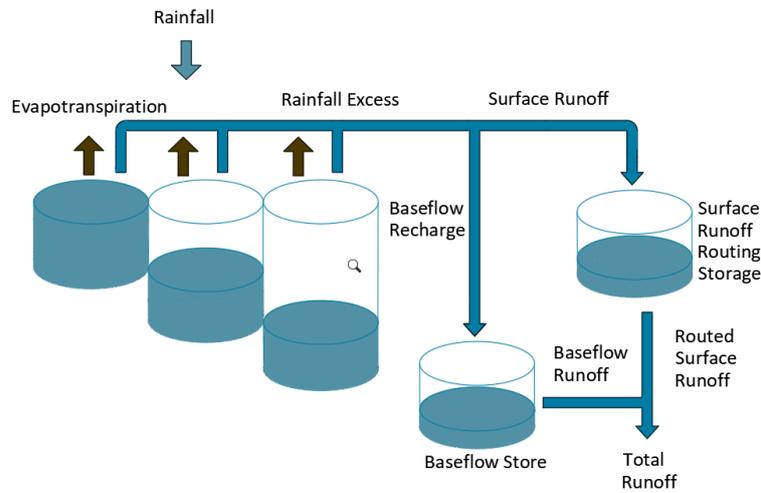


Figure 10 - Structure of the AWBM rainfall-runoff model

5.3 Storage Model

The available storage from the proposed wetlands is retrieved from the Civil 3D model. The storage model is used to determine the storage volume for the 2 proposed wetlands and minor detention pond over the period of a year and to demonstrate the minimum required volume will to be maintained during this time. The storage is estimated using the following equation illustrated below:

$$S(t) = S_{i-1} + P(t) + Q(t) - E(t) - L(t)$$

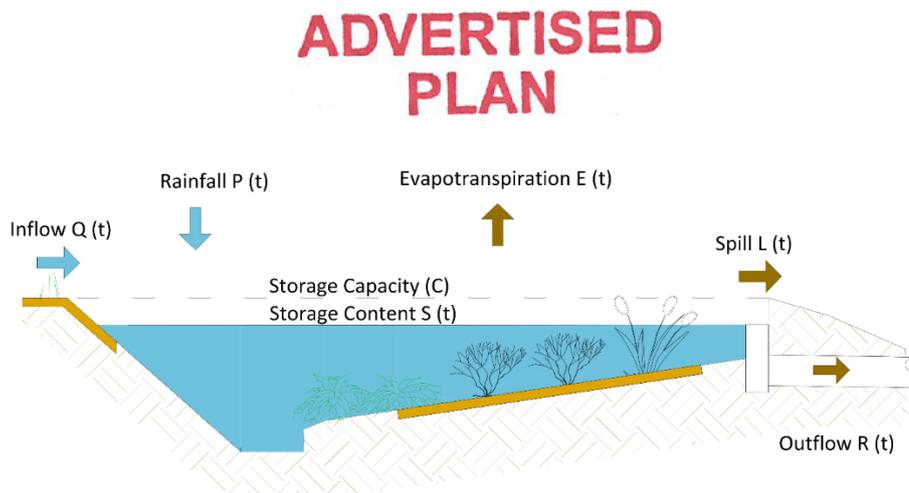


Figure 11 - Storage Model Graphic (typical general concept)

The Rainfall, ET and Infiltration in the Storage area are estimated as a fraction of the Storage Capacity. The storage volume is divided by the depth of the outlet to obtain an approximate surface area of storage, and this is multiplied by the rainfall, ET and Infiltration Rate.

The storage model parameters are determined using the Civil 3D topography model and the site-specific characteristics. Table 2 shows the main parameters used for the Water Balance model developed by TTW to determine the reliability of the storage.

The model considers the formula mentioned above to estimate the Storage content as a function of the different inflows and outflows that affect the system.

Table 2 - Storage Model Parameters from Model Developed by TTW

Parameters	Wetland 1	Wetland 2	Wetland 3
Area (m ²)	2927	1888	950
Detention Depth (m)	0.5	0.5	0.5
Storage Capacity (m ³)	1750	1250	800
Storage Content (m ³)	950	650	750
Depth Outlet Pit (m)	0.5	0.5	0.5

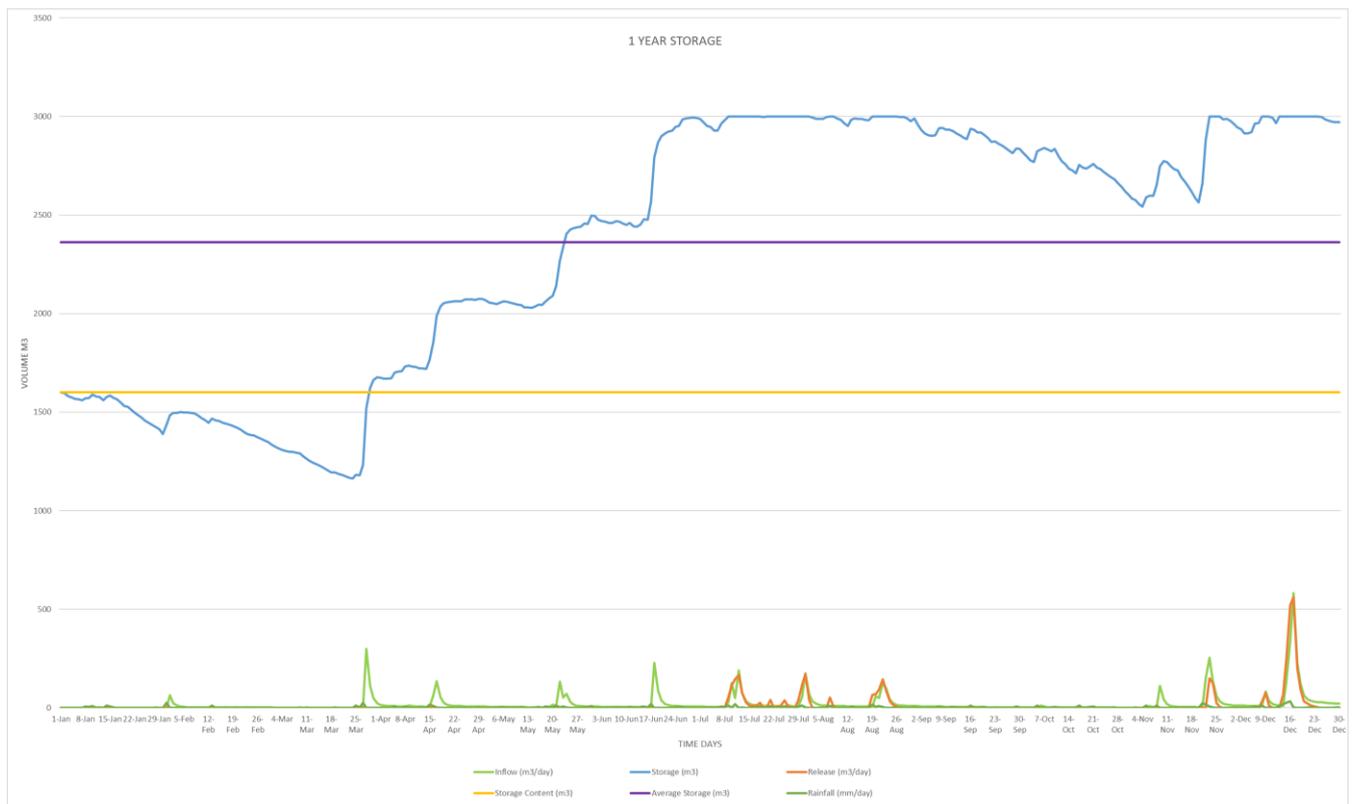


Figure 12 - Storage of Wetland 1 and 2 Systems

According to the implemented storage model, the storage content will be full 76% of the time during a year. The model assumes that the starting storage will be a minimum of 0.5-meter depth which represents the storage capacity of the wetland system. The storage behaviour over the period of a year can be reviewed in

Figure 6 above, the details of the volume of storage, inflows and outflows. It is important to note that this model is only an estimation, and the uncertainties of the model structure and parameters need to be considered in the decision-making process.

A storage model was also developed for wetland 3 to determine the storage-reliability of the proposed system. The incoming runoff was estimated using Monte Carlo simulation software and the AWBM. The proposed system for a 1-year storage using Monte Carlo simulation shows that there will be a 100% reliability.

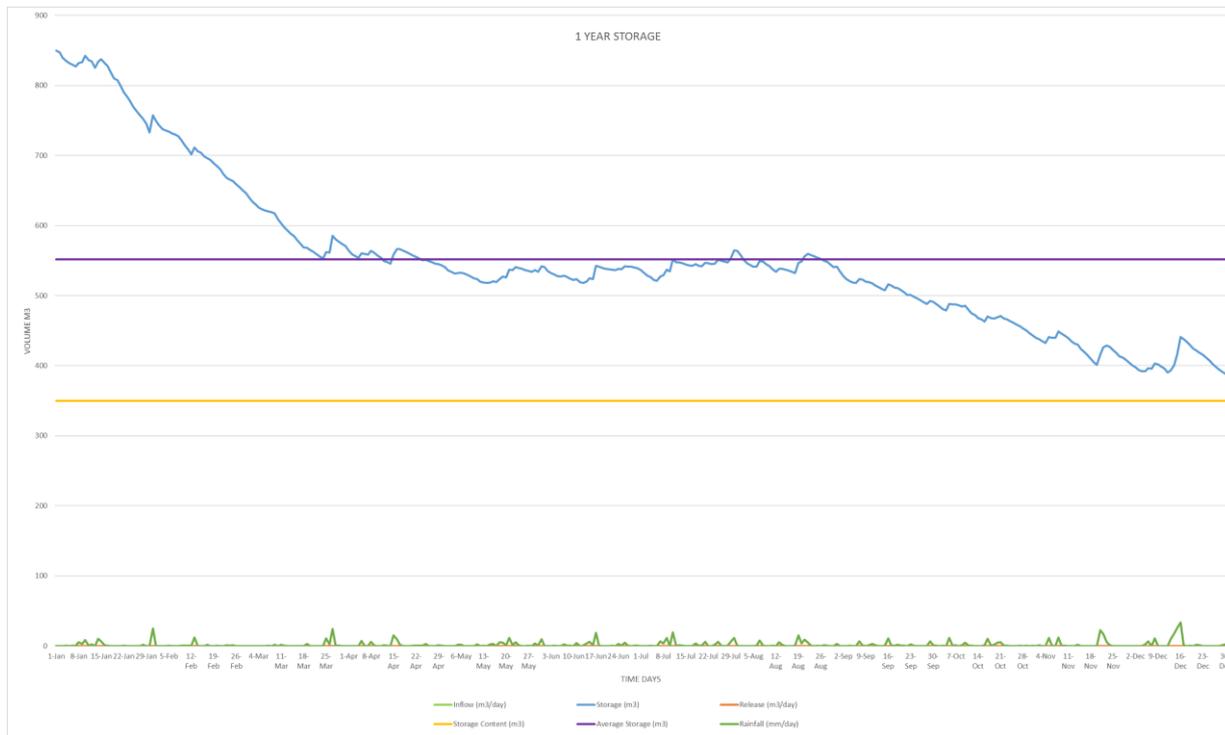


Figure 13 - Wetland 3 Storage

5.4 On-Site Detention

The outflows from the proposed catchment must be maintained at a 5-year ARI pre-developed levels and the on-site detention volumes are estimated on the basis of the 1 in 100-year ARI event. The total volume to be detained in accordance with Bass Coast Council drainage scheme are calculated using a DRAINS model for the pre-developed and proposed catchment. The OSD estimation for NVVM has calculated for the area of site works only, attenuating flows to predevelopment rates.

The estimated permissible site discharge is calculated to be 0.372 m³/s (to be approved by Bass Shire Council) and the total volume is approximately 1,350m³ combined from the detention ponds, proposed rainwater tank and OSD system for the proposed carpark.

The DRAINS model is developed to illustrate the overland flows, drainage network and OSD systems to detain the 100-year event into the pre-developed flows (Figure 10). The total outflow from the combined as-built catchment is 0.360 m³/s and it is compliant with the calculated permissible site discharge. The detention systems do not account for the external catchment flows entering the site as all external catchments will flow past the development to the west and the current flow paths will not be impacted by the proposal.

On-Site detention is also required for the NVVM development within the Carpark Area (0.54 Ha) and the detention storage accepted for the site is 1 in 100-year ARI. The proposed OSD system will be an underground

crate system that is to be discharge to a slow dispersion, free draining open swale that connect to the existing formalised open channel on the eastern boundary. This arrangement follows the current hydrology of the site, with the immediate works catchment flowing to the east boundary swale. The tank will have a high infiltration swale cover that will treat the runoff from the impervious car park surface and subsequently reduce majority of overland flows during the minor storm event and well as limiting flows from the 100-year ARI event to predevelopment conditions. The OSD calculations have been developed using DRAINS (Figure 6) to calculate the Volume of storage necessary and assuming a permissible site discharge of 0.372m³/s, in line with a 5-year ARI predevelopment event. Table 2 shows the results of the proposed system.

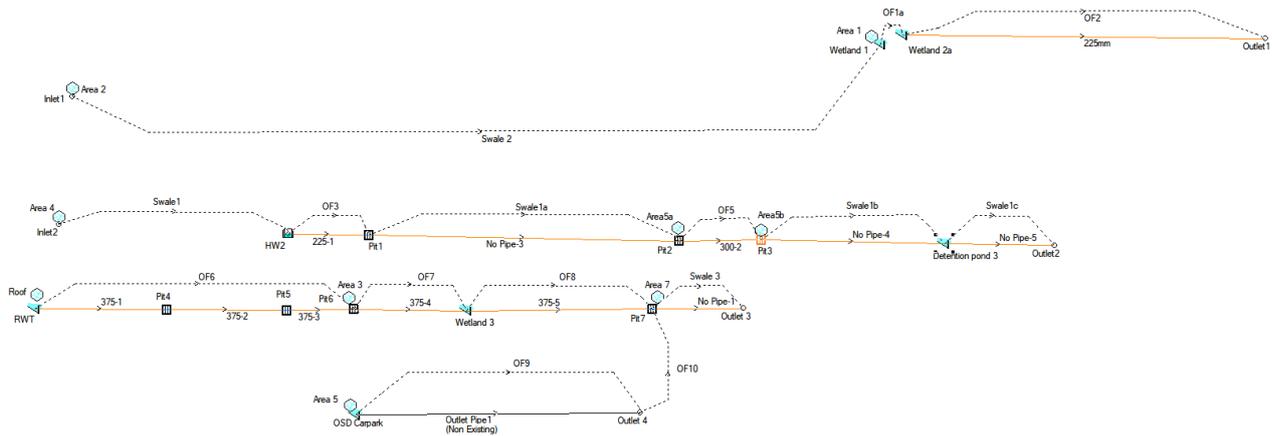


Figure 14 - DRAINS Catchment Model to estimate the additional volume require for OSD.

The proposed OSD bio-retention system proposed for the carpark catchment has an area of 450 m² with a 500 mm depth. The water is conveyed on the top of the OSD via a bio-retention swale into the underground tank (Figure 6) and the calculated volume is 270 m³.

The main access road will also require attenuation. Preliminary DRAINS calculations suggest that 270m³ detention will be required. This will be achieved via the runoff being direct to standard detention basin through an open channel. Unlike, the wetland systems that require a constant standing depth of water the detention basin will generally be dry and only detain water in a storm event that exceeds the permissible discharge. The basin will be planted with native species that will be suit the fluctuations in moisture content through the growing medium.

The total detention volumes that have been estimated by the DRAINS model are detailed in Table 3. The volumes are estimated considering the available extended detention depth of 0.3 m in the pond, the detention basin, and the underground tank with filtration system for the proposed carpark. Additionally, a preliminary calculation for the rainwater tank has also been considered as part of the volume that would be detain. The result of the DRAINS model is that the proposed arrangement maintains the outflows to pre-developed levels as requested by council guidelines.

**ADVERTISED
PLAN**

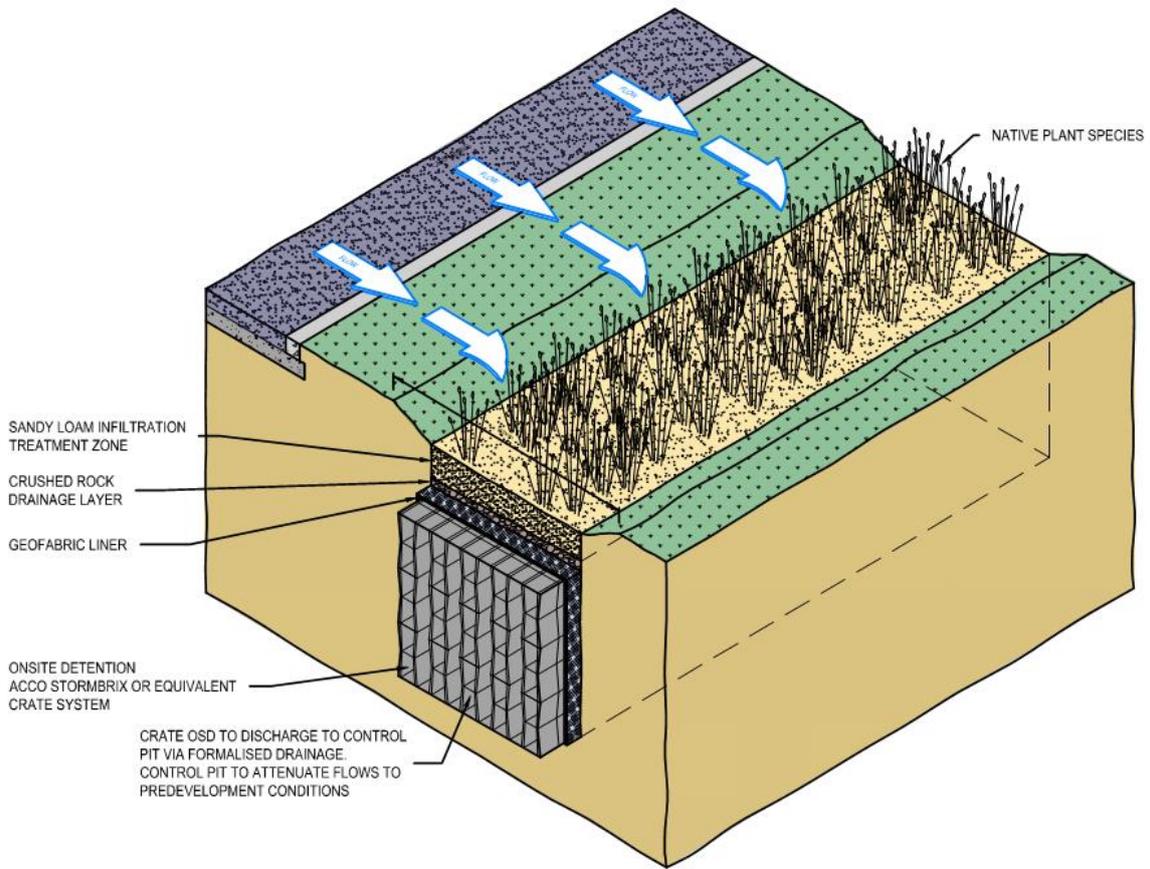


Figure 15 – OSD + Filtration Swale

Table 3 - On-Site Detention requirements for NVVM

OSD System	Approximately Site catchment (ha)	1 in 100-year Detention Volume (m ³)
RWT	0.44	8.5
Wetland 3	3.5	800
Carpark OSD	0.54	270

**ADVERTISED
PLAN**

OSD System	Approximately Site catchment (ha)	1 in 100-year Detention Volume (m ³)
Detention Pond	1.72Ha	270

As noted above the site was observed to be saturated, Further investigation will be required to demonstrate this, and may have an impact on the above detention strategy. If saturated OSD volume may need to be increased to cater for the 100-year ARI storm event, and calculations to demonstrate predevelopment discharge rates are achieved.

6.0 Stormwater Quality

NVVM is part of Bass Coast Shire Council and therefore required to provide on-site stormwater treatment that complies with Best Practice Environmental Management Guidelines (BPEMG) to obtain the required 'Greenstar Rating'. The stormwater quality targets to reduce pollutant loads from new developed areas are defined in Table 4 below.

Pollutant	Target Reduction
Total Suspended Solids (TSS)	80%
Total Phosphorus (TP)	45%
Total Nitrogen (TN)	45%
Litter	70%

Table 4 - Pollutant Reduction Targets (Best Practice Environmental Management Guidelines - Victorian Stormwater Committee, 1999)

The existing site is considered farmland area and the external catchment contributing to the outflows is an existing airport with a 0.4% of the area considered as impervious. A Model for Urban Stormwater Improvement Conceptualisation (MUSIC) model has been developed to size the required treatment areas within the development of NVVM. The model uses the default one year of rainfall data for Koo Wee Rup (1971-1980) with an average rainfall of 769mm and evapotranspiration of 1008mm.

A pre-development model with an urban node representing the external catchment and an agricultural catchment for the site areas were carried out using MUSIC to be compared against the post-developed model. The proposed model implements a series of WSUD treatment measures to improve the water quality and minimize the outflows. Table 5 presents a comparison of both situations in which the external catchment is included.

**ADVERTISED
PLAN**

Table 5 - MUSIC results for Pre-Developed and Post-Developed Catchment conditions considering the External Catchment effects

	Pre-Development	Post Developed	Difference
Flow (ML/yr)	172	201	14%
Peak Flow (m3/s)	0.119	1.22	90%
Total Suspended Solids (kg/yr)	3050	5060	40%
Total Phosphorus (kg/yr)	13.6	13.9	2%
Total Nitrogen (kg/yr)	167	211	21%
Gross Pollutants (kg/yr)	0	1580	100%

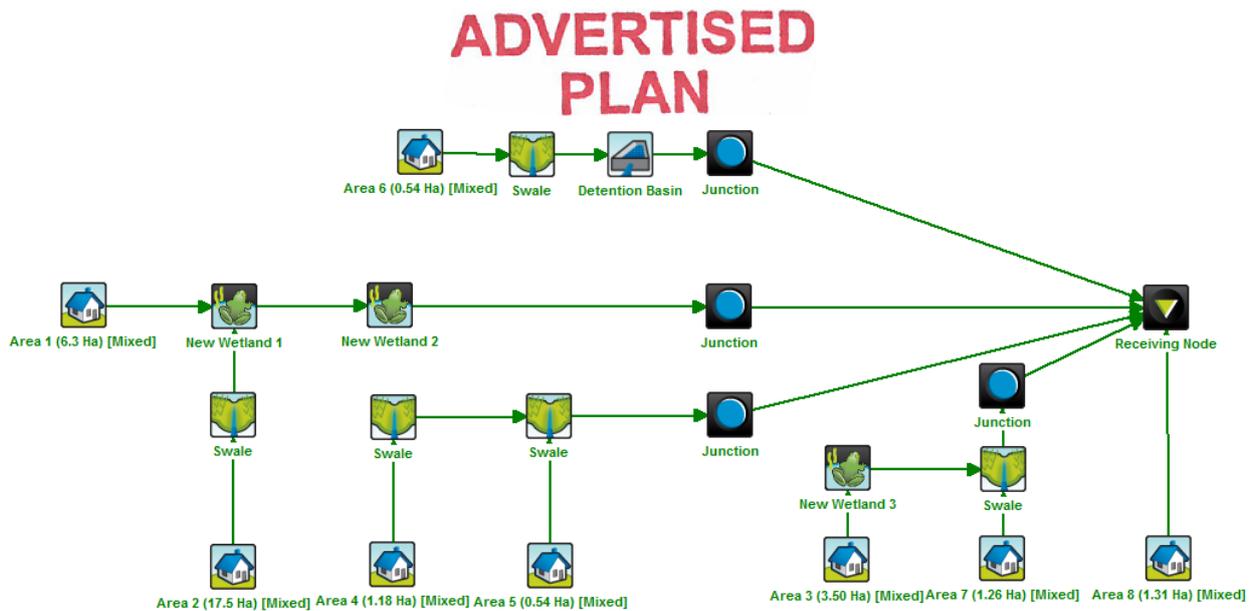


Figure 16 - MUSIC Treatment Train for Officer District Park

The implementation of 2 additional wetlands, detention pond and a strategically planted conveyance swales demonstrates the removal of nitrogen and phosphorous is appropriate to treat the runoff from the proposed Carpark and developed areas to BPEGM requirements. If the ultimate design requires additional level of treatment, filtration media can be imported within portions of the conveyance swale to assist with nutrient removal. The proposed treatment train is compliant with the BPEMG pollutant target removals as demonstrated in Table 6 below.

	Source Load	Residual Load	Percentage Reduction (%)
Flow (ML/yr)	62.6	43.9	29.9
Total Suspended Solids (kg/yr)	4030	734	81.8
Total Phosphorus (kg/yr)	14.5	5.43	62.7
Total Nitrogen (kg/yr)	148	69.5	53
Gross Pollutants (kg/yr)	837	51.1	93.9

Table 6 - MUSIC Model Result

The performance of the proposed stormwater management strategy achieves the load reduction targets according to the model developed with MUSIC. The proposed swales and wetland systems treat the runoff from the site to achieve the water quality targets.

7.0 Conclusions

The SWMS report summarizes the stormwater management strategy proposed for NVVM to be reviewed by Bass Coast Shire Council and Melbourne Water. It is TTW expert opinion that the current design complies with the requirements for water quantity and quality.

Further investigation may be required to demonstrate restricted flows from the development will not have adverse effect on downstream catchment. This would entail an extensive flood study of the entire greater catchment.

Prepared by
TTW (VIC) PTY LTD

Authorised By
TTW (VIC) PTY LTD



Alejandra Acosta Hermosillo
Civil Design Engineer

Jake Barnes
Associate Director Civil

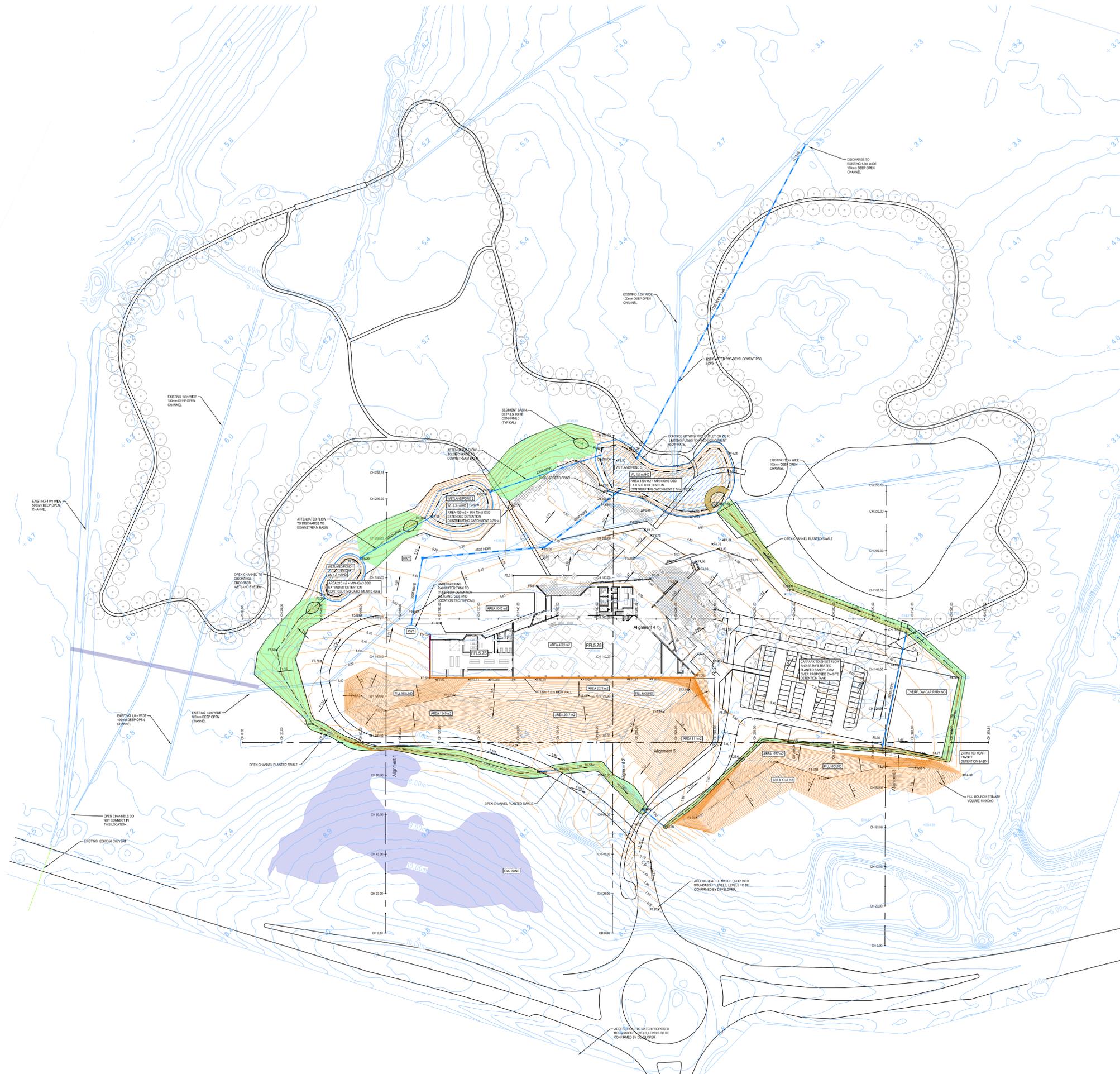
J:\2020\2040\204087\Reports\TTW\SWMS\204087 - NVVM - Stormwater Management Strategy Report_Rev02.docx

**ADVERTISED
PLAN**

Appendix A

NVVM Concept Catchment Plan

**ADVERTISED
PLAN**

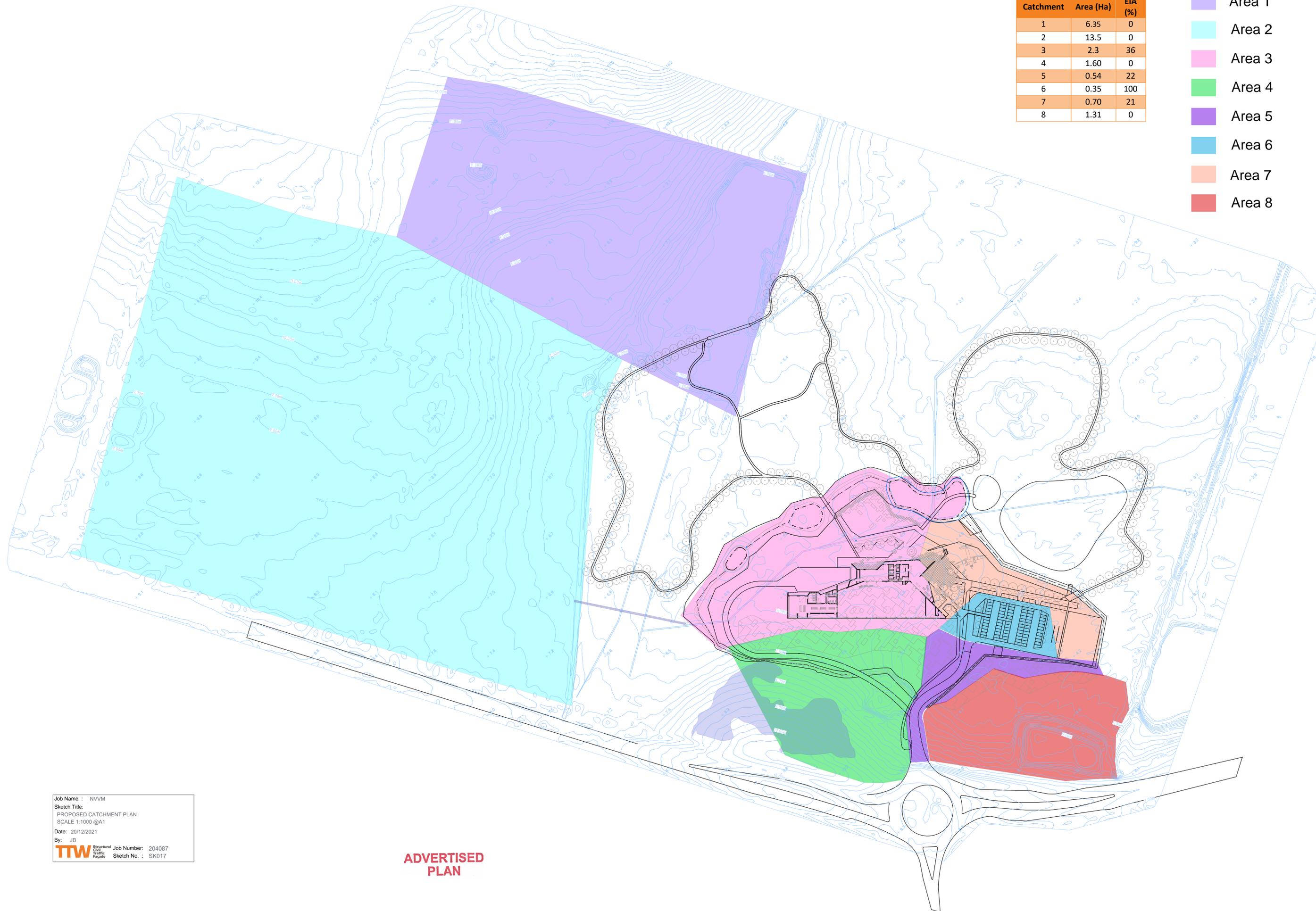


ADVERTISED PLAN

Job Name : NVVM
 Sketch Title:
 CIVIL SITE PLAN
 SCALE 1:1000 @A1
 Date: 20/12/2021
 By: JB
TTW Structural
 Traffic
 Façade Job Number: 204087
 Sketch No. : SK016

Catchment	Area (Ha)	EIA (%)
1	6.35	0
2	13.5	0
3	2.3	36
4	1.60	0
5	0.54	22
6	0.35	100
7	0.70	21
8	1.31	0

- Area 1
- Area 2
- Area 3
- Area 4
- Area 5
- Area 6
- Area 7
- Area 8



Job Name : NVVM
 Sketch Title:
 PROPOSED CATCHMENT PLAN
 SCALE 1:1000 @A1
 Date: 20/12/2021
 By: JB
TTW Structural Job Number: 204087
 Civil Traffic People Sketch No. : SK017

**ADVERTISED
 PLAN**

Appendix B

VicPlan Maps

**ADVERTISED
PLAN**

PLANNING PROPERTY REPORT

From www.planning.vic.gov.au at 06 July 2020 02:08 PM

PROPERTY DETAILS

Address: **24 CHURCHILL ROAD NEWHAVEN 3925**
 Lot and Plan Number: **Lot 1 PS729804**
 Standard Parcel Identifier (SPI): **1\PS729804**
 Local Government Area (Council): **BASS COAST**
 Council Property Number: **20289**
 Planning Scheme: **Bass Coast**
 Directory Reference: **Melway 734 A7**

www.basscoast.vic.gov.au

[Planning Scheme - Bass Coast](#)

UTILITIES

Rural Water Corporation: **Southern Rural Water**
 Urban Water Corporation: **Westernport Water**
 Melbourne Water: **Inside drainage boundary**
 Power Distributor: **AUSNET**

[View location in VicPlan](#)

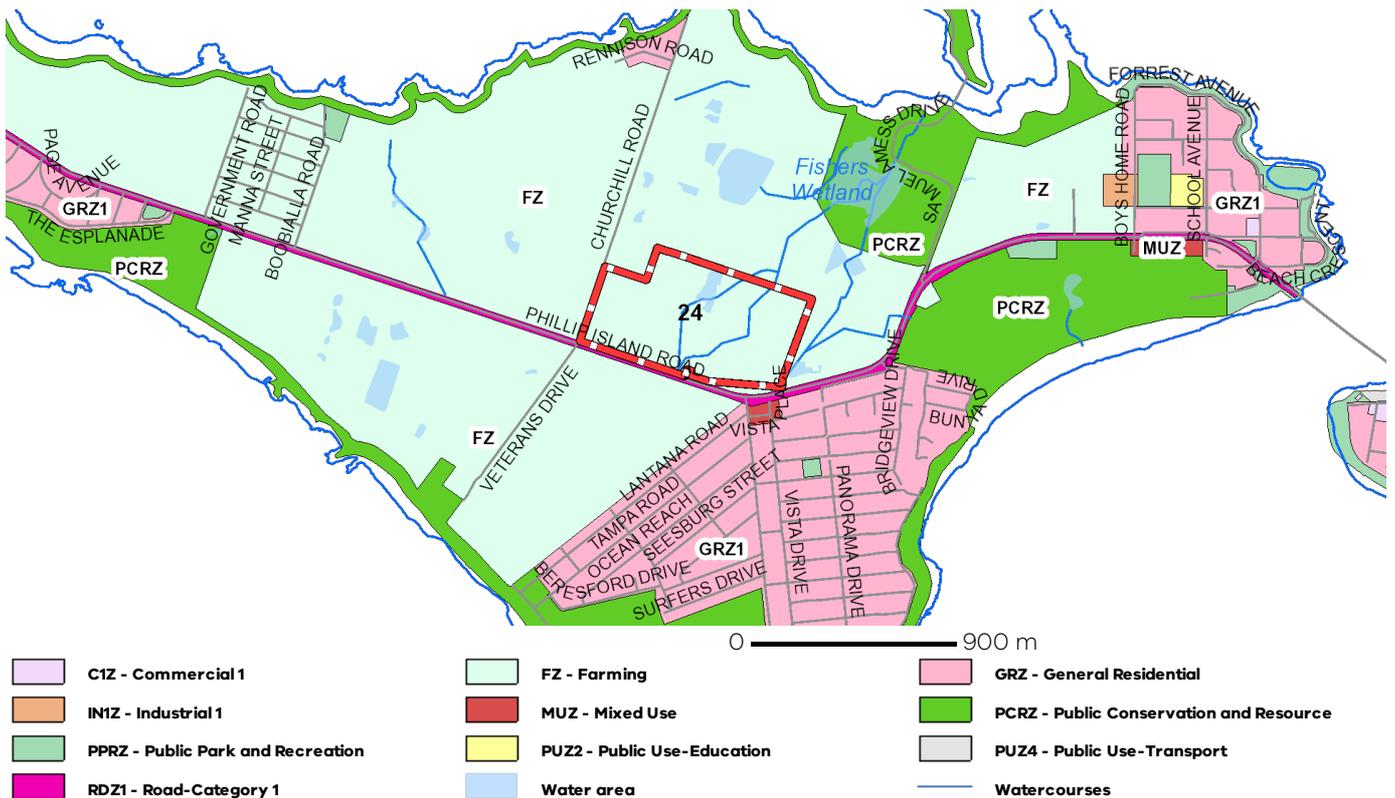
STATE ELECTORATES

Legislative Council: **EASTERN VICTORIA**
 Legislative Assembly: **BASS**

Planning Zones

[FARMING ZONE \(FZ\)](#)

[SCHEDULE TO THE FARMING ZONE \(FZ\)](#)



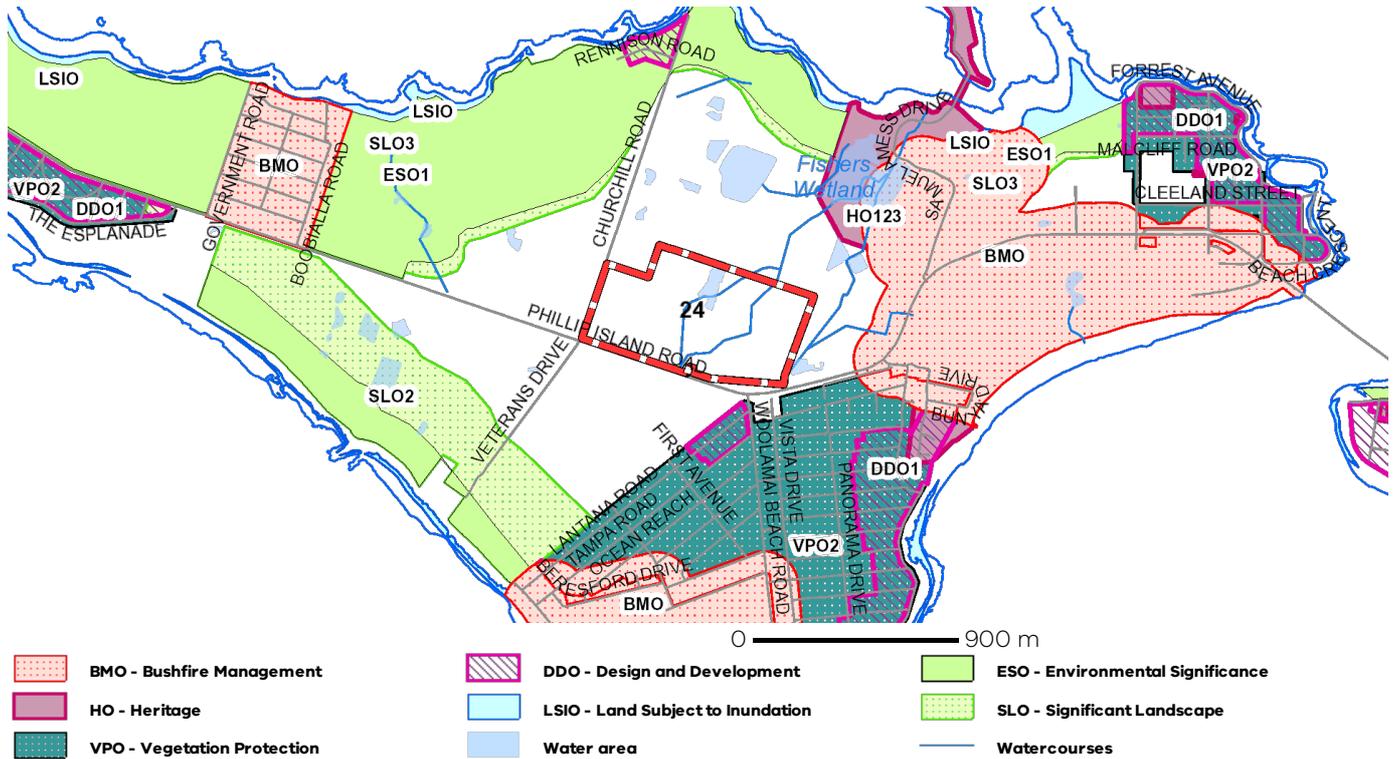
Note: labels for zones may appear outside the actual zone - please compare the labels with the legend.

**ADVERTISED
PLAN**

Planning Overlay

None affecting this land - there are overlays in the vicinity

- [BUSHFIRE MANAGEMENT OVERLAY \(BMO\)](#)
- [DESIGN AND DEVELOPMENT OVERLAY \(DDO\)](#)
- [ENVIRONMENTAL SIGNIFICANCE OVERLAY \(ESO\)](#)
- [HERITAGE OVERLAY \(HO\)](#)
- [LAND SUBJECT TO INUNDATION OVERLAY \(LSIO\)](#)
- [SIGNIFICANT LANDSCAPE OVERLAY \(SLO\)](#)
- [VEGETATION PROTECTION OVERLAY \(VPO\)](#)



Note: due to overlaps, some overlays may not be visible, and some colours may not match those in the legend

ADVERTISED PLAN

Areas of Aboriginal Cultural Heritage Sensitivity

All or part of this property is an 'area of cultural heritage sensitivity'.

'Areas of cultural heritage sensitivity' are defined under the Aboriginal Heritage Regulations 2018, and include registered Aboriginal cultural heritage places and land form types that are generally regarded as more likely to contain Aboriginal cultural heritage.

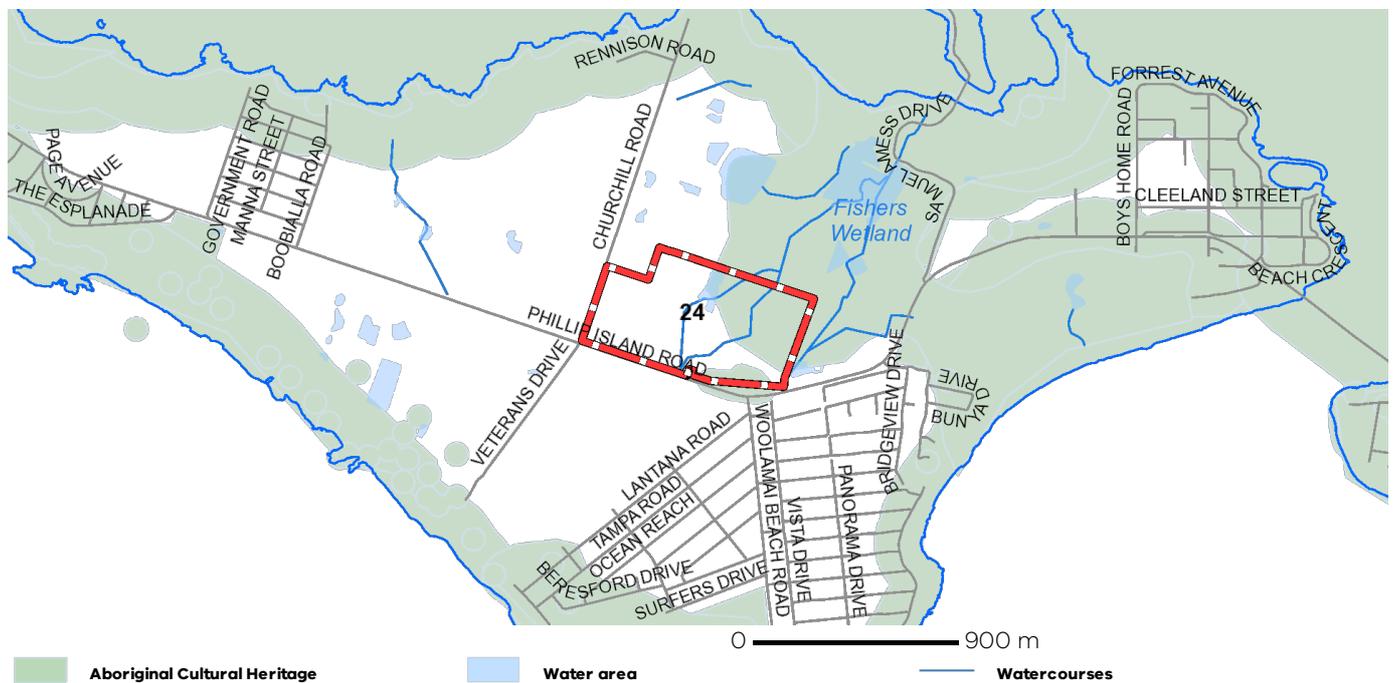
Under the Aboriginal Heritage Regulations 2018, 'areas of cultural heritage sensitivity' are one part of a two part trigger which require a 'cultural heritage management plan' be prepared where a listed 'high impact activity' is proposed.

If a significant land use change is proposed (for example, a subdivision into 3 or more lots), a cultural heritage management plan may be triggered. One or two dwellings, works ancillary to a dwelling, services to a dwelling, alteration of buildings and minor works are examples of works exempt from this requirement.

Under the Aboriginal Heritage Act 2006, where a cultural heritage management plan is required, planning permits, licences and work authorities cannot be issued unless the cultural heritage management plan has been approved for the activity.

For further information about whether a Cultural Heritage Management Plan is required go to <http://www.aav.nrms.net.au/aavQuestion1.aspx>

More information, including links to both the Aboriginal Heritage Act 2006 and the Aboriginal Heritage Regulations 2018, can also be found here - <https://www.aboriginalvictoria.vic.gov.au/aboriginal-heritage-legislation>



ADVERTISED PLAN

Further Planning Information

Planning scheme data last updated on 1 July 2020.

A **planning scheme** sets out policies and requirements for the use, development and protection of land. This report provides information about the zone and overlay provisions that apply to the selected land. Information about the State and local policy, particular, general and operational provisions of the local planning scheme that may affect the use of this land can be obtained by contacting the local council or by visiting <https://www.planning.vic.gov.au>

This report is NOT a **Planning Certificate** issued pursuant to Section 199 of the **Planning and Environment Act 1987**. It does not include information about exhibited planning scheme amendments, or zonings that may affect the land. To obtain a Planning Certificate go to Titles and Property Certificates at Landata - <https://www.landata.vic.gov.au>

For details of surrounding properties, use this service to get the Reports for properties of interest.

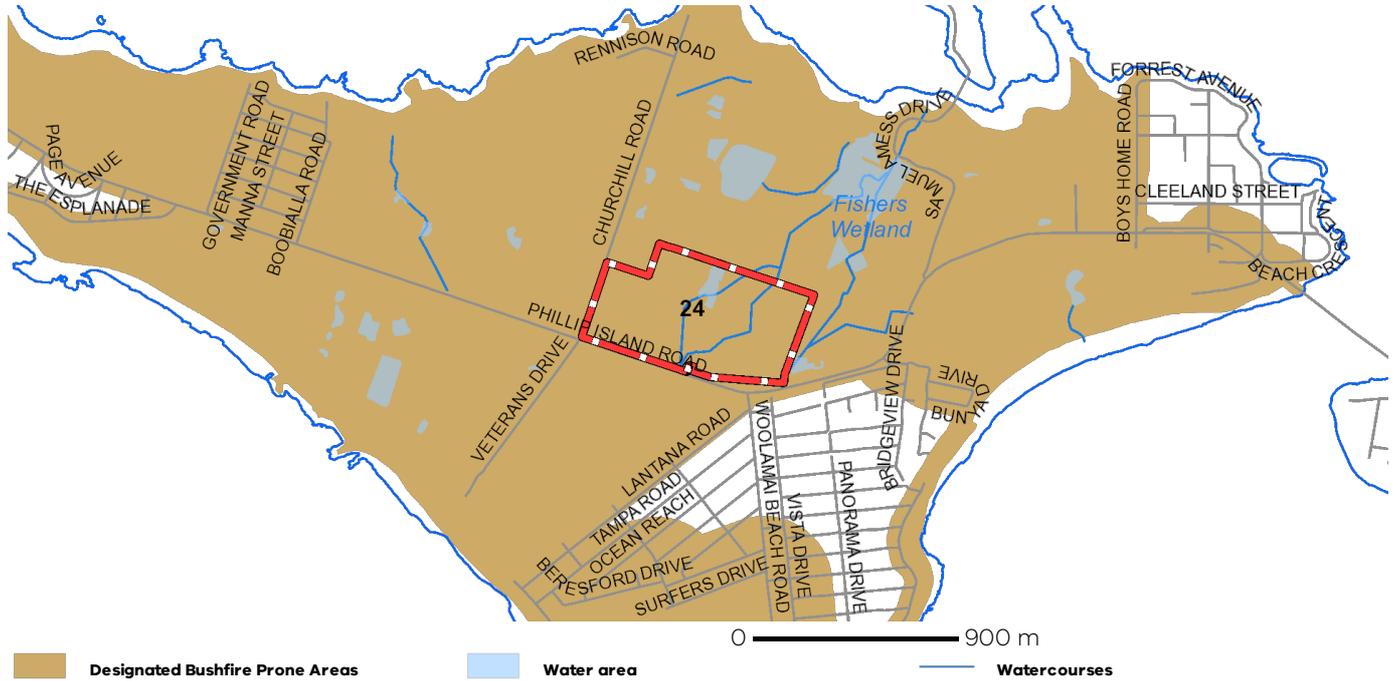
To view planning zones, overlay and heritage information in an interactive format visit <https://mapshare.maps.vic.gov.au/vicplan>

For other information about planning in Victoria visit <https://www.planning.vic.gov.au>

**ADVERTISED
PLAN**

Designated Bushfire Prone Areas

**This property is in a designated bushfire prone area.
Special bushfire construction requirements apply. Planning provisions may apply.**



Designated bushfire prone areas as determined by the Minister for Planning are in effect from 8 September 2011 and amended from time to time.

The Building Regulations 2018 through application of the Building Code of Australia, apply bushfire protection standards for building works in designated bushfire prone areas.

Designated bushfire prone areas maps can be viewed on VicPlan at <https://mapshare.maps.vic.gov.au/vicplan> or at the relevant local council.

Note: prior to 8 September 2011, the whole of Victoria was designated as bushfire prone area for the purposes of the building control system.

Further information about the building control system and building in bushfire prone areas can be found on the Victorian Building Authority website <https://www.vba.vic.gov.au>

Copies of the Building Act and Building Regulations are available from <http://www.legislation.vic.gov.au>

For Planning Scheme Provisions in bushfire areas visit <https://www.planning.vic.gov.au>

ADVERTISED PLAN

Appendix C

Melbourne Water Response

**ADVERTISED
PLAN**

07 June 2021

Kerri-Anne Tatchell
Bass Coast Shire Council
PO Box 118
Wonthaggi VIC 3995

ADVERTISED PLAN

Dear Kerri-Anne,

Proposal: Planning permit for development - Use and development of the land for a Museum and Restaurant, the removal of native vegetation, the construction and display of business identification signage, and the creation of access to a RDZ1 road
Site location: Lot No 1, 24 CHURCHILL ROAD NEWHAVEN 3925

Melbourne Water reference: MWA-1208432
Council reference: 210094
Date referred: 23/04/2021

Thank you for your correspondence of 23 April 2021 regarding a planning permit application referral for the above referenced works. Your granting of an extension of time to respond, as per my email of 26 May 2021 is also much appreciated.

Melbourne Water, pursuant to Section 52(1) of the Planning and Environment Act 1987, objects to the proposed development for the following reasons:

Grounds of objection

1. The proposed development is inconsistent with the Planning Policy Framework relating to drainage and floodplain management.
2. The proposed development is inconsistent with Melbourne Water's regional drainage and waterway management responsibilities under the Water Act 1989 (Vic).
3. The proposed development does not take into consideration the waterway (Creek 3261) and tributary, in the design of the museum and restaurant (café), access roads and tracks.
4. The proposed development is contrary to the Department of Environment, Land, Water and Planning ['Guidelines for Development in Flood Affected Areas'](#) including Flood Impacts and Flow Conveyance.

The Assessment of the Proposal

Flooding Information

The property in question is traversed by two unnamed waterways, "Creek 3261" and a tributary of Creek 3261, as identified on the Planning Property Report for the property,

obtained from the (DELWP) VicPlan website. <https://production-planning-report-pdf.s3-ap-southeast-2.amazonaws.com/24-Churchill-Road-Newhaven-Vicplan-Planning-Property-Report.pdf>

Melbourne Water does not have any detailed flood mapping or flood studies of this catchment area, therefore, no current flood information can be provided at this point in time.

As denoted within the proposed development plans for the construction of the Museum and Restaurant (Café), quite significant filling of the land is proposed, as demonstrated within the '3D views 24 Churchill Drive Newhaven'. The proponent of the works, must engage a qualified hydraulic engineer to determine the flood impacts when comparing the pre-developed vs post-developed conditions resulting from the proposed development/filling.

The flood assessment must respond to the key criteria within DELWP's 'Guidelines for Development in Flood Affected Areas'. Modelling, afflux maps and consolidated reports/conclusions, must be submitted to Melbourne Water for our consideration and approval. If there is found to be any afflux/increase in flood levels, mitigation options will need to be undertaken to ensure the current flood behaviour is maintained.

It is noted that the plans do not show the alignment of Melbourne Water's 'Creek 3261' or the tributary, crossing the site.

Waterway & Wetland Protection

ADVERTISED PLAN

Melbourne Water has identified that part of this property is within an 'area of cultural heritage sensitivity' within the 'Aboriginal Heritage Regulations 2018', defined specifically as an area of sensitivity along the waterway defined above.

The below Fauna is listed within the 'Flora and Fauna Guarantee Act 1988' (the FFG Act) and the 'Environment Protection and Biodiversity Conservation Act 1999' (EPBC Act);

- *Ardea Alba* (Great Egret); FFG Listed
- *Potorous tridactylus trisulcatus* (Long Nosed Potoroo) EPBC and FFG listed
- *Area alba modesta* (Eastern Great Egret); FFG Listed
- *Stictonetta naevosa* (Freckled Duck); FFG Listed
- *Numenius madagascariensis* (Eastern Curlew); EPBC and FFG listed
- *Anseranas semipalmata* (Magpie Goose); FFG listed
- *Hydroprogne caspia* (Caspian Tern) FFG listed
- *Haliaeetus leucogaster* (Whitebellied Sea-eagle) FFG listed
- *Oxyura australis* (Bluebilled Duck); FFG listed
- *Botaurus poiciloptilus* (Australasian Bittern); EPBC and FFG listed
- *Egretta garzetta* (Little Egret); FFG
- *Neophema chrysogaster* (Orangebellied Parrot); EPBC and FFG listed

A Ramsar listed wetland 'Fisher's Wetland' is located within close proximity to the property, within the Western Port, on the northern shore of Phillip Island.

In order to demonstrate that the above flora and fauna values identified in any environmental report and the assets above, have been carefully considered, the following information must be submitted to Melbourne Water for further consideration:

- All plans must be updated to show 'Creek 3261' within the site. Melbourne Water

records show that the waterway appears to cross directly through the proposed building site.

- Any new or modified waterway crossing must be installed in accordance with Melbourne Water's Constructing [Waterway Crossings guidelines](https://www.melbournewater.com.au/sites/default/files/Constructing-waterway-crossings-guidelines.pdf). A separate application will be required to be made, via our website. Please refer to the following guidelines:
<https://www.melbournewater.com.au/sites/default/files/Constructing-waterway-crossings-guidelines.pdf>
- A Stormwater Management Plan must be developed and submitted to Melbourne Water, showing the methods for stormwater capture and treatment within the development. Drainage from the access road, tracks and crossings must be directed away from Creek 3261 to minimise the likelihood of sediment and other pollutants entering the waterway and affecting downstream wetland habitats.
- Melbourne Water requires a buffer consisting of 10 metres of native vegetation on either side of the Creek 3261 which must be established to protect the creek and the downstream Fisher's Wetland (an important wetland habitat on Phillip Island).
- Any impact on the bed and banks of the waterway must be rectified to as close to natural condition as possible and must be demonstrated within a works method statement and/or certified reinstatement survey, submitted to Melbourne Water prior to the completion of works.
- Melbourne Water records show this area may contain aboriginal sites of significance. Prior to any works on site, the proponent should contact Aboriginal Affairs Victoria, to ensure that works will not impact upon any site of significance. Any correspondence herein shall be submitted to Melbourne Water for our records.

ADVERTISED PLAN

Advice to Council and Applicant

Melbourne Water is responsible for regional drainage, floodplain and waterway management and for contributing to the protection and improvement of waterway health across greater Melbourne. Not only is Melbourne Water the caretaker of river health we are also the designated waterway manager for the Port Phillip and Westernport region. In collaboration with others, Melbourne Water is responsible for achieving healthy rivers, creeks, estuaries, wetlands and floodplains that meet the environmental, economic, recreational and cultural needs of current and future generations.

We note that Melbourne Water's comments are not being provided in its formal capacity as a Referral Authority (Floodplain Manager) under the LSIO, but rather as an interested party.

Melbourne Water's interest arises from its regional drainage and waterway management responsibilities under the Water Act 1989 (Vic). These functions are broad and include obligations to:

- protect drainage systems and waterways;
- implement programs for the protection and enhancement of in-stream uses; and

- improve water quality in drainage systems.

Prior to the submission of amended plans and reports, it is recommended that the permit applicant contacts Melbourne Water on 9679 7517 to discuss the requirements above in further detail.

Please forward any further correspondence to devconnect@melbournewater.com.au quoting reference MWA-1208432 in the subject line of the email.

Regards,



Emma Tame
Development Planning Services

**ADVERTISED
PLAN**

Appendix D

Geotechnical Report

**ADVERTISED
PLAN**



BORE LOG 4565.2

CLIENT: Vietnam Veterans Association – Museum LOCATION: gravel surface DATE DRILLED: 08/07/2001				SHEET: 1 of 1 DATUM: Ground Level LOGGING ENGINEER: MBS			
DRILL RIG TYPE: N/A				BORE DIAMETER: 75mm			
depth (m)	graphic log	drill type	bore water	SOIL DESCRIPTION (type, universal classification, moisture, strength, colour, additional information)	insitu tests	samples	NOTES
		JA		FILL, SILT (ML), moist, medium dense, grey, gravel, brick fragments			
0.50-				wet, some gravel becomes CLAYEY, sand, orange			ADVERTISED PLAN
0.70-				SILTY CLAY (CH), humid, stiff, light brown, mottled orange	PP	AS	
1.00-							
1.50-				LIMIT OF TESTING			
2.00-							

Drill Type:		Bore Water:		Samples:		In Situ Testing:	
JA	Jarret Auger	NE	Not Encountered	U63	63Ø selby tube	SPT	Standard Penetration
FA	Flight Auger	NO	Not Observed	U50	50Ø selby tube	DCP	Dynamic Cone Pen.
Per	Percussion	WT	Water Table	AS	Auger Sample	V	Shear Vane
WB	Wash Bore	Sep	Seepage	BS	Bulk Sample	PM	Pressuremeter
NMLC	Triple Barrel Diamond Core			SPT	SPT split tube	PP	Pocket Penetrometer



BORE LOG 4565.1

CLIENT: Vietnam Veterans Association – Museum
LOCATION: gravel surface
DATE DRILLED: 08/07/2001

SHEET: 1 of 1
DATUM: Ground Level
LOGGING ENGINEER: MBS

DRILL RIG TYPE: N/A

BORE DIAMETER: 75mm

depth (m)	graphic log	drill type	bore water	SOIL DESCRIPTION (type, universal classification, moisture, strength, colour, additional information)	insitu tests	samples	NOTES
0.35		JA		FILL, GRAVEL (CRUSHED ROCK) becomes SILT (ML), moist, firm, grey-brown			ADVERTISED PLAN
0.50				SILT (ML), moist, firm, grey-brown			
0.65				becomes GRAVELLY			
1.00		NE		SILTY CLAY (CH), humid-moist, stiff, light brown, mottled orange, trace rootlets	PP	AS	
1.50				LIMIT OF TESTING			PP = 180 kPa
2.00							

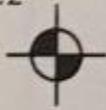
PHILLIP ISLAND ROAD

existing museum building

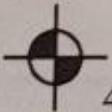
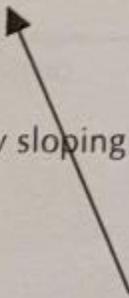
**ADVERTISED
PLAN**

SAN REMO ROAD

4565.2



gently sloping gravel surface



4565.1



Test Locations

SITE PLAN



BORE LOG 5390.3

CLIENT: Vietnam Veterans Association of Australia LOCATION: grassed surface DATE DRILLED: 24/04/2003	SHEET: 2 of 2 DATUM: Ground Level LOGGING ENGINEER: MBS
---------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------

DRILL RIG TYPE: ATS 3000	BORE DIAMETER: 90mm
---------------------------------	----------------------------

depth (m)	graphic log	drill type	bore water	SOIL DESCRIPTION (type, moisture, strength, color, additional information)	in situ tests	samples	NOTES
2.50	[Pattern]	FA	NE	as above SILTY CLAY	CL		ADVERTISED PLAN
3.00				LIMIT OF TESTING			
3.50							
4.00							

Drill Type:	Bore Water:	Samples:	In Situ Testing:
JA Jarrett Auger FA Flight Auger	NE Not Encountered NO Not Observed WT Water Table	U63 63Ø selby tube U50 50Ø selby tube AS Auger Sample	SPT Standard Penetration DCP Dynamic Cone Pen. V Shear Vane P Pressuremeter



BORE LOG 5390.2

CLIENT: Vietnam Veterans Association of Australia LOCATION: gravel surface DATE DRILLED: 24/04/2003					SHEET: 2 of 2 DATUM: Ground Level LOGGING ENGINEER: MBS		
DRILL RIG TYPE: ATS 3000					BORE DIAMETER: 90mm		
depth (m)	graphic log	drill type	bore water	SOIL DESCRIPTION (type, moisture, strength, color, additional information)	in situ tests	samples	NOTES
2.50	[Pattern]	FA	NE	as above SILTY CLAY	CL		
3.00				LIMIT OF TESTING			
3.50							
4.00							

ADVERTISED
PLAN

PP AS PP 140kPa

Drill Type:	Bore Water:	Samples:	In Situ Testing:
JA Jarrett Auger	NE Not Encountered	U63 63Ø selby tube	SPT Standard Penetration
FA Flight Auger	NO Not Observed	U50 50Ø selby tube	DCP Dynamic Cone Pen.
Per Percussion	WT Water Table	AS Auger Sample	V Shear Vane
WB Wash Bore	Sep Seepage	BS Bulk Sample	PM Pressuremeter
		SPT SPT split tube	PP Pocket Penetrometer

airstrip

5390.3



gravel track

**ADVERTISED
PLAN**

5390.2

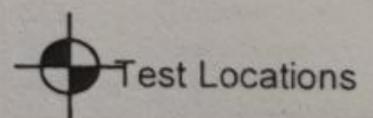
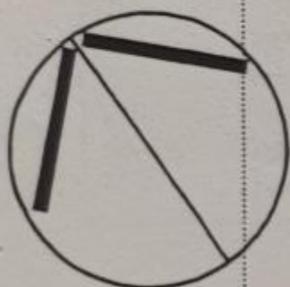


CHURCHILL
ROAD

5390.1



open drain



Test Locations

SITE PLAN
(Not to Scale)



BORE LOG 5390.1

CLIENT: Vietnam Veterans Association of Australia
LOCATION: grassed surface
DATE DRILLED: 24/04/2003

SHEET: 2 of 2
DATUM: Ground Level
LOGGING ENGINEER: MBS

DRILL RIG TYPE: ATS 3000

BORE DIAMETER: 90mm

depth (m)	graphic log	drill type	bore water	SOIL DESCRIPTION (type, moisture, strength, color, additional information)	<small>conventional laboratory test results</small>	<small>in situ tests</small>	<small>samples</small>	NOTES
2.50	[Pattern]	FA	NE	as above SILTY CLAY	CL	PP	AS	PP = 150kPa
3.00				LIMIT OF TESTING				
3.50								
4.00								

ADVERTISED
PLAN

Drill Type: JA Jarrett Auger	Bore Water: NE Not Encountered	Samples: 1400	In Situ Testing: PP = 150kPa
----------------------------------------	------------------------------------------	-------------------------	----------------------------------------



WAA Museum
57 Phillip Island Rd.
SAN REMO VIC 3925
Ph: +61 3 5678 5999
Fax: +61 3 5678 5995

E-mail: vmuseum@nex.net.au

Home Page: http://www.users.bigpond.com/vietnam_vets_museum , ORC

Fax

To: STEPHEN ROSENDALE From: JOHN METHVEN
Fax: 5671 2222 Date: 22 **ADVERTISED**
Phone: 56785 999 Pages: 8 **PLAN**
Re: NEW MUSEUM CC:

Urgent For Review Please Comment Please Reply Please Recycle

Comments:

Please find attached revised slab & footing plans from Engineers.

Regards

John Methven

Monash business Park
12 Business Park Drive
Notting Hill, Victoria 3168
Telephone 03 9558 9888
Facsimile 03 9558 9090
gamcos@compuserve.com



Gamble & Cosentino Pty Ltd
Designers and Engineers

FAX TRANSMITTAL

To	Vietnam Veterans Museum	Date	27 April 2004
Attention	Laurie Dawson	Job No	16055
Phone N°	03 5678 5999	Fax N°	03 5678 5995
From	Marcus Lightfoot	Pages	1 (Including Cover)

ADVERTISED PLAN

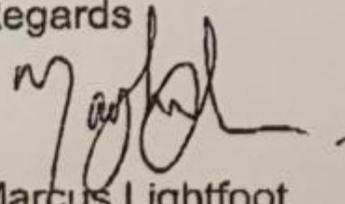
Re: Revised Administration Slab

Dear Laurie,

As discussed earlier to day to be able to use the SL72 mesh for the main hanger slab instead of the specified SL82, the area of steel needs to be increased. This can be done in the following ways:

- Lay the SL72 mesh and provide an additional layer on top of that of min SL52
- Lay the SL72 mesh and tie to that N12 bars at Max 1000ctrs each way

Either of the above will produce a satisfactory slab. Extra care will need to be taken with respect to concrete cover over the steel.

Regards

Marcus Lightfoot

Attachments: none



Geoscience
Engineering
Environmental
Ground Water



GEOTECHNICAL INVESTIGATION REPORT

SITE: Churchill Road South
PHILLIP ISLAND, VICTORIA

CLIENT: VIETNAM VETERANS ASSOCIATION OF AUSTRALIA
57 Phillip Island Road
SAN REMO, VICTORIA 3925

**ADVERTISED
PLAN**

1. INTRODUCTION

At the request of Mr Gary Parker, a geotechnical investigation has been performed to identify subsurface conditions and geotechnical parameters for the proposed construction given below. Conclusions and recommendations are based on the investigation methods outlined and are considered to be a minimum requirement for the project. Further investigations and testing may be required where more accurate and comprehensive parameters are necessary. This report does not assess the natural or any fill soils for contamination or any other parameters other than that required for the structural design of the building. An assessment of possible contamination which may affect the use and/or construction of the structure is recommended in addition to this report. This report is only for use by the client to whom it is issued. No responsibility will be taken for use by other parties.

2. PROPOSED CONSTRUCTION

A steel framed industrial type building supported on independent footings with an independent slab on grade floor. It is envisaged that the building will be clad in steel sheeting.

3. FIELDWORK

Three boreholes were drilled with flight augers using an ATS 3000 drill rig at the locations shown on the attached site plan. Appropriate in situ testing was performed and samples were retrieved using appropriate protocols for both physical and chemical laboratory testing. All sampling and logging of boreholes were performed by a qualified Geotechnical Engineer from AGS-Schult.

4. RESULTS

Please refer to the attached borelogs and site plan.

