Warren Smith & Partners

6th December 2019

CIVIL ENGINEERING SERVICES

Nepean Gardens
13 Park Road, Wallacia
Development Application Report

PROJECT #	5936001
ISSUE	Issue for Development Application
DATE	6th December 2019
REVISION	1
AUTHOR	N.Quinn
REVIEWED BY	L.Shaughnessy
STATUS	Current
DOCUMENT #	5936001-WS+P-CS-RP-0001

DOCUMENT CONTROL

Rev #	Date	Description of Change
1	6th December 2019	Issue for Development Application

APPROVALS

Rev #	Author	Status	Reviewer	Approval
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CIVIL ENGINEERING SERVICES

1. INTRODUCTION

Warren Smith & Partners (WS+P) has been engaged by the Catholic Cemeteries Board (CCB) to prepare a development application (DA) report for the proposed works located at 13 Park Road, Wallacia. This report outlines the stormwater strategy plan and road design associated with the proposed development of Nepean Gardens and aims to address the following: -

- Stormwater drainage works;
- Proposed road design and;
- Sediment and erosion control.

1.1 BACKGROUND

The existing site is located at 13 Park Road, Wallacia, approximately 13km south of Penrith City Centre and is currently utilised as an 18-hole golf course. It is proposed to redevelop the entire site, with the western half of the site being reconfigured to become a 9-hole golf course, known as Wallacia Country Club. The eastern half of the site will be redeveloped into a cemetery, known as Nepean Gardens, to ensure the continued availability of burial space for the increasing population of greater Sydney. The site is bound by Park Road and Mulgoa Road to the south and west respectively, and residential farmland to the north and east. The development will include the construction of the following two (2) buildings:-

- Chapel;
- Administration and Gatehouse building.

The development will also see the construction of approximately 1.8km of road to facilitate movement across the site.

Please refer to Figure 1 for an aerial view of the development site.

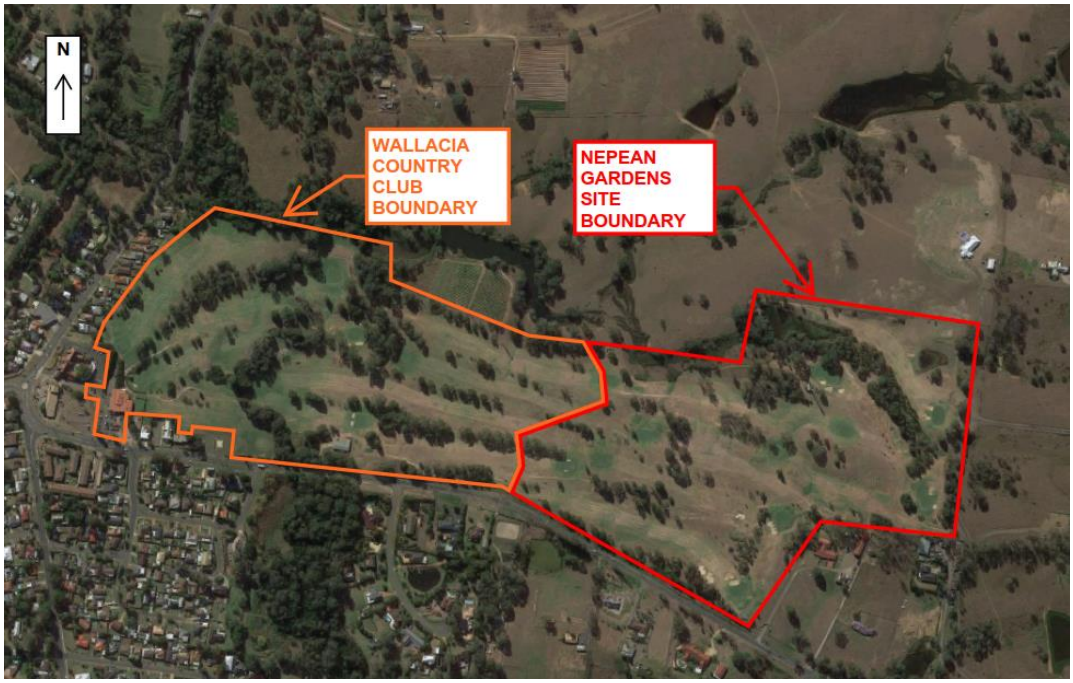


Figure 1: Aerial View of Development Area *(Source: GoogleMaps)*

2. EXISTING STORMWATER INFRASTRUCTURE

A desktop review and site inspection was undertaken in order to determine the existing drainage infrastructure within the development site. The inspection revealed the following: -

- Jerry's Creek runs in a south-north direction and is located west of the site boundary.
- There are a number of valleys which drain water off site;
- The site grades approximately 6-10% towards existing valleys;
- There are two (2) streams located in the north-east corner of site. These have been classified as a Class 3 and a Class 2 stream as per the Office of Water Guidelines;
- There are two (2) existing ponds in the north-eastern corner of site and a third pond located partially on site along the northern boundary;
- There is a DN750 headwall located on the southern boundary which reticulates surface water from the existing golf course under Park Road.

Please refer to Figure 2 below for an illustration of the site characteristics.

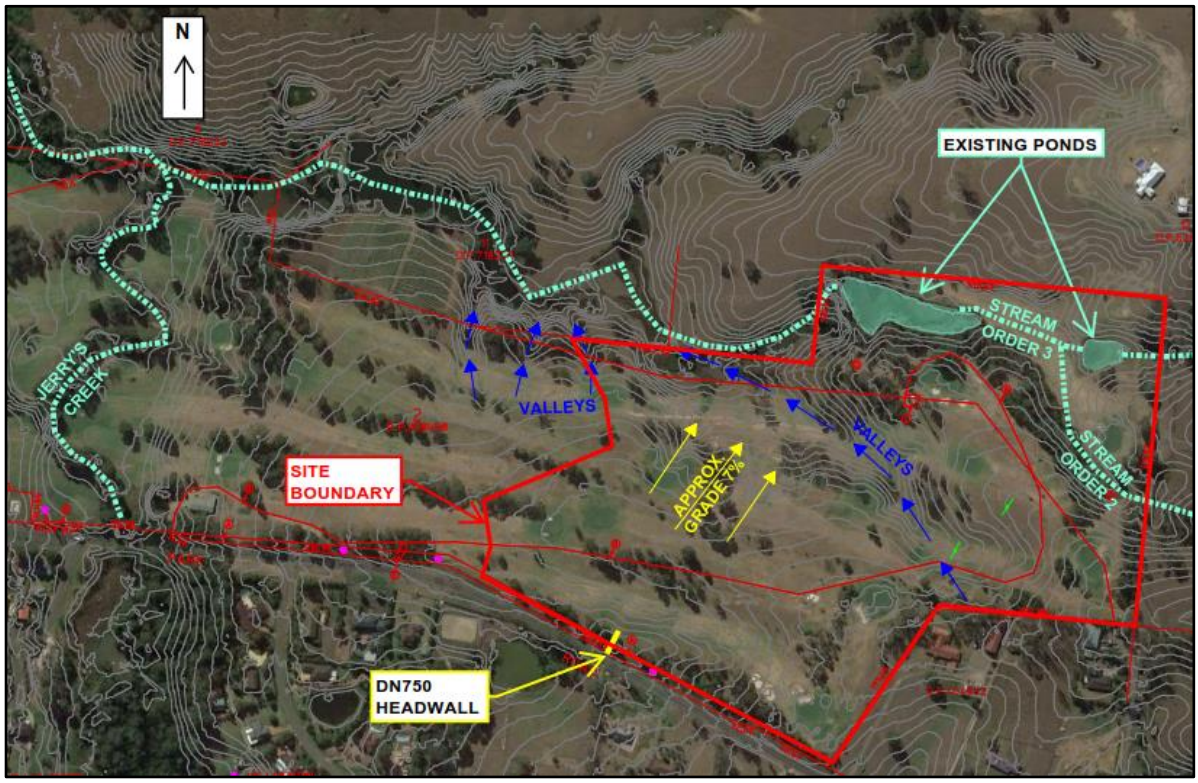


Figure 2: Aerial View of Existing Site Conditions

3. AUTHORITY AND REGULATORY REQUIREMENTS

Penrith City Council's (PCC) regulatory requirements have been referenced from the documents below:-

- PCC Development Control Plan (DCP) 2014;
- PCC Stormwater Drainage for Building Developments – Working Draft (2013), and;
- PCC Design Guidelines for Engineering Works for Subdivisions and Developments (2013)

The stormwater requirements are as follows:-

- All piped stormwater systems shall be designed to cater for storm events up to and including the 5% AEP event;
- Overland flow must be designed to cater for storm events up to and including the 1% AEP storm event.
- Runoff cannot be discharged into bushland areas, including threatened ecological communities;
- The new development must not increase stormwater peak flows in any downstream areas for all rainwater events up to and including the 1% AEP storm;
- Onsite detention storage is to be located at a level that is above the 20% AEP flood level;
- All pipes draining to the OSD system shall convey the 100yr ARI flow from their respective sub-catchments when the basin is at top water level, and;
- DRAINS results should be presented in a spreadsheet and models put on a CD/USB for submission.
- The tailwater levels adopted in DRAINS shall be in accordance with the PCC Stormwater Drainage Specification for Building Developments.

4. PROPOSED ROAD DESIGN

4.1 ALIGNMENT AND LAYOUT

The road alignment was developed to promote ease of access throughout the site. In order to minimise the batter extents from the roads and minimise earthworks required during construction, the longitudinal grade of the roads aim to match the existing topography of the land as much as possible. In all achievable areas, batters from the road grading to the existing landscape were maintained at 1:6. Retaining walls will also be used to further to minimise earthworks across the site.

Additional considerations to the layout include the movement of hearses across the site. To ensure that there are no issues in vehicle movement, the maximum longitudinal grade for all roads has been set at 10%.

The road layout has been optimised in response to various ecological concerns on site. The two main locations this has occurred is for the alignment of Road 4 leading into the Chapel basement and Road 3. It was determined that the original proposed locations of both these roads impact heavily on existing sensitive vegetation on site. Please refer to Figure 3 for details of the original proposed road locations and location of sensitive native vegetation whilst Figure 4 outlines amended road layout to minimise impact.

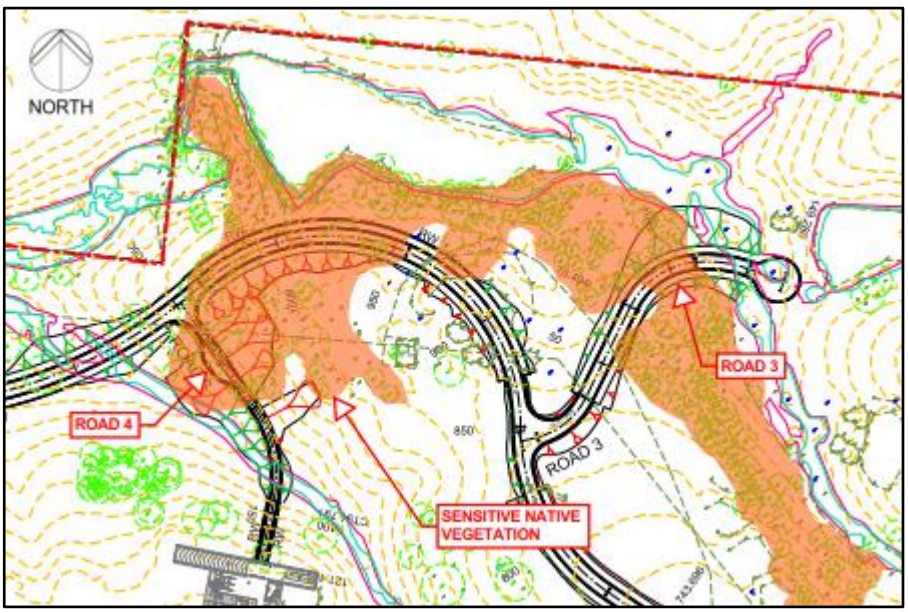


Figure 3: Original Location of Sensitive Native Vegetation

To maintain access to the Chapel basement, and also access to the north-east corner of the property Roads 3 and 6 are proposed in the locations outlined in Figure 4.

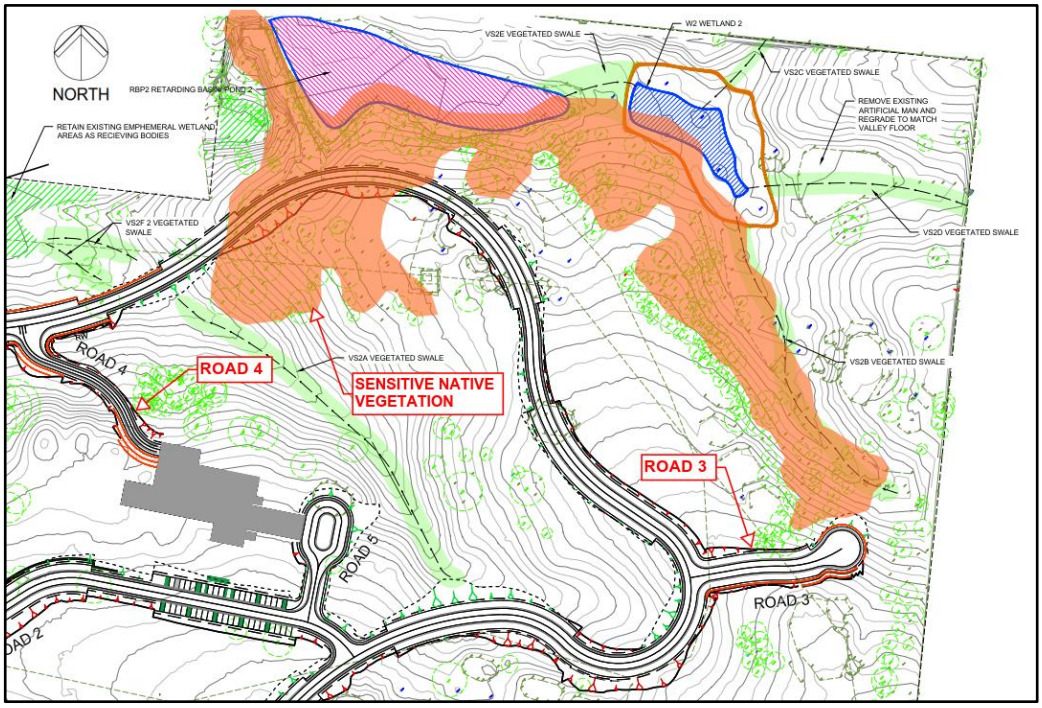


Figure 4: Proposed Location of Road 3 and 6

The impacts to native vegetation from Road 1 will be offset elsewhere on site.

4.2 ROAD WIDTH

The road widths have been determined in consultation with the Rural Fire Service (RFS) and their *Planning for Bushfire Protection* specification. The specification outlines the following requirements for public roads: -

- Roads must be two-wheel drive, all weather roads.
- Perimeter roads are classified as roads which separate bushland from urban areas. These roads must be two-way with a minimum 8m width kerb-to-kerb.
- All other roads are classified as internal roads or non- perimeter roads and shall be minimum 5.5m kerb to kerb;
- Dead end roads are not recommended. However, if unavoidable they must not be greater than 200m in length and incorporate a minimum 12m outer radius turning circle;

- The maximum grade for sealed roads should not exceed 15 degrees (26.8%) and an average grade of not more than 10 degrees (17.6%).
- Public roads directly interfacing the bush fire hazard vegetation are to provide roll top kerbing to the hazard side of the road.

In consultation with Traver's Bushfire and Ecology, no roads on site have been classified as perimeter roads, therefore in accordance with Planning for Bushfire Protection specification, the remaining road widths are to be determined as per their curve radii. To comply with this specification, the minimum road width requirement for the development is 6.5m. However, in order to maximise burial space and minimise the cut and fill balance throughout the site, a swept path analysis was run for two (2) 8.0m long medium rigid vehicles (MRV) passing each other at 10km/hr for all two-way road networks. This was undertaken to reduce the width of the roads to as low as reasonably practicable and within acceptable standards of the NSW RFS.

It was concluded and accepted by the RFS that the minimum two-way road width required to achieve these requirements is 6.5m plus 2.1m on each side for parking. Road 4 will function as a single lane service vehicle access to the crematorium and will not have parallel parking facilities. Please refer to Figure 5 for an illustration of the single lane road within the site.

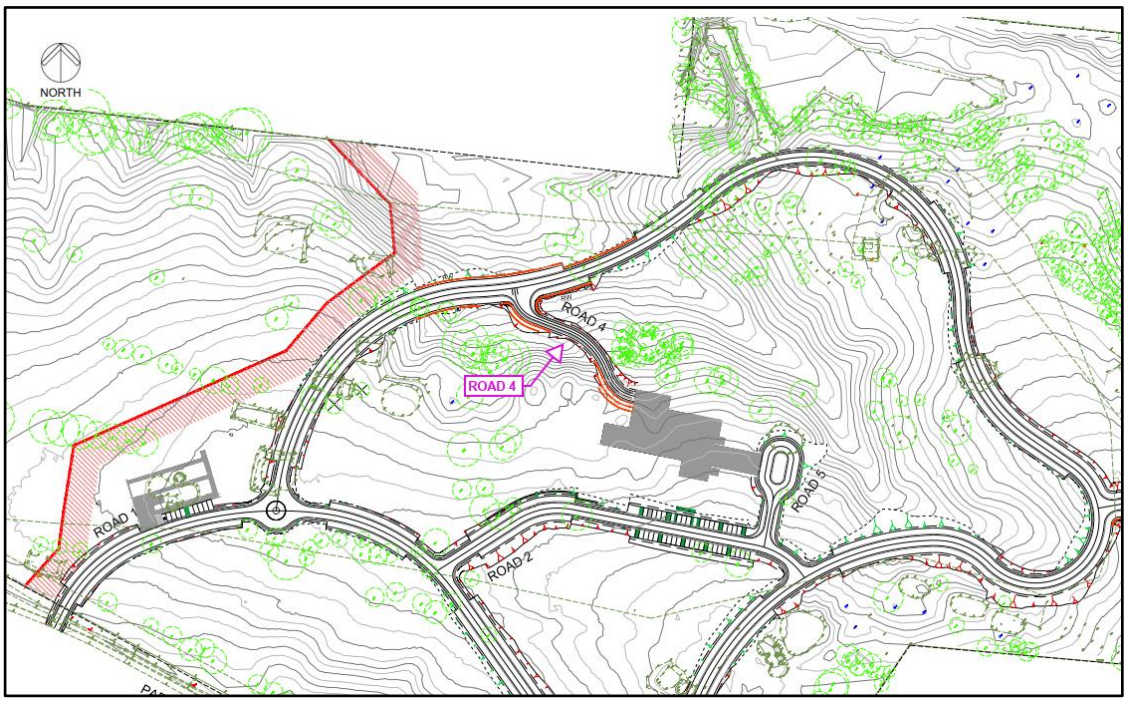


Figure 5: Proposed Single Lane Road

5. PROPOSED STORMWATER DRAINAGE SYSTEM

The stormwater drainage network has been designed to capture and reticulate the majority of the site's catchment to a number of proposed basins on site. These basins will act as on-site detention, ensuring the post development flow rates of the development do not increase when compared with the pre-development state. The required volume of these basins has been calculated using a RORBS model and is outlined in the Stormwater Management Plan (SWMP) by Stormy Water Solutions. The location of these basins is outside of the 5% AEP flood extents as per PCC requirements. Please refer to Figure 6 for location of the basins.

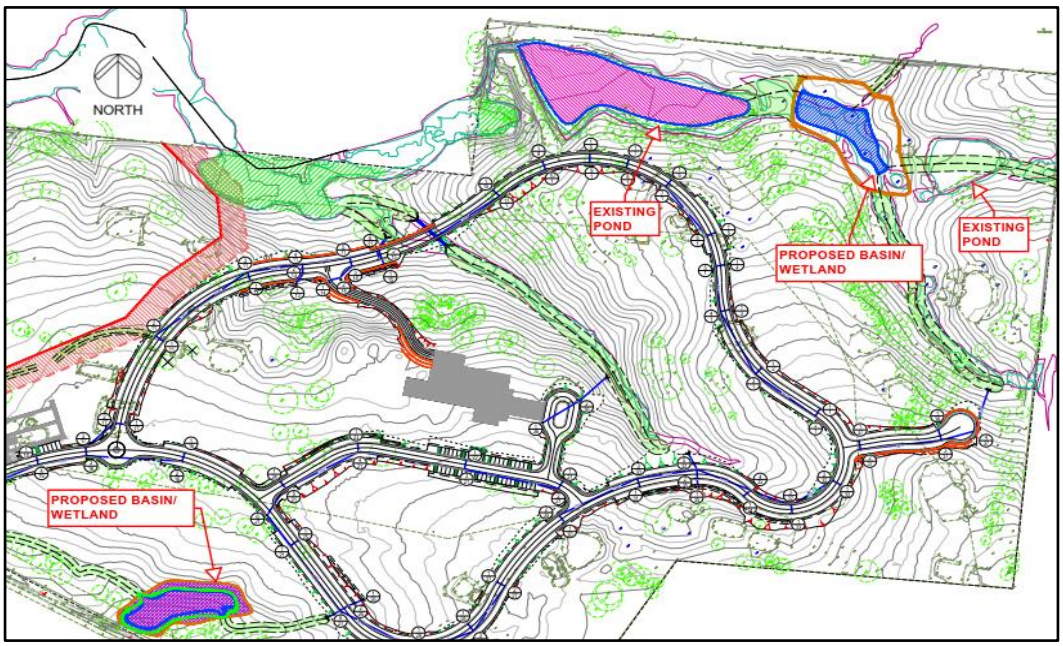


Figure 6: Proposed Basins on Site

As per PCC specification, the road stormwater network has been design to accommodate the 5% AEP storm event and allow for safe overland flow during the 1% AEP storm event. Water captured in the system will discharge directly to vegetated swales upstream of a proposed retarding basin in a total of six (6) separate locations. The swales will serve the dual purpose of retarding flow and providing treatment to the water before entering the Council network. Please refer to Figure 7 for an illustration of these locations.

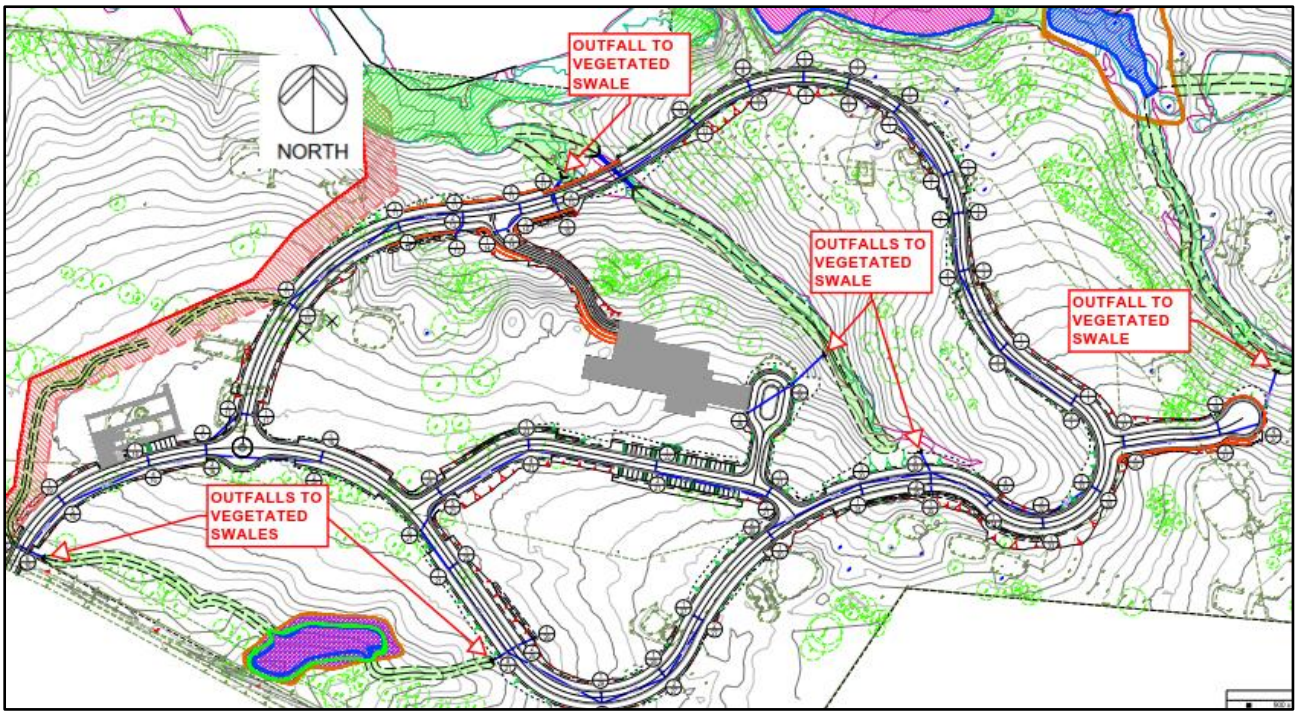


Figure 7: Location of Stormwater Discharge to Vegetated Swales

5.1 DRAINS MODEL INPUT PARAMETERS

Stormwater flows in the system were calculated using an ILSAX model in DRAINS in order to size the pipe network on site. DRAINS is a stormwater drainage design and analysis program which performs hydraulic grade line analysis and generates flows that occur in a drainage system for a particular AEP storm event.

The catchment characteristic factor values used in the DRAINS model are listed below: -

- Soil Type – Normal 3.0
- Paved (Impervious) Area Depression Storage 1mm
- Supplementary Area Depression Storage 1mm
- Grassed (Pervious) Area Depression Storage 5mm
- Antecedent Moisture Condition 3.0
- Blockage Factor for On-Grade Pits 20%
- Blockage Factor for Sag Pits 50%

The rainfall data has been taken from the ARR Data Hub and the Bureau of Meteorology Rainfall IFD Data System using local coordinates. Due to the size of DRAINS data and results, this can be provided to Council upon request.

6. SEDIMENT AND EROSION CONTROL

The Contractor for the works is required to provide Sedimentation and Erosion Control in accordance with the general requirements outlined below.

6.1 SITE PROTECTION MEASURES

It is proposed to provide the following in order to inhibit the movement of sediment off the site during the demolition and construction phases.

6.1.1 SITE ACCESS

Construction vehicles leaving the site shall be required to pass over a Temporary Construction Vehicle Entry consisting of a 1.5m long by 3m wide ‘cattle rack’.

6.1.2 SEDIMENT CONTROL

All exposed earth areas where it may be possible for runoff to transport silt down slope shall be protected with a sediment and erosion control silt fence generally installed along the boundaries of the site.

The fence will be constructed in accordance with details provided by the Department of Conservation and Land Management incorporating geotextile fabric which will not allow suspended particles greater than 50mg/L non-filterable solids to pass through, and as such comply with the appropriate provisions of the Clean Waters Act 1970.

The construction of the silt fence will include the following:-

- Geotextile fabric buried to a maximum of 100mm below the surface;
- Overlapping any joins in the fabric;
- Turning up on the ends for a length of 1 metre in order to prevent volumes of suspended solids escaping in a storm event;
- Any Council owned road kerb entry and or gully pits will be protected by Atlantis Filter Bales and EcoSock. Additional protection will be provided by inserting Water Clean Filter Cartridges into the gully opening, and;
- Internal site drainage pits shall be protected by Sediment Traps consisting of hay bales.

6.2 TEMPORARY STORMWATER SYSTEM (WHERE REQUIRED)

Site runoff within the zones of the excavation will be drained into a central holding well within the excavation. Runoff will be allowed to settle out suspended particles and debris, and an acceptable water of 50mg per litre of Non Filterable Residues (NFR) is required to be achieved prior to discharge.

6.2.1 DUST CONTROL

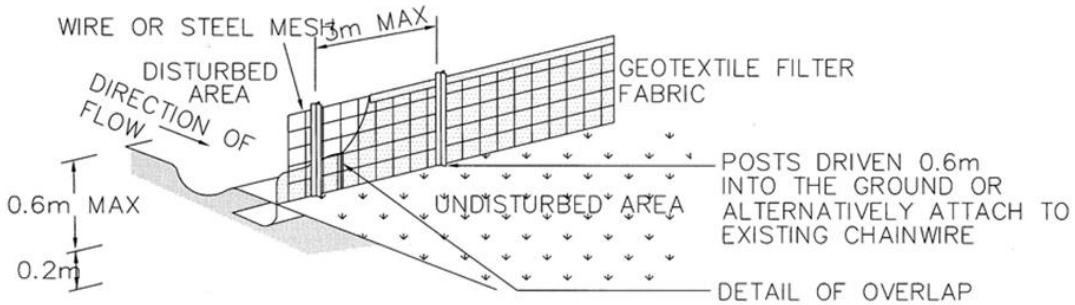
The following dust control procedures will be adhered to:

- Loose loads entering or leaving the site will be securely covered by a tarpaulin or like material in accordance with RMS and local Council Guidelines.
- Soil transport vehicles will use the single main access to the site.
- There will be no burning of any materials on site.
- Water sprays will be used across the site to suppress dust. The water will be applied either by water sprinklers or water carts across ground surfaces whenever the surface has dried out and has the potential to generate visible levels of dust either by the operation of equipment over the surface or by wind. The watercraft will be equipped with a pump and sprays.
- Spraying water at the rate of not less than three (3) L/s and not less than 700kPa pressure. The area covered will be small enough that surfaces are maintained in a damp condition and large enough that runoff is not generated. The water spray equipment will be kept on site during the construction of the works.
- During excavation all trucks/machinery leaving the site will have their wheels washed and/or agitated prior to travelling on Council Roads.
- Fences will have shade cloth or similar fabric fixed to the inside of the fence.

6.2.2 MAINTENANCE

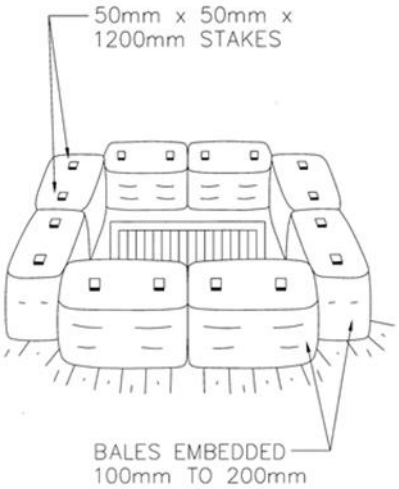
- It will be the responsibility of the site foreman for the building contractor to ensure sediment and erosion control devices on site are maintained. The devices shall be checked daily and the appropriate maintenance undertaken as necessary.
- Prior to the closing of the site each day, the road shall be swept and materials deposited back onto the site.
- Gutters and roadways will be kept clean regularly to maintain them free of sediment.
- Appropriate covering techniques, such as the use of plastic sheeting will be used to cover excavation faces, stockpiles and any unsealed surfaces;
- If dust is being generated from a given surface, and water sprays fail;
- If fugitive emissions have the potential to cause the ambient as quality to foul the ambient air quality;
- The area of soils exposed at any one time will be minimised wherever possible by excavating in a localised progressive manner over the site; and,
- Materials processing equipment suitable comply with regulatory requirements. The protection will include the covering of feed openings with rubber curtains or socks.

It is considered that by complying with the above, appropriate levels of protection are afforded to the site and the adjacent public roads, footpaths and environment.



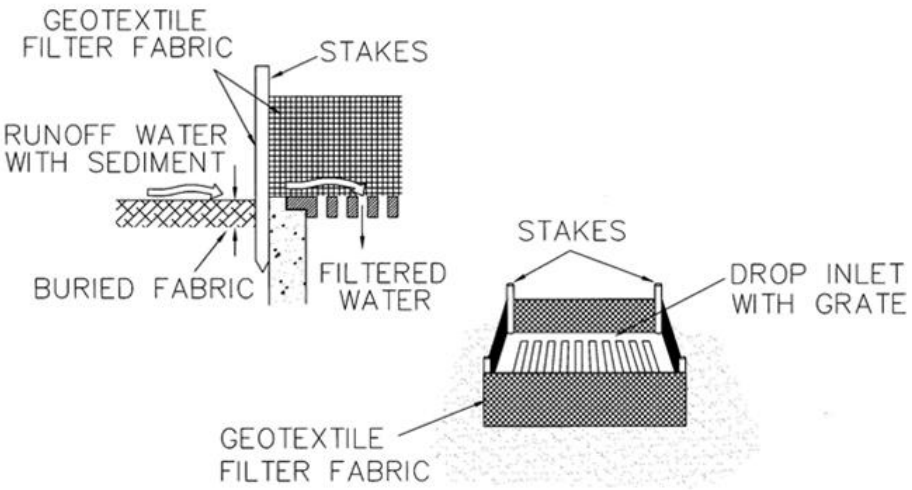
SEDIMENT CONTROL FENCE

NTS



STORMWATER PIT
SEDIMENT TRAP

NTS



GEOTEXTILE FILTER FABRIC DROP INLET
SEDIMENT TRAP

NTS

Atlantis Sediment Control Filter Bales

What are FilterBales?

Water Clean FilterBales are a unique new patented 7 stage sediment filter device developed to substantially reduce the migration of sediment and contaminants into drainage systems while allowing filtered water to easily pass through. FilterBales reduce customers' time and money by providing solutions to comply witht environmental and regulatory requirements.

Durable, Dependable, Reusable.
Replacing hay bales and other inadequate attempts to stop sediment run-off, FilterBales are durable and re-useable, effectively stopping your money from "pouring down the drain". They are also lightweight and easy to handle. Replaceable Water Clean Filter Cartridges guarantee peak performance is maintained.

Ask your local FilterBales stockist about replacement frequencies in your area. Cartridges and filter covers should be changed when the infiltration rate decreases. Water Clean FilterBales are suitable for a wide range of sediment and water management situations and can be easily secured in place for long term use. The unique multi-directional filter system allows you to position Water Clean FilterBales in any direction without reducing performance.

Water Clean FilterBales can be fixed to concrete or bitumen surfaces using an epoxy mortar-binder or fixed to earth surfaces using 6-10 mm pegs or stakes. When positioning, the side with the red reflective marker should be facing traffic.

www.atlantiscorp.com.au

1. FilterBales frames are a perforated plastic structure made from recycled wheelie bins, battery cases, milk bottles etc.

2. Filter medium (bio engineered soil media) used in the filter cartridges is made from a special blend of recycled organic (RO) materials from kerbside and vegetation drop off centres. The RO hosts enhanced naturally occurring micro-organisms. The blend also contains natural minerals to capture nutrients. The filter medium is as safe as normal soil.

3. FilterBales have a seven (7) stage filtration system:

1. In through the filter bag
2. Through the perforated plastic structure wall
3. In through the filter cartridge bag
4. Through the bio engineered filter medium
5. Out through the filter cartridge bag
6. Out through the perforated plastic structure wall
7. Out through the filter bag

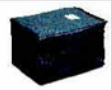
4. The filter bag is made from 300-micron (one third of a millimetre) pore size geotextile. This is the first stage that filters much of the sediment and other suspended solids from the run-off water. The geotextile is designed to stop sediment and reduce clogging but allow water to pass through easily. The filter cartridge bags are made from a similar geotextile.

5. FilterBales work effectively up to "a one-in-one-year 48 hours, 100 mm "storm events". This is the largest storm event experienced since the commercialisation of FilterBales. Having handled this easily, Filter Bales are considered capable of handling much greater "storm events'. During these storm events FilterBales were used inside gully pits in one application and on the ground surrounding the gully pit in another application.

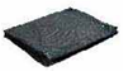
6. EcoSocks are made from a similar geotextile to the filter cartridge bags and contain the same bio engineered soil media as the FilterBales. They appear able to stand up to as much wear and tear as a sandbag.

7. FilterBales are much lighter (at around 15 kgs dry weight) than hay bales. This reduces exposure to Occupational Health and Safety problems

Product Range

Item No.	Description	
HFB001	**High FilterBale,** suitable for high flow situations and higher retention time applications. Contains two standard size WaterClean Filter Cartridges in upright formation to treat contaminated waters. (605mm x 485mm x 460mm)	
LFB002	**Low FilterBale,** suitable for low flow situations and kerb & gutter applications. Multi-directional module containing two standard size WaterClean Filter Cartridges. (605mm x 485mm x 220mm)	
ESF004	**Directional EcoSock,** can be used in conjunction with FilterBales to direct water. Will also provide some sediment filtration from seepage through bio-remediating media contained within the EcoSock (1135mm x 160mm x 30mm)	

Accessories

Item No.	Description	
FCR004	**WaterClean Filter Cartridges** contain a unique blend of fixating and bio-remediating products that treat common pollutants. To achieve maximum performance, each FilterBale uses two WaterClean Filter Cartridges. (440mm x 400mm x 100mm)	
HBC005 (High bale)	**Replaceable FilterBale covers,** made from specially designed geotextile. FilterBale covers have a standard aperture of 300 microns.	
HBC006 (Low bale)	**Replaceable FilterBale covers,** made from specially designed geotextile. FilterBale covers have a standard aperture of 300 microns.	

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V3-20/06/01