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Communities NSW

Southern Highlands Regional Shooting Complex

Soil and Water Management Plan

November 2010

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

Contents

Table Index

Figure Index

Appendices

1. Introduction

1.1 General Purpose and Objective

The purpose of this Soil and Water Management Plan (SWMP) is to minimise the risk to human health or the environment from the proposal by reducing the potential for sediment, metal (and other) contamination to migrate to nearby sensitive receptors. The management plan includes details on:

- Aspects of range design associated with pollution control and minimisation;
- Stormwater and wastewater management structures;
- Erosion control measures;
- The application of soil amendments to reduce the risk of metal mobilisation and transport; and
- The environmental monitoring program and evaluation process.

This plan is prepared in accordance with US EPA *Best Management Practices for Lead at Outdoor Shooting Ranges* (EPA; 2005) and NSW Landcom's Soils and Construction: Managing Urban Stormwater (2004) manual.

1.2 SWMP Requirements

This management plan addresses particular issues contained within the Minister's Determination for the proposal, as listed in Table 1.

Table 1 Minister's Requirements

Requirement	Relevant Section of this plan
A Soil and Water Management Plan shall be prepared to meet the requirements outlined in Chapter 2 of the NSW Landcom's *Soils and Construction: Managing Urban Stormwater (2004)* manual – the "Blue Book". A copy of the Plan shall be submitted to the Department of Planning	All
The design capacity of the amended soil wastewater treatment and disposal system for the proposed shooting complex, including upgrade or transfer of the wastewater system at the existing Hill Top rifle range, must be based on average and peak wastewater loads expected to be generated at the site.	Section 4.3 of the Water Cycle Management Plan
The amended soil mound must be located at least 100 metres from the Rocky Waterholes Creek or any other perennial or intermittent creek or watercourse, and at least 40 metres from any drainage depression and dam.	Section 4.1 of the Water Cycle Management Plan
A detailed water cycle management plan (WCMP) for the operation of the complex prepared by a person with knowledge and experience in the preparation of such plans which is to incorporate the elements of Appendix E of the Environmental Assessment.	Water Cycle Management Plan

Requirement	Relevant Section of this plan
Plans and procedures for the remediation of any contaminated soils on the site.	Section 4.5 of the Water Cycle Management Plan
Construction monitoring plan, including monitoring of surface water and engineering controls.	Section 5

1.3 Management Principles

The following mitigation measures (in general) would be implemented to combat the potential environmental impacts from the proposal:

- Remediation of the existing stopbutt in accordance with DECC requirements so that it meets health and ecological investigation levels suitable for recreational open spaces. A Site Audit Statement prepared by a qualified site auditor to assess the existing stopbutt and confirm that it has been remediated and is suitable for its intended use;
- Sediment control ponds would be established at the commencement of construction. A minimum of six (6) ponds, with a combined storage volume of 6,630m^3, would be provided and would be retained for operation of the proposal;
- New stopbutts and target mounds are designed to reduce erosion, including the construction of a 3(h):1(v) slope to improve stability, to promote low-velocity sheet flow, and to assist with vegetation establishment. Note the angle of front slope is specified by NSW Police range guidelines;
- Stopbutts would be constructed from suitable clean site soils or imported clean fill and all rocks and other debris removed to minimise the potential for ricochet;
- The stopbutt is designed to minimise contact between water and projectiles to reduce the rate of shot deterioration and metal leaching; and
- Preparation of a soil and water sub plan as part of the operation environmental management plan, to include the following measures:
  - The usage of firing lanes at rifle and pistol ranges would be staggered to minimise effects on stopbutt stability;
  - The establishment of grass where possible as an erosion control, which would also assist with filtering pollutants from runoff;
  - Raking of fine agricultural grade lime into soils within the range, shot fall zones, and stopbutts to reduce the mobility of metals by increasing soil pH to within the range of 6.5 to 8.5;
  - Testing to identify the chemical characteristics of soil around stopbutts to confirm maximum quantity of phosphate application in stopbutt trenches in order to avoid phosphate accumulation and runoff to waterways;
  - Monitoring for pH where lime is added to soils;
  - Re-application of lime when pH of soils is found to drop below pH 6.5;
  - Lead management measures to prevent metal migrations at the shotgun range, which would entail:

- Shot curtains to minimise shot distribution (if it is not possible to clear the entire range); and
- Overlap of shot fall zones to minimise the area of potential impact;

– Where feasible the use of less toxic shot (i.e. non lead) would be promoted by the clubs; and

– A long term monitoring program would be implemented at the site to monitor possible metal accumulation and migration from the site. The monitoring program is outlined in Section 5 of the Water Cycle Management Plan.

2. Proposal Outline

The proposal would involve works to establish a regional recreational shooting complex incorporating the existing Hill Top Rifle Range (which would continue to operate), and include:

- An additional rifle range (500 metres by 100 metres);
- An additional range for rifle and pistol shooting (200 metres by 85 metres);
- A pistol range (50 metres by 140 metres);
- A shotgun range;
- An indoor air range (21 metres by 17 metres by 6.5 metres); and
- Supporting facilities and infrastructure, including:
  - Clubhouse and Toilet facilities;
  - Access roads (designed for two wheel vehicle access) connecting to Wattle Ridge Road and between the clubhouse and ranges;
  - Diesel generator, solar panels, water supply tanks and septic system;
  - Informal parking for 160 cars; and
  - Ponds to contain water for water quality control and fire fighting purposes.

The project would be located in the vicinity of the existing Hill Top Rifle Range, on Wattle Ridge Road, approximately 5.5 km northwest of the centre of the village of Hill Top in the Wingecarribee local government area (LGA) (approximately 2 km to the nearest residence). The site location is shown below.

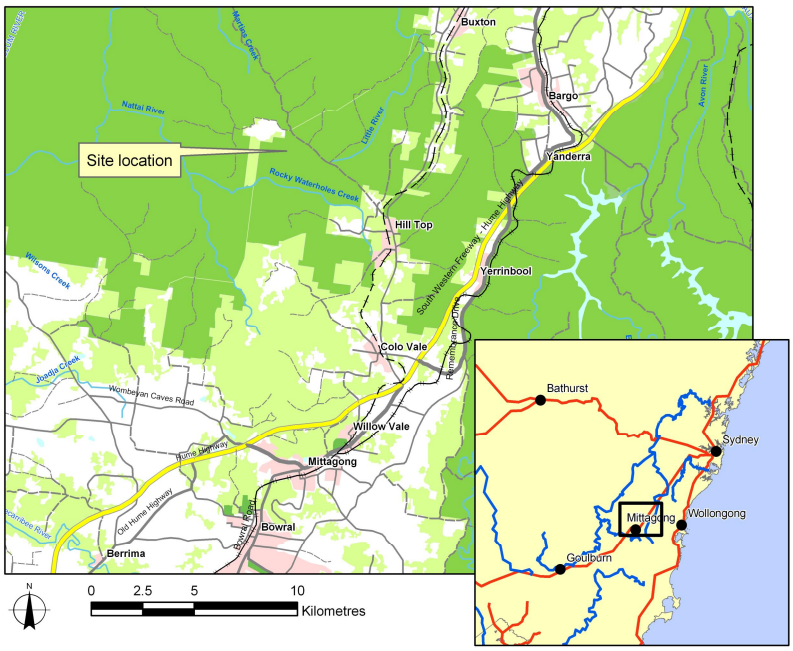


Figure 2.1 Site Location

2.1 Site Location and Description

The proposal is located in the Wingecarribee LGA near the village of Hill Top in the southern highlands of New South Wales, approximately 11 km north of Mittagong. Mittagong is located at the southwestern end of the Sydney Basin between the upper reaches of the Nepean River and other rivers such as the Wollondilly, Nattai, Bargo and Wingecarribee. These rivers flow into the Nepean River further to the north.

The Wingecarribee Local Environmental Plan 1989 (the LEP) applies to the site.

The site is currently the location of the Hill Top Rifle Range. The Southern Highlands Rifle Club licensed land on which the range is located, from the National Parks and Wildlife Service, on 3 June 1993. The existing Hilltop Rifle Range consists of a seven-target rifle range 800 m long, with firing mounds at 100 m intervals. A small clubhouse, toilet facilities and informal car parking are also located on site.

1,036 hectares (ha) of land has been excised from the Bargo State Conservation Area by means of the *National Parks and Wildlife (Adjustment of Areas) Act 2006*. The development would occupy an area of approximately 16 ha within this land (the proposal location). The area occupied by the range and associated facilities would be cleared as part of the proposal. The remainder of the land on the site (approximately 1,021 ha) would be retained in its existing condition as a vegetation buffer zone. This area would act as a safety zone for the proposal.

2.2 Surrounding Land Uses and Sensitive Receptors

The site is bounded by:

- Wattle Ridge – a grazing property/residence which adjoins the site to the northwest (located approximately 2.5 km north of the existing range);
- Bargo State Conservation Area to the southwest;
- A 330 kV cleared electricity easement (Transgrid) to the southeast; and
- Wattle Ridge Road to the northeast.

Bargo State Conservation Area is located further southwest, southeast and northeast. Nattai National Park is located further to the northwest, on the opposite site of the Wattle Ridge property. Nattai National Park is accessible from the end of Wattle Ridge Road approximately 3 km away.

Sensitive receptors include Rocky Waterholes Creek, located approximately 1.5 km south of the site. The creek is a tributary of the Nattai River. The Nattai River is located approximately 7.5 km west of the site.

2.3 Geology, Soils and Topography

Topographically and geologically the area is transitional between the Cumberland Plain of the Sydney Basin, and the southern uplands.

The underlying geology of the site comprises the Hawkesbury Sandstone of the Mittagong Formation (Herbert and Helby, 1980). The site lies within an outcrop of the Narrabeen group, which comprises sandstone, claystone and siltstone. The Hawkesbury sandstone overlies a Triassic shale unit, the Wianamatta Group.

The site is characterised by relatively flat topography, being situated on a spurline that trends to the north from the Wattle Ridge Range. This spurline occupies a position between two tributaries of the Rocky Waterholes Creek. All watercourses are upper tributaries of the Nattai River.

The three main groups of soils that occur within the region are (NPWS, 2001):

- Sandstone tableland soils;
- Valley soils (sandstone derived); and
- Soils associated with nutrient rich shales and igneous rocks.

Land surfaces in the site do not appear to have been significantly transformed. These soil landscape types are unstable when disturbed. They are highly susceptible to mass movement, such as slides and rock falls, as well as wind and water erosion (Hazelton and Tille, 1990). A major cause of erosion in an area of this type is fire. After a fire in which the crowns are consumed, the loose sandy soils remain bare for a long period. If rain then shortly follows a fire, there is a resulting increase in surface run-off, causing increased erosion, and a reduction in plant propagation and animal habitats.

2.4 Hydrogeology

The site is located within the Hawkesbury Sandstone – southeast groundwater flow system, which consists of layered aquifer system with yields ranging from less than one to 50 infills. Basalt caps are expected to occur in some areas of the Mittagong Ranges, with groundwater from this horizon discharging into seeps, springs and rivers (Sydney Catchment Authority, 2006).

According to the Department of Natural resources Groundwater Licence database, groundwater within the Hilltop area was found to be present at depths of approximately 20 metres in the sandstone aquifer. The depths to groundwater within the aquifers are expected to be dependent on rainfall and therefore are likely to vary seasonally. A borehole on site near the proposed clubhouse was terminated at 50 m depth with no water detection,

2.5 Hydrology

The nearest pluviograph station to the site is located at Moss Vale, which is considered too distant to provide representative hydrology data for the study area. A number of daily rainfall stations are located in close proximity to the study area. Table 2 summarises these stations, providing station number, name and recording start and end years.

Table 2 Daily Rainfall Data

Station Number	Station Name	Start Date	End Date	Max mean monthly rainfall (mm)	Min mean monthly rainfall (mm)
068044	Mittagong (Beatrice St)	1886	2004	92.9	53.2
068052	Picton Council Depot	1880	2004	88.6	44.8

An analysis undertaken on this data indicated that there is some variability in the rainfall with the maximum mean monthly rainfall of 93.8 mm in March, while the minimum mean monthly rainfall recorded is about 43.7 mm in September. The average annual rainfall at both gauges is 848 mm. The mild

seasonal variability would indicate that rainwater collection via rainwater tanks is viable (the existing clubhouse utilises rainwater tanks and to date the tanks have never needed any top-up).

Mean monthly evaporation data for the region ranges from 40-50 mm in June to 200-250 mm in December, with an annual evaporation rate of approximately 1600 mm. The annual evaporation rate exceeds the average annual rainfall for the region, however the existing erosion control ponds still contained water during a site inspection in December 2006 despite a prolonged period with only limited rainfall.

2.5.1 Waterways

Rocky Waterholes Creek, which is immediately south of the proposed ranges drains directly to the Nattai River approximately 6 km to the west of the existing Hilltop Rifle Range. The Nattai River drains north to Lake Burragorang. The catchment of Rocky Waterholes Creek is approximately 23.5 square kilometres, while the catchment of the Nattai River upstream of the junction with Rocky Waterholes Creek is some 240 square kilometres. The total catchment area of the Nattai River upstream of Lake Burragorang is 480 square kilometres. Figure 2.2 illustrates the major regional catchments.

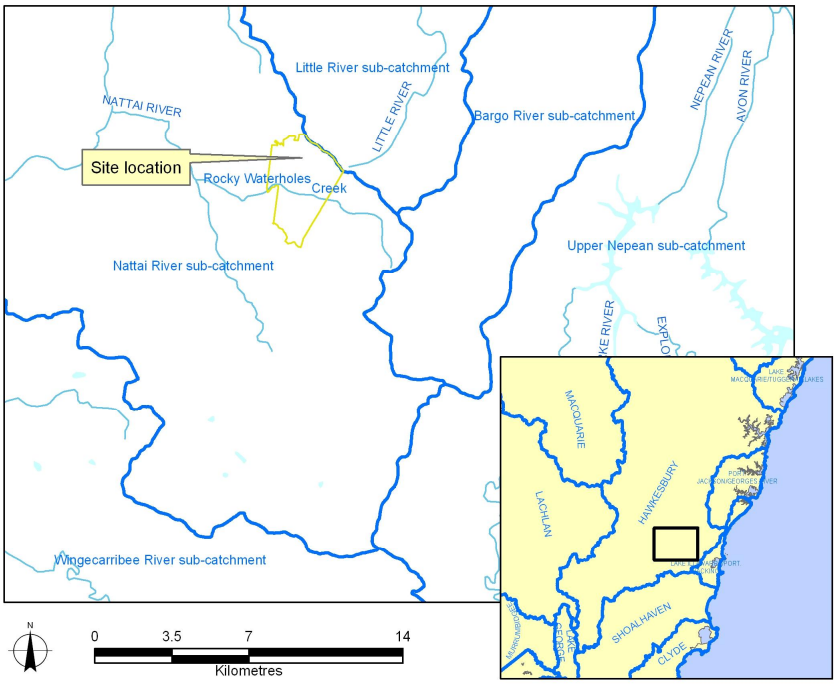


Figure 2.2 Water Catchment

2.5.2 Onsite Creeks

As the site sits on the top of a spurline that runs from north to south, the natural fall is from the centre of the spurline to the east and to the west into steep gullies. The gullies drop from the level of Rocky Waterholes Creek Road down to Rocky Waterholes Creek, a fall of approximately 100 metres over a distance of less than 1 km. As a result of the topography, the site is not subjected to flooding.

2.6 Water Quality

The Hawkesbury Nepean Catchment Management Authority has classified 98% of the Nattai River as being 'Near Intact'. The Draft Hawkesbury Nepean Catchment Action Plan (2007) identifies a strategy for managing the entire catchment and sets out procedures for looking after the near intact systems such as the Nattai River.

Table 3 identifies the results of testing in the Nattai River undertaken by Sydney Catchment Authority. These results indicate the high standard of the river water.

Table 3 Water Quality Data at Gibbergunyah Creek

Water Quality Parameter	TP (mg/L)	TN (mg/L)	NH_3 (mg/L)	DO (mg/L)	Chlorophyll-A (mg/L)	Faecal Coliform (cfu/100ml)
Result	0.0985	4	0.01	74	2.5	6

3. Environmental Impact

Potential environmental impacts resulting from the construction phase of the project are likely to be associated with soil and erosion of the site. These will be addressed by following Landcom's requirements, detailed in Section 4 of this plan.

4. Mitigation and Control

4.1 Stormwater Management

In the context of Water Sensitive Urban Design (WSUD), the planning and design sets out to minimise the hydrological impacts of development on the surrounding environment. The management of stormwater encompasses:

- Water quality management;
- Flood management;
- Flow management; and
- Flow attenuation.

Key planning and design objectives are:

- Protect and enhance natural water systems following development;
- Integrate stormwater treatment into the landscape by incorporating multiple-use corridors, that maximise the visual and recreational amenity of the development;
- Protect water quality draining from development areas;
- Reduce runoff and peak flows from developments by employing local detention measures, minimising impervious areas and maximising re-use (for example through rain water tanks); and
- Stormwater management must form a key component in the overall water cycle management for the site.

Opportunities for future stormwater management for the proposal aims at preventing an increase in the amount of stormwater leaving the site, maintaining the water balance, and to slow the transmission of stormwater to receiving waters to match the existing predevelopment conditions. Additionally, the stormwater management system prevents the transportation of gross and sediment-born pollutants as much as possible.

Specific strategies include:

- Provision of treatment practices such as ‘treatment trains’ and wetlands to manage water quality, downstream or close to the point of discharge. Treatment practices incorporating treatment strategies in series are encouraged;
- Promotion of sheet flow of runoff water over the range surface. Sheet flow lowers the water velocity, which will lower the water’s sediment load–carrying capacity. It reduces the potential for erosion on the range and avoids potential point source discharge issues and monitoring requirements that may occur with channelled flow. Promoting sheet flow is accomplished by regrading and flattening out the slope of the land surfaces and by creating broad, very shallow drainage pathways to replace ditches or deep, narrow channels;
- Prevention of storm water from impacting on berms or areas that have the highest potential for erosion from flowing onto comparatively clean range areas or mixing with storm water from the clean areas. This tactic minimises the land area affected by mobilised contaminants in the runoff and the volume of contaminated runoff requiring management. It is accomplished by grading the slope of

range area surface to change drainage patterns and constructing diversion channels/swales and small berms to alter runoff flow and drainage patterns;

- Silt fences around low side of all works;
- Diversion drains for cleanwater / capture drainage for road,
- Construction of sedimentation ponds, which are a valuable last resort to manage storm water in areas where the runoff waters have the highest potential for carrying sediments and lead residues. Sedimentation ponds are designed and sized properly to effectively slow the water and allow the suspended solids to settle out. The drainage area that the pond will serve is well defined, and the calculated volume of water the pond must handle is accurate; otherwise, the pond's effectiveness will be minimal. It is proposed that for the Hill Top Shooting Complex there would be six ponds, three located at the 500 m / 200 m range, one each at the shotgun and 50 m pistol range and one at the proposed clubhouse. The ponds have been sized in accordance with the requirements of Landcom Soils and Construction Volume 1 (Landcom; 2004). The sizes of the ponds are as follows:
  - Pond 1 at 200 m range – 2,000 m^3;
  - Pond 2 at 200/500 m range – 660 m^3;
  - Pond 3 at 500 m range – 1,380 m^3;
  - Pond 4 at 50 m pistol range – 270 m^3;
  - Pond 5 at Shotgun range – 1,090 m^3; and
  - Pond 6 at the carpark and clubhouse (existing pond to be retained to act as erosion control pond during construction) – 1,230 m^3;

  The ponds have been designed based on the 5-day 85th percentile storm depth and for type D/F soils.

  The ponds would be utilised for the life of the complex and monitoring would be required at the discharge location for each pond. The ponds can be utilised for fire fighting during construction, as there will be no potential contaminants contained in site runoff;

  The ponds can only be drained or emptied when the water inside the ponds complies with the limits for turbidity and suspended solids identified in Table 4.
- Locating stopbutts away from existing water courses and bodies;
- Providing landscaping as soon as possible following the construction of earthworks; and
- Stockpiles will be located away from creeks.

The design drawings in Appendix A show the proposed ponds and the inlet/outlet structure.

4.2 Post Development Runoff

Sedimentation ponds will remain following the construction phase. Refer water cycle management plan.

4.3 Wastewater Management System

Portable toilets will be brought to site for the duration of the construction period. Sewerage wastes will be removed from the portable toilets as required and the toilets will be removed from site at the end of construction.

As part of the construction works, a packaged wastewater treatment system will be constructed at the site of the new clubhouse. The amended soil mound will be located adjacent to the new club house, and must be a minimum of 40m from the existing dam and 100m from any perennial or intermittent creek.

4.4 Permanent Erosion Control

Stopbutts and target mounds would be designed to reduce erosion, including the construction of a 3(h):1(v) slope to improve stability (front face 2.5:1 due to NSW Police requirements), to promote low-velocity sheet flow, and to assist with vegetation establishment. In an effort to minimise impact to stopbutt stability usage of firing lanes at rifle and pistol ranges would be staggered. Grass would also be established as an erosion control, which would also assist with filtering pollutants from runoff. Diversion and sediment control drains are shown in the erosion control plans in the appendices.

Construction stage sediment ponds would be left in place.

4.5 Application of Soil Amendments

The deepness of the water table, the shallow depth at which bedrock is encountered and the topography of the site indicates that the risk for groundwater contamination is minimal. However there is a risk for contaminant migration to occur through dissolution of metals via rainfall and transport through surface water runoff. As such, fine agricultural grade lime would be raked into soils within the range, shot fall zones, stopbutts and collection trenches to reduce the mobility of metals by increasing soil pH to within the range of 6.5 to 8.5. The dose of lime required would be determined by laboratory testing and specifications provided for individual lime products.

Re-application of lime would be undertaken when the pH of soils is found to drop below pH 6.5.

5. Construction Monitoring

5.1 Construction Monitoring Program

A construction monitoring program would be implemented at the site to monitor the implemented controls. The monitoring program includes:

- Surface water monitoring; and
- Inspection of engineering controls.

Descriptions and requirements for the monitoring program are summarised in Table 4. The results of the monitoring are to be incorporated into an annual report to be prepared by Communities NSW (Sport and Recreation) and submitted to Sydney Catchment Authority. The report will highlight any failed tests or issues that may have arisen during monitoring and will identify remedial actions or modified management practises to prevent recurrence of the failures.

Table 4 Proposed Monitoring program

Task	Location	No. of Samples	Analytes	Timing	Criteria	Comments
Surface Water Monitoring	Erosion control pond discharges Rocky Waterholes Creek Tributaries	1 sample per pond discharge Rocky Waterholes Creek Tributaries = 3 locations (upstream, midstream and downstream)	Turbidity/Suspended Solids (SS) pH	Turbidity/SS = monthly and after rainfall events with more than 20 mm of rain pH = monthly	Turbidity/SS = 25 NTU / 50 mg/L pH = pH of creek water or if not available 6.5 to 8.5	An exceedance of any of the surface water criteria will trigger immediate investigation into the source of the exceedance and an inspection of engineering and operational controls. Further investigation and testing may be required.
Inspection of engineering controls	All controls – ponds / berms / silt fences / diversion drains /	Visual Inspection	Evidence of damage, erosion, sediment outside controlled areas.	Weekly and after any severe storm events		Repairs made where required, and failing controls reassessed possibly replaced/upgraded

5.2 Assessment Criteria

5.2.1 Criteria Used

The criteria used to assess levels of contamination include:

- Surface Water:
  - ANZECC (2000) Asutralian and New Zealand Guidelines for Fresh and Marine Water Quality – Chapter 3 Aquatic Ecosystems (fresh water pristine system); and
  - Australian Drinking Water Quality Guidelines (health based).

6. Conclusion

The site is characterised by relatively flat topography, being situated on a spurline that trends to the north from the Wattle Ridge Range. This spurline occupies a position between two tributaries of the Rocky Waterholes Creek. All watercourses are upper tributaries of the Nattai River. As a result of the proposal location, testing for contaminants was undertaken to determine a baseline, to assess the potential for migration of contaminants from the proposed range facilities and to identify the levels of contamination at the existing facility.

During the construction phases of works the soil and water management plan will be the principle document which incorporates both surface water monitoring and soil and water management engineering controls.

Appendix A

Soil and Water Management Plan Drawings

EROSION AND SEDIMENT CONTROL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE SOIL AND WATER MANAGEMENT PLAN.

2. ALL EROSION AND SEDIMENT CONTROL MEASURES TO BE IN ACCORDANCE WITH THE DEPARTMENT OF HOUSING MANAGING URBAN STORMWATER EDITION 2004 AND WINGECARRIBEE COUNCIL SPECIFICATIONS. WHERE DISCREPANCY OCCURS BETWEEN THESE TWO, THE MORE DETAILED SPECIFICATIONS WILL TAKE PRECEDENCE.

3. WORKS SHALL BE UNDERTAKEN IN THE FOLLOWING SEQUENCE:
   a. INSTALL ALL SILT FENCING.
   b. CONSTRUCT BASINS
   c. CONSTRUCT CATCH DRAINS, DIVERSION DRAINS AND STRAW BALES
   d. INSTALL OTHER EROSION AND SEDIMENT CONTROLS.
   e. UNDERTAKE REMAINING SITE WORKS IN ACCORDANCE WITH THE ENGINEERING PLANS.
   f. REHABILITATE THE REMAINING SITE.

4. THIS ORDER MAY BE CHANGED SUBJECT TO FIELD CONDITIONS BUT ANY SUCH CHANGE MUST ACHIEVE ALL ENVIRONMENTAL AND CONSTRUCTION GOALS.

5. CONTROLS AFFECTED BY THE WORKS ARE TO BE RE-ESTABLISHED PRIOR TO THE COMPLETION OF EACH DAYS WORK.

6. THE CONTRACTOR SHALL PROVIDE SHAKER GRIDS AT ALL SITE ACCESS / EGRESS POINTS.

7. STRIP TOPSOIL OVER THE SED. BASIN SITE TO AN AVERAGE DEPTH OF 150mm UNLESS OTHERWISE APPROVED BY THE SUPERINTENDENT. TOP SOIL STOCKPILES SHALL NOT EXCEED 2m IN HEIGHT AND BATTER SLOPES TO BE 3H:1V MAXIMUM.

8. THE CONTRACTOR IS TO STABILISE TOPSOIL STOCKPILES AND ALL DISTURBED AREAS AS SOON AS THEY REACH FINAL LEVELS. STABILISATION TO BE BY HYDROSEEDING OR OTHER METHOD APPROVED BY SUPERINTENDENT. ALL SEEDED AREAS TO BE WATERED TWICE WEEKLY UNTIL GRASS IS ESTABLISHED OR COVERED WITH BITUMEN HAY MULCH. RECOMMENDED PLANT SPECIES FOR TEMPORARY COVER ARE:
   - JAPANESE MILLET 25kg/ha (SPRING)
   - OATS (RYECORN) 25kg/ha (SUMMER)
   - JAPANESE MILLET 10kg/ha (AUTUMN)
   - OATS (RYECORN) 25kg/ha (WINTER)
   - GYPSUM AND MULTIGROW / ENRICH FERTILISER AT RATES TO BE DETERMINED BY SUBSOIL AND TOPSOIL TESTING.

   PERMANENT GRASSING TO BE IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS.

9. WHERE SURFACE SLOPES ARE STEEPER THAN 6H:1V BITUMEN STRAW MULCH SHALL BE APPLIED AFTER SEEDING AT THE FOLLOWING RATES, OR AS DIRECTED.
   - MULCH 0.5kg/m2
   - BITUMEN EMULSION 0.25l/m2 (50% WATER, 50% SLOW BREAKING ANIONIC EMULSION MIX)

10. TOPSOIL SHALL BE SPREAD AND STABILISED AS SOON AS POSSIBLE. DISTURBED AREAS SHALL BE LEFT WITH A SCARIFIED SURFACE TO ENCOURAGE WATER INFILTRATION AND ASSIST KEYING IN TOPSOIL.

11. DUST CONTROL MEASURES SHALL BE IMPLEMENTED CONTINUOUSLY DURING CONSTRUCTION WORKS TO THE SATISFACTION OF THE SUPERINTENDENT AND COUNCIL.

12. THE CONTRACTOR SHALL REHABILITATE ANY DISTURBED AREAS WITHIN 10 CALENDAR DAYS WHERE FINAL SHAPING HAS OCCURRED.

13. DURING EARTHWORKS, TEMPORARY DIVERSION BANKS SHOULD BE CONSTRUCTED TO LIMIT SLOPE LENGTH, WHERE POSSIBLE IN ACCORDANCE WITH THE FOLLOWING:

    RECOMMENDED MAXIMUM SPACING BETWEEN CROSS BANKS

SLOPE	MAXIMUM SPACING (m)
0 to 1%	150
1 to 3%	100
3 to 5%	70
5 to 10%	50
10 to 17%	16

14. SEDIMENT TRAPS AND BASINS ARE TO BE MAINTAINED SUCH THAT:
    (a) SEDIMENT IS REMOVED SUCH THAT NO LESS THAN 70% OF THE DESIGN CAPACITY REMAINS AT ANY ONE TIME.
    (b) MATERIALS ARE REPLACED OR REPAIRED AS REQUIRED TO ENSURE THE SERVICEABILITY OF BOTH THE ELEMENT AND THE TRAP OR BASIN.

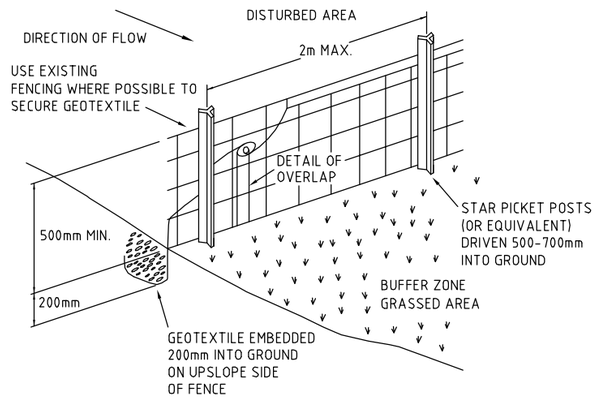
15. PERMANENT DRAINAGE STRUCTURES INCLUDING PIPES, PITS ARE TO BE HANDED OVER IN A CLEAN CONDITION AT THE COMPLETION OF THE CONTRACT MAINTENANCE PERIOD.

16. ACCESS POINT TO ALLOW MACHINE ENTRY / EXIT ARE TO INCLUDE A ROUNDED DIVERSION BANK 0.3m HIGH WITH 10H:1V BATTERS TO DIVERT RUNOFF TO SEDIMENT FENCES EITHER SIDE OF ENTRY.

17. WHERE FLOCCULATION OF BASIN IS REQUIRED, UNLESS OTHERWISE SPECIFIED, THE RECOMMENDED INITIAL DOSING IS 0.32kg OF GYPSUM PER CUBIC METRES OF BASIN VOLUME. THE CONTRACTOR MAY VARY THIS RATE SUBJECT TO TESTING OF WATER SAMPLES AND THE ACHIEVEMENTS OF THE REQUIRED WATER QUALITY STANDARDS. FLOCCULATION TO TAKE PLACE WITHIN 48 HOURS OF AN EVENT.

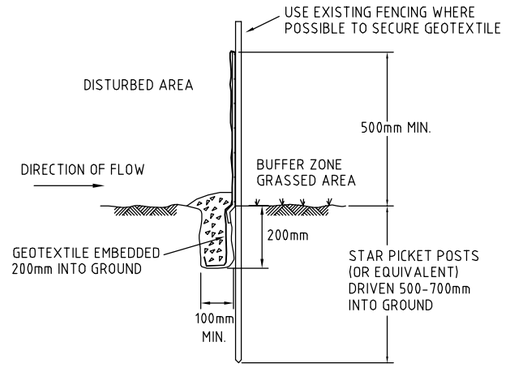
18. THE CONTRACTOR SHALL MAINTAIN A LOG BOOK DETAILING
    - RECORDS OF ALL RAINFALL ON SITE.
    - CONDITION OF SOIL AND WATER MANAGEMENT STRUCTURES
    - ANY APPLICATION OF FLOCCULATING AGENTS TO SEDIMENT BASIN
    - VOLUMES OF ALL WATER DISCHARGED FROM SEDIMENT BASINS - ANY ADDITIONAL REMEDIAL WORKS REQUIRED. THE LOG BOOK SHALL BE MAINTAINED ON A WEEKLY BASIS AND BE MADE AVAILABLE TO ANY AUTHORISED PERSON UPON REQUEST. THE ORIGINAL LOG BOOK SHALL BE ISSUED TO THE PROJECT MANAGER AT THE COMPLETION OF THE WORKS.

19. THE CONTRACTOR SHALL AT ALL TIMES RESTRICT CONSTRUCTION EQUIPMENT MOVEMENT TO THE ESSENTIAL CONSTRUCTION AREAS. THE CONTRACTOR SHALL NOT EXTEND LAND DISTURBANCE BEYOND 2m FROM THE EDGE OF ANY ESSENTIAL CONSTRUCTION ACTIVITY.



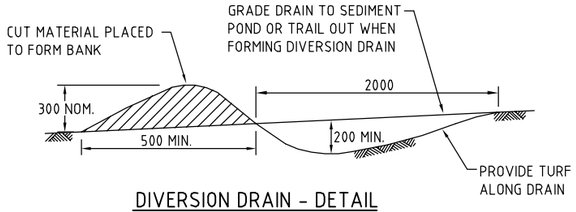
GEOFABRIC "SILT" FENCE - DETAIL

NOT TO SCALE



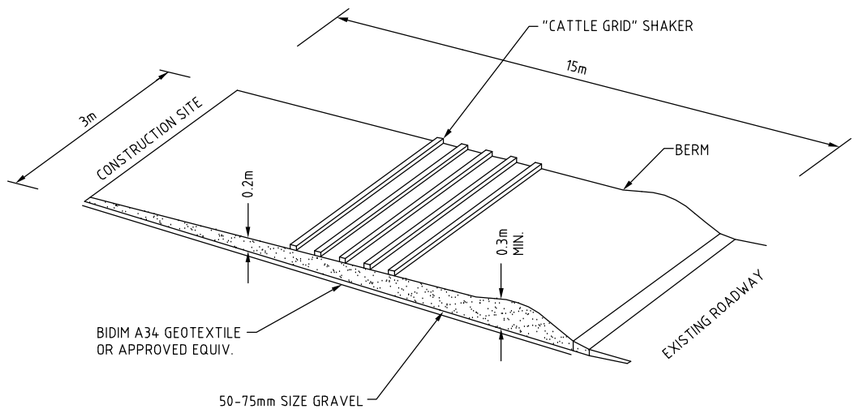
GEOFABRIC "SILT" FENCE - TYPICAL SECTION

NOT TO SCALE



DIVERSION DRAIN - DETAIL

NOT TO SCALE



STABILISED SITE ACCESS DETAIL

NOT TO SCALE

FOR CONSTRUCTION

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Checked	Approved	Date
0	ISSUED FOR CONSTRUCTION		PJS	FC*	AH*	11.10.10

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Drawn	M PELLOW	Designed	A HORTON
Drafting Check	S ATKINS*	Design Check	F CARROZZA*
Approved	A HORTON*		
Date	11.10.2010		
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client: COMMUNITIES NSW
Project: HILL TOP RANGE
Title: EROSION AND SEDIMENT CONTROL STANDARD NOTES AND DETAILS

Original Size: A1
Drawing No: 21-17850-C002
Rev: 0

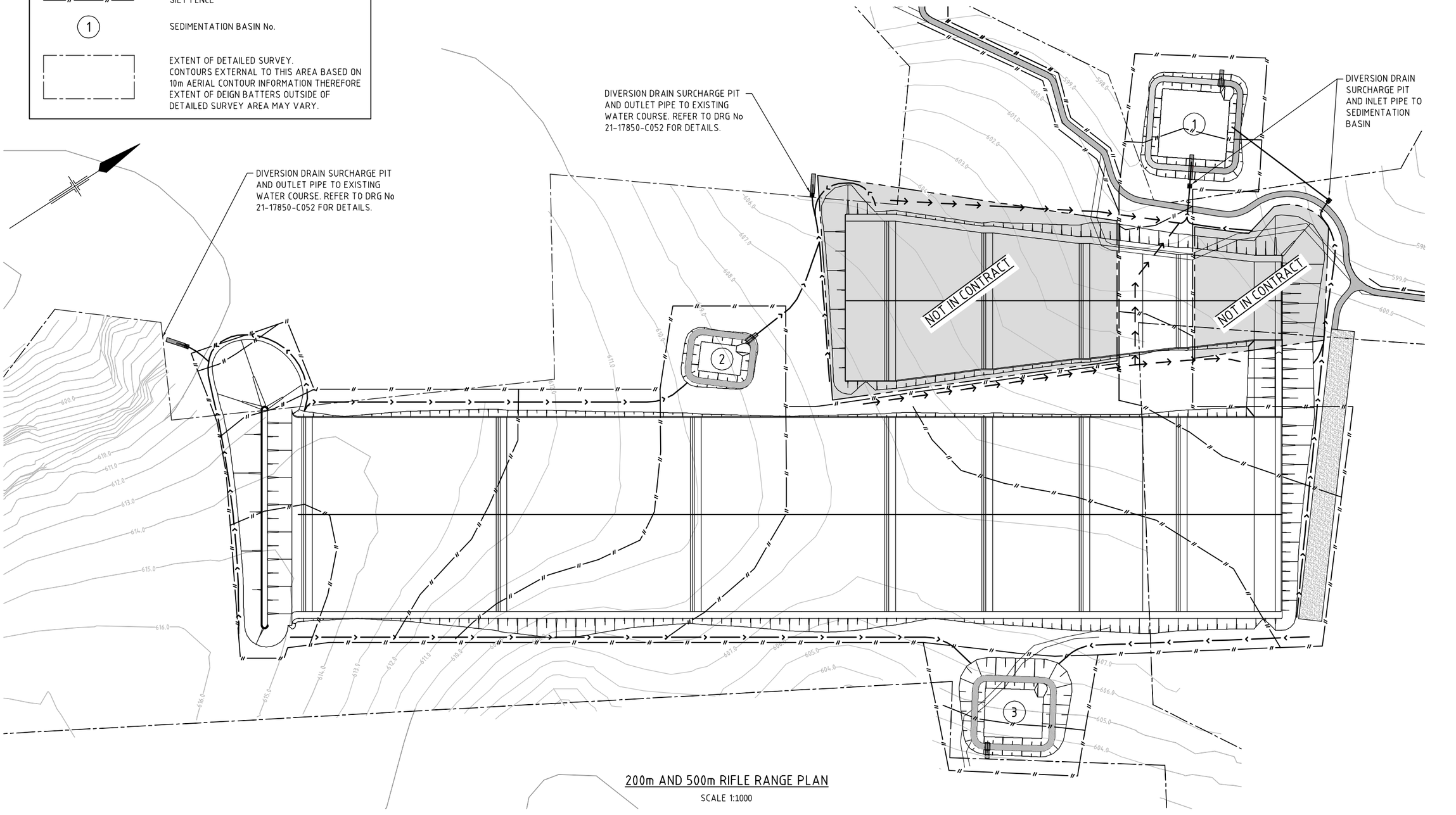
Plot Date: 11 October 2010 - 2:37 PM
Cad File No: G:\21\17850\CADD\Drawings\21-17850-C002.dwg

LEGEND

- CLEAN WATER DIVERSION DRAIN
- DIRTY SITE WATER DIVERSION DRAIN (TO SEDIMENTATION BASIN)
- SILT FENCE
- (1) SEDIMENTATION BASIN No.
- EXTENT OF DETAILED SURVEY. CONTOURS EXTERNAL TO THIS AREA BASED ON 10m AERIAL CONTOUR INFORMATION THEREFORE EXTENT OF DEIGN BATTERS OUTSIDE OF DETAILED SURVEY AREA MAY VARY.

NOTE

DRAWING SHOWS MINIMUM EXTENT OF SILT FENCES. CONTRACTOR TO ENSURE SILT FENCES AND EROSION CONTROL COMPLY WITH REQUIREMENTS OF NSW HOUSING BLUE BOOK 2004.



200m AND 500m RIFLE RANGE PLAN

SCALE 1:1000

FOR CONSTRUCTION

No	Revision	Drawn	Checked	Approved	Date
0	ISSUED FOR CONSTRUCTION	PJS	FC*	AH*	11.10.10

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0 10 20 30 40 50m
SCALE 1:1000 AT ORIGINAL SIZE

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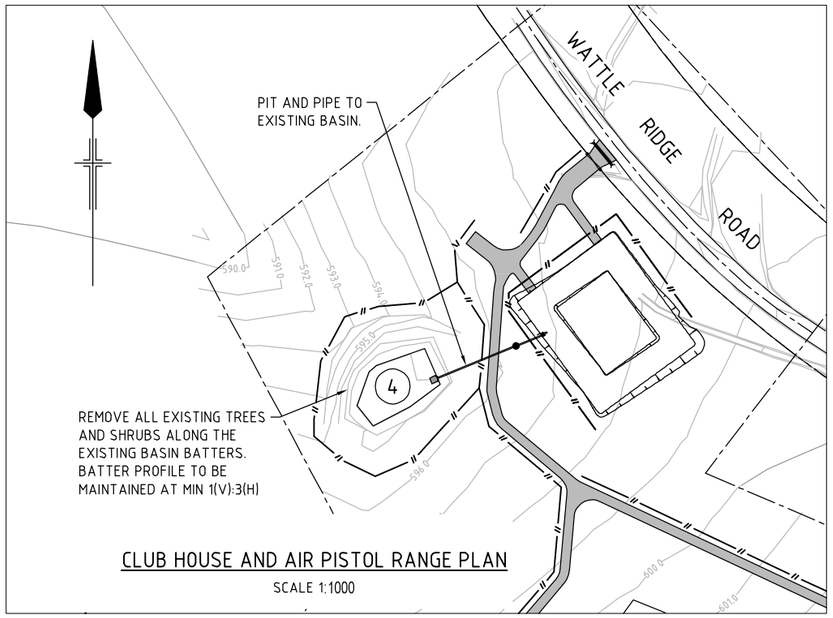
DO NOT SCALE

Drawn	M PELLOW	Designed	A HORTON
Drafting Check	S ATKINS*	Design Check	F CARROZZA*
Approved	A HORTON*		
Date	11.10.2010		
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client: COMMUNITIES NSW
Project: HILL TOP RANGE
Title: EROSION AND SEDIMENT CONTROL PLAN SHEET 1

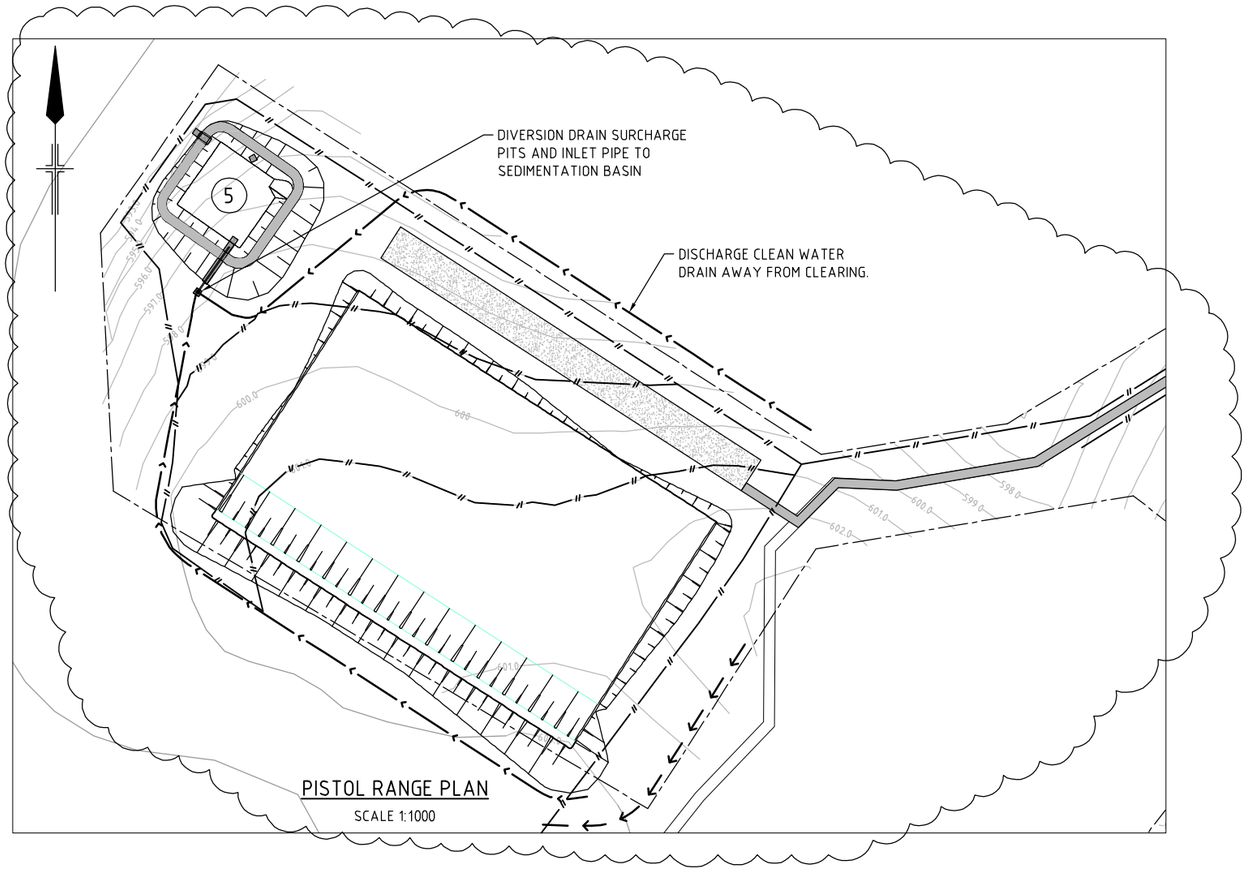
Original Size: A1
Drawing No: 21-17850-C006
Rev: 0

Plot Date: 11 October 2010 - 2:39 PM
Cad File No: G:\21\17850\CADD\Drawings\21-17850-C006.dwg



CLUB HOUSE AND AIR PISTOL RANGE PLAN

SCALE 1:1000



PISTOL RANGE PLAN

SCALE 1:1000

LEGEND

- CLEAN WATER DIVERSION DRAIN
- DIRTY SITE WATER DIVERSION DRAIN (TO SEDIMENTATION BASIN)
- SILT FENCE
- (1) SEDIMENTATION BASIN No.
- EXTENT OF DETAILED SURVEY. CONTOURS EXTERNAL TO THIS AREA BASED ON 10m AERIAL CONTOUR INFORMATION THEREFORE EXTENT OF DEIGN BATTERS OUTSIDE OF DETAILED SURVEY AREA MAY VARY.

SHOTGUN RANGE PLAN

SCALE 1:1000

FOR CONSTRUCTION

No	Revision	Drawn	Checked	Approved	Date
1	RELOCATION OF PISTOL RANGE	PJS	FC*	AH*	24.11.10
0	ISSUED FOR CONSTRUCTION	PJS	FC*	AH*	11.10.10

Note: * indicates signatures on original issue of drawing or last revision of drawing

0 10 20 30 40 50m

SCALE 1:1000 AT ORIGINAL SIZE

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Drawn	M PELLOW	Designed	A HORTON
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Approved	A HORTON*		
Date	24.11.2010		
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client: COMMUNITIES NSW
Project: HILL TOP RANGE
Title: EROSION AND SEDIMENT CONTROL PLAN SHEET 2

Original Size: A1

Drawing No: 21-17850-C007

Rev: 1

Plot Date: 24 November 2010 - 12:58 PM Cad File No: G:\21\17850\CADD\Drawings\21-17850-C007.dwg

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	G Ortiz / T Capuyan	F Carrozza	*On File	A Horton	*On File	25/8/10
1	F Carrozza	A Horton	* On File	A Horton	* On File	29/9/10
2	F Carrozza	A Horton	* On File	A Horton	* On File	20/10/10
3	Chris Klein	A Horton	*On File	A Horton	* On File	19/11/10