Stockton Rifle Range

Site Environmental Management Plan

For: Department of Defence

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ABBREVIATIONS

ACM	Asbestos Containing Material
DA	Development Application
DECCW	Department of Environment, Climate Change and Water
EMP	Environmental Management Plan
EPA	Environment Protection Authority
HDPE	High- Density Polyethylene
HIL	Health based Investigation Level
LEP	Local Environment Plan
NEPM	National Environment Protection Measure
NSW	New South Wales
OHSP	Occupational Health and Safety Plan
PAH	Polycyclic Aromatic Hydrocarbon
RAC	Remediation Area of Concern
RAP	Remedial Action Plan
SMEC	Snowy Mountains Engineering Corporation
SEMP	Site Environmental Management Plan
SWMS	Safe Work Method Statement
UXO	Un-Exploded Ordnance
WSP	WSP Environmental Pty Ltd

1 INTRODUCTION

1.1 Purpose

This document is a Site Environmental Management Plan (SEMP) for the Stockton Rifle Range site. It provides procedures and controls for managing potential contamination risks posed by unexpected findings, beneficial groundwater use, residual rifle range waste (lead pellets and cartridges) and excavations at the former target mantle.

Future users of the site need to implement the procedures and controls specified in this SEMP in order to comply with the requirements specified in a non-statutory site audit statement 150B prepared for the site by Dr Ian Swane, a NSW DECCW accredited site auditor (Contaminated Land).

The SEMP does not provide detailed background information on site history, site conditions, previous investigations and the outcome of remediation work. Readers requiring information on these matters should refer to the reports listed in **Section 5**.

1.2 Background

The Stockton Rifle Range is located at the intersection of Popplewell and Taylor Roads, Fern Bay, Stockton, approximately 5km north of Newcastle, NSW (**Figure 1 in Appendix A**). The site occupies approximately 111ha and is legally described as Lot 5 in DP 233358 in the Local Government Area of Port Stephens. At the date of this SEMP, the site is owned by the Department of Defence ('Defence'). **Figure 2** in **Appendix A** provides a plan of the site.

Environmental investigations at the site identified the need for a program of remediation work to remove some areas containing elevated frequencies of rifle range waste (lead pellets and cartridges), lead contaminated soil, localised areas of building and demolition waste, a localised PAH[1] hotspot and ACM[2] fragments. The waste and contamination was likely to have been associated with historical land uses at the site.

A program of remediation work was subsequently undertaken to address these areas of environmental concern as part of a due diligence process for the sale of the site. The work was undertaken by a Remediation Contractor between March 2009 and February 2010, with a validation report (SMEC, March 2010) prepared. **Figure 2** in **Appendix A** identifies the location of the main remediated areas (referred to as Remediation Areas of Concern, RAC).

The SMEC (March 2010) Validation Report concluded that:

- All known areas of contaminated soil had been remediated.
- Contaminant levels remaining in fill soils (silty clay/slag/gravel) were characterised and assessed as posing a low risk to human health and the environment.

[1] PAHs = Polycyclic Aromatic Hydrocarbons (main source was likely to be old bitumen/tar in roads)
[2] ACM = Asbestos Containing Material (mainly fibro)

- Visible and identified asbestos containing material (ACM) fragments had been removed from the site.
- All known Un-Exploded Ordnance (UXO) have been removed from the site.
- Sufficient investigations, remediation work and validation testing had been undertaken to conclude that any unknown contamination or waste material that may remain at the site poses a low risk to future users and the environment.
- The site was suitable for the proposed land uses, subject to the implementation of a SEMP.

For the purpose of the remediation and validation work, the site was divided into two types of areas referred to as *"unrestricted landuse"* and *"non-development landuse"*. The *"unrestricted landuse"* category refers to those areas where the most sensitive landuse would be *"standard"* residential (HIL A, as defined by DECCW Guidelines). The *"non-development landuse"* includes heritage or ecologically constrained areas where the most sensitive landuse would be open space/parkland (HIL E, as defined by DECCW Guidelines). A plan showing the location of these two area types across the site is provided in **Figure 2a** in **Appendix A**.

1.3 SEMP Implementation

As noted in Section 1.1, implementation of this SEMP is required in order to comply with the requirements specified in a non-statutory site audit statement 150B prepared for the site by Dr Ian Swane, a NSW DECCW accredited site auditor (Contaminated Land).

The SEMP has been prepared in general accordance with the Section 3.4.6 of the DEC NSW (2006) *Guidelines for the NSW Site Auditor Scheme (2nd edition)*, including discussions with Port Stephens Council regarding the implementation of the SEMP.

The implementation of the SEMP will be administered through a notation on the site planning certificate, issued in accordance with Section 149 of the *Environmental Planning and Assessment Act 1979*.

1.4 SEMP Objective

The objective of the SEMP is to provide a process for safely managing:

- Materials known to be affected by low levels of residual contaminants in shallow soils, deeper soils and groundwater at the site;
- Potential residual ACM in surface and subsurface material;
- Residual Rifle Range waste including lead pellets and cartridges;
- Former roads comprised of bitumen and gravel;
- Fill material comprised of silty clay, slag and gravel; and
- Unexpected, potentially harmful materials encountered in the future.

The SEMP must be referenced when a change in landuse is proposed and when planning or conducting activities at the site that may disturb the existing ground surface and/or buildings and structures.

1.5 Limitations

The information within this plan is based on the data collected and documented during the stated remediation and validation period.

SMEC's validation report and subsequent SEMP is strictly limited to the assessment and management of known contaminants of concern within the nominated remediation areas. The absence of any identified hazardous or toxic materials on the subject property should not be interpreted that such materials do not exist on the subject property.

This plan relates only to the objectives stated and does not relate to any other work undertaken for the Client.

This SEMP has been prepared on the basis of the concentrations observed in the soil and groundwater at the time of the Validation Report. These conditions may change with time and space.

Conclusions and recommendations regarding the property are the professional opinions of the SMEC personnel who conducted the assessments and validation programs. Whilst normal Quality Assurance assessments of data reliability have been made, SMEC assumes no responsibility or liability for errors in any data obtained from regulatory agencies, sources outside of SMEC, or developments resulting from situations outside the scope of this project.

This SEMP does not provide detailed Safe Work Method Statements (SWMS), Occupational Health and Safety Plans (OHSPs) or Construction Work Method Statements.

This SEMP is limited to those management aspects arising from existing reported contamination conditions, and does not cover any other general environmental management requirements that may apply to the site irrespective of such conditions.

2 ROLES AND RESPONSIBILITIES

The implementation of this SEMP is the responsibility of the owner of the site or it's Nominated Representative. This SEMP has been prepared for all site users, including those involved in designing, developing, constructing, ongoing operations, maintenance, administration and occupation on the site. This includes:

- Site Management Staff;
- Contractors;
- Subcontractors; and
- Occupants.

Planning decisions and intrusive works on the site should only be conducted by contractors/individuals who have read and acknowledged understanding of this SEMP.

Table 1 below outlines the responsibilities for the implementation of this SEMP. These responsibilities do not replace any other regulatory responsibilities of the parties in relation to a change in landuse or development work at the site.

Table 1 - SEMP Responsibilities

Responsible Party	Responsibilities
Site Owner	▪ Provide this SEMP to any new site owner, any occupant and any contractor. ▪ Ensure all parties clearly understand this SEMP and what is required to comply with the SEMP requirements. ▪ Update this SEMP if site conditions change and inform other parties of the changes. ▪ Ensure information relating to site conditions such as potential contaminants in soils, groundwater or remnant building materials is readily available. ▪ Ensure any tender documentation, scope of works, design briefs, contract documents, and other relevant documents developed in relation to works at the site include SEMP specific requirements. ▪ Document future activities undertaken in the management areas and update the SEMP as required.
Planning Authorities	▪ Maintain information regarding this SEMP on planning instruments. ▪ Ensure the DA process considers the potential contamination, including groundwater and hazardous materials. ▪ Approve changes to the SEMP.
Occupant	▪ Provide this SEMP to contractors (engaged by the Occupant). ▪ Comply with this SEMP during the occupation of the site. ▪ Document activities within the management areas and advise the Site Owner.
Contractors	▪ Comply with this SEMP for all site works, as well as relevant legislation and guidance. ▪ Inform the owner/occupier if conditions change from those documented in this SEMP. ▪ Ensure designs and work methods reflect the requirements of this SEMP. ▪ Document activities in the management areas and advise the Site Owner/Occupant.

It is the responsibility of all site users to be informed and conduct site planning and site works in accordance with this SEMP.

3 SITE CONDITION

3.1 Overview

The site is currently non-operational and is maintained by caretakers appointed by the Commonwealth. As shown on **Figure 2** in **Appendix A**, the main site features are:

- Open space, including:

  - A former Firing Range, located in the central portion of the site. The former Firing Range contained ten (10) Firing Yards, identified by ten (10) former Firing Mounds. Targets were supported by a large concrete structure that was set into the ground at the eastern end of the site, which was referred to as the Target Mantle. A high mound of earth at the eastern end of the range was used to capture the fired bullets, which was referred to as the Stop Butt. The former Firing Range is vegetated with grasses and shrubs. The occasional piece of irrigation piping (both PVC and metal) can be found across the Firing Yards.

    The Stop Butt has been rehabilitated and revegetated.

    The Target Mantle concrete structure was retained (**Photo 5, Appendix B**) and filled by on-site soils removed from the former Firing Mounds and sandy soils from other on-site areas. A plan showing the cross-section of the backfilled trench and recontoured Stop Butt is provided in **Figure 4** in **Appendix A**.

  - A former Auxiliary Range, located in the northern portion of the site, in the 'non-development' land use area.

  - A former 20mm Accuracy Range located on the southern side of the Firing Range.

  - Northern and Southern heavily Vegetated Areas, which hold ecological significance.

  - Mobile Sand dunes in the eastern portion of the site.

- Heritage infrastructure, including a 'Links Anti-Aircraft Battery' consisting of four (4) Gun Emplacements and a central command post, which are associated with historical Defence activities at the site. The concrete structures are surrounded by soil mixed with building and demolition waste ramped up against the exterior walls (**Photo 6, Appendix B**); and
- An internal road network, for vehicular access to key site infrastructure. Noting that in general, site roads are unsealed.

A wire mesh fence bounds the site to the west, with damaged wire fencing existing around the remainder of the site. The primary entrance to the site is via a gated access road leading from Popplewell Road on the western side of the site. The land uses surrounding the site are as follows:

- North – Worimi Regional Park, then Stockton Golf Club.
- South – Coastal Sand Scrub, then Stockton Mental Hospital.
- East – Sand dunes, then the Pacific Ocean.
- West – Popplewell Road, then low density Residential dwellings, then the Northern Arm of Hunter River approximately 250m further west.

The eastern portion of the site is dominated by the coastal dune system forming part of Stockton Beach. Rusted fence posts (star pickets) and a soak (a small area of surface water surrounded by vegetation) can also be observed in the dune area.

A groundwater divide appears to exist on-site due to the site being located on a narrow peninsular bounded on the west by the Hunter River and the east by the Pacific Ocean. Rain falling on the site is a source of fresh water recharge that flows on the eastern side of the site to the Pacific Ocean and on the western side of the site to the Hunter River.

The Port Stephens Council (February 2007) "Acid Sulfate Soil Planning Map" shows parts of the site to be Acid Sulfate Soil Planning Category (3), where management controls are required for works that extend beyond 1m below natural ground surface.

3.2 Site History – Contamination Status and Remediation Works

3.2.1 Site Contamination Status

On the basis of the SMEC/WSP (2009) Contamination Assessment, the primary areas of environmental (contamination) concern across the site, prior to remediation works, can be described as:

- Stop Butt - Lead concentrations exceeding the adopted assessment criteria (HIL A, 300mg/kg) in surface (<0.3m) soils in the Stop Butt, with other metal concentrations (copper, zinc, nickel and total chromium) also elevated in relation to background concentrations. Elevated lead concentrations were reported in neutral leachate from surface soils indicating that some breakdown of the lead has occurred and that through contaminant leaching, the potential exists for the Stop Butt to act as an ongoing source of lead contamination to groundwater. Lead was detected in groundwater collected from one of the groundwater wells (RRGW10) installed in the Stop Butt. It was estimated that approximately 3,120m^3 of soils in the Stop Butt were affected by lead at concentrations above the adopted assessment criteria.
- Firing Range – Sampling of the firing mounds and in the firing yards did not identify contaminants of concern exceeding the adopted assessment criteria, with the exception of the number of bullets per square metre in the 10th Firing Yard. Surface soils in the 60m closest to the Stop Butt/Target Mantle were most significantly impacted.
- Firing Mounds – Ten (10) Firing Mounds which run North/South across the Firing Range were capped with slag material, which did not meet the aesthetic criteria for the site.
- Auxiliary Range – Although contaminant concentrations were less than the adopted assessment criteria, the number of spent bullets per square metre exceeded the adopted assessment criteria.
- Northern Heavily Vegetated area – The northern portion of the site is vegetated by Sand Apple-Blackbutt Forest. Demolition waste, including sheet metal and cement fibre sheets containing asbestos (**Photos 2 and 3, Appendix B**), was noted throughout the accessible portions of this area (approximately 50,000m^2). Asbestos fibres were not detected in the surface soils. A Polycyclic Aromatic Hydrocarbon (PAH) contamination hotspot (D4-1) was also identified in this area.

- Former Ranger's Quarters Septic Tank – A potential septic tank was reported in the western portion of the site.

3.2.2 Site Remediation Works

A remediation and validation program was undertaken at the site between 6 March 2009 and 22 February 2010, to manage contamination risks at the site. The ultimate goal of the remediation program was to render the site suitable for potential future development. The program of works included remediation in six known areas of impact (RACs):

- RAC 1, Stop Butt – Excavation of surface soils (brown, silty/sandy material containing spent projectiles) in discrete sections (approximately 25m wide), stockpiling of this material, validation of residual soils, screening of the excavated material, immobilisation of screened material (where required), waste classification of material and offsite disposal. The excavated volume of material from RAC1 was approximately 4,500m^3.
- RAC 2, 10th Firing yard – Scrape of surface soils within the 60m closest to the Stop Butt, stockpiling of this material, validation of residual soils, screening of the excavated material and re-use of the screened material onsite to reinstate RAC 2. The excavated volume of material form RAC2 was approximately 3,500m^3.
- RAC 3, Auxiliary Range – Scrape of surface soils, stockpiling of this material, validation of residual soils, screening of the excavated material and then re-use of the material onsite to reinstate RAC2. The excavated volume of material from RAC3 was approximately 230m^3.
- RAC 4, D4 (TPH and PAH hotspot) – Excavation of soil hotspot including partially buried building and demolition waste (to approximately 0.5mbgl), stockpiling of excavated material including sorting/recycling of building materials (where possible), validation of residual soils, classification of stockpiled material and offsite disposal of the material. The excavated volume of material from RAC4 was approximately 360m^3.
- RAC 5, Potential Asbestos Containing Material (ACM) in Heavily Vegetated Area – An AS1 licensed contractor hand-picked ACM fragments (**Photo 1, Appendix B**) within and adjacent to 'accessible' areas. An Occupational Hygienist then inspected the ACM removal 'Stages' and provided an Asbestos Clearance Certificate. Where identified ACM could not be removed by hand, these areas were excavated. The estimated surface area of RAC5 was 170,000m^2.
- RAC 6, Former Rangers Quarters Septic Tank – Excavation of the former septic tank, offsite disposal of the excavated material, validation of residual soils and backfilling of excavation with natural sands sourced from the Blow Out area in the south-eastern portion of the site. The excavated volume of material from RAC6 was approximately 35m^3.

Other primary works associated with the remediation and validation program included:

- Screening of material excavated from areas RAC1, RAC2 and RAC3 to remove spent projectiles and casings, the screened material was sampled and where contaminant concentrations met the adopted validation criteria the material was re-used onsite as follows:
  - screened material from RAC2 and RAC3 within RAC2 (the 10th Firing Yard); and

- screened material from the Stop Butt East (rear) within the former Auxiliary Range (RAC3).

- If after sieving, concentrations of lead classified the material as *Hazardous* or *Restricted Solid Waste*, the material was immobilised in accordance with a NSW EPA Specific Immobilisation Approval (2008-S-18).
- Excavation and onsite re-use of the Firing Mound slag material to backfill the Stop Butt Target Mantle/Trench (refer **Figure 4, Appendix A**). The trench was filled to remove a potential OHS hazard.
- After the removal of stockpiled material within the Stockpile Area, a scrape was undertaken of the top 100mm of surface soils. The residual soils within the Stockpile Area were validated, with the majority of excavated material sampled and re-used in less sensitive areas onsite (RAC4, RAC5a and the access road leading to RAC3 and RAC5a). A small volume of the material from the Stockpile Area was disposed of offsite.

Following completion of the remediation and validation program, SMEC/WSP concluded that:

> *Subject to the preparation and implementation of an appropriate Site Environmental Management Plan, the site meets the relevant standards for:*
>
> - *low density residential use in the Firing Yards; and*
> - *open space/parkland across the remainder of the site.*

3.2.3 UXO

Historical reports (Gibson Nominees, 2006 and Milsearch, 2002) identified that there was the potential for Unexploded Ordnance (UXO) to exist at the site but generally concluded that the overall UXO risk for the site was 'slight'.

On the basis of these recommendations, the remediation works program was not supervised by a UXO consultant. An 'unexpected finds' protocol was implemented as a precautionary measure.

During remediation works some UXO and Defence related waste, such as spent bullets, was encountered including:

- Practice grenade – South-East corner of RAC2. This material was removed by appropriate Defence UXO specialists.
- Rifle grenade – South-East corner of RAC2. This material was removed by appropriate Defence UXO specialists.
- Spent projectiles – Significant quantities of spent projectiles of various sizes, were encountered in RAC 1 and RAC 2:
  - Remnants of a two inch mortar;
  - A number of 20mm World War II projectiles;
  - A 30mm DEFA practice projectile;
  - A number of 20mm practice proof projectiles; and
  - A tail of Number 68 grenade.

The material was excavated, screened and the spent projectiles were disposed of offsite.

On the basis of the remediation works, all known UXO has been removed from the Site. SMEC consider that the risk of UXO or Defence related waste remaining on Stockton Rifle Range is low. This risk assessment is supported by Defence accredited UXO specialist, Gibson Nominees (2010) who note:

> *We are satisfied that the risk of UXO being present at the Stockton Rifle range site is very low and does not prevent the Stockton Rifle Range site being used for sensitive land uses that include residential with accessible soil.*

The low future risks at the site shall be managed through the Unexpected Findings Protocol (**Section 4.5**).

3.3 Management Areas and Materials

While all known areas of contaminated soil have been remediated, some materials remain at the site that need to be managed to minimise risks to human health and the environment in the event of a change to a more sensitive land use.

The areas where materials onsite are known to require ongoing management comprise:

- Material that was reused in the open space/non-development landuse area that may be impacted by lead contamination at levels not suitable for re-use on the proposed residential/unrestricted landuse area;
- Small remnant quantities (less than adopted site criteria of 6 spent bullets per m^2) of Rifle Range waste including lead pellets and cartridges primarily in:
    - RAC2, the former 10th Firing Yard (very occasional projectile),
    - RAC3, the Auxiliary Range (0 – 2 projectiles per m^2) and
    - the former stockpile area in the main firing range (0 – 4 projectiles per m^2).

  Examples of the rifle range waste which may remain on site are provided in **Photo 4, Appendix B**;
- Former access roads comprised of bitumen and gravel;
- Links Anti-Aircraft Battery (Gun Emplacement) fill, comprised of sand mixed with building and demolition waste (**Photo 6, Appendix B**);
- Building and demolition waste at the western end of the site and in the north-eastern corner (Area RAC5a);
- Fill material (containing small quantities of building and demolition rubble) in the northern vegetated area (**Photo 3, Appendix B**);
- Fill material comprised of slag and gravel primarily in the 10^{th} Firing Yard and Stockpile Area;
- Fill material in the south-eastern corner of the site; and
- Slag material (sourced from the former firing mounds) buried in the target mantle backfill area (between RAC1 and RAC2). Details of the target mantle fill profile are provided in **Figure 4, Appendix A**.

The locations of these management areas are shown on **Figure 3** in **Appendix A**.

Because of the long history of the site as a Defence facility, there is also a risk that some waste materials may remain in small quantities at presently unknown locations.

These materials primarily comprise ACM fragments (**Photo 1, Appendix B**), Defence-related waste and UXO (refer **Section 3.2.3**). Sufficient investigations, remediation work and validation testing have been undertaken to conclude that any unknown contamination or waste material that may remain at the site poses a low risk to future users and the environment. To provide acceptable risk management protocols however, procedures and controls need to be provided to manage "unexpected findings".

3.4 Groundwater

The site is located on a sandy peninsula, bounded by the Tasman Sea to the east of the site and the Hunter River to the west of the site. Some connectivity through groundwater is expected between the Hunter River and the Tasman Sea.

The SMEC/WSP (2008) *Contamination Assessment* identified groundwater with elevated concentrations of zinc and copper. Groundwater sampling was undertaken during the remediation program to assess the groundwater contamination with regards to the elevated concentrations of copper and zinc found in 2008:

- One test pit (GWTP1) was excavated down to groundwater level to collect a grab sample.
- Three groundwater wells (RRGW11, RRGW12 and RRGW13) were installed within the Stockpile Area.

The additional sampling and analysis found only marginally elevated concentrations of copper and zinc in the groundwater (refer **Figure 5, Appendix A**).

Historic and current activities onsite are unlikely to significantly increase the zinc concentrations in groundwater. Rather, elevated concentrations are likely to be the result of slightly acidic conditions in the sandy soils (past disturbance of Acid Sulfate Soils) causing the release of zinc into the groundwater. The low clay content of the aquifer (which is composed mainly of quartz sand) provides little opportunity for the adsorption of zinc. Zinc would be readily transported by the groundwater and subject to dispersion and dilution.

Groundwater at the site appears to flow in a North-Westerly direction towards the Hunter River. On the basis of zinc concentrations reported in groundwater wells in close proximity to the site boundary (RRGW01, RRGW02 and RRGW04), the zinc impacts are likely to be localised in the north western part of the site. It is unlikely that the site is significantly impacting local groundwater and water quality in the Hunter River.

Due to the elevated concentrations of zinc, the groundwater is not suitable for use as drinking water. Subject to further testing, groundwater at the site may be suitable for extraction for beneficial re-use as irrigation water. A review of the NSW Groundwater Works database and groundwater level logging undertaken at the site did not identify evidence of known groundwater extraction on or near the site.

4 MANAGEMENT PROCEDURES AND CONTROL MEASURES

4.1 Principles

The principal environmental site management approach is to manage contamination risks in a safe manner, so that the site remains suitable for its intended uses, as described in **Section 1.2**.

The contamination risks are currently low, due to the remediation works which have been undertaken at the site, the low levels of residual contaminants, limited exposure risks and contaminated materials being inert and/or inaccessible. As such, no specific management controls are required for passive activities at the site such as general maintenance, walking or driving.

Key activities requiring the actioning of this SEMP include, but are not necessarily limited to:

- Excavation;
- Removal of soil from the site;
- Removal/repair of existing structures;
- Removal/repair of old access roads;
- Removal/repair of existing underground services;
- Landscaping; and
- Beneficial use of groundwater extracted from the site.

All such works should be managed and supervised by suitably qualified and experienced personnel. No such work should be commenced at the site until relevant personnel have received a copy of and read this SEMP. Persons responsible for the implementation of this SEMP are specified in **Section 2**.

Soils, wastes and remnant building materials at the site must be managed in accordance with regulatory requirements. These include, but may not be limited to:

- *Protection of the Environment Operations Act* 1997;
- Department of Environment, Climate Change and Water (DECCW) waste management guidelines and requirements;
- *Occupational Health and Safety Act* 2000 and WorkCover requirements; and
- Port Stephens Council *Development Control Plan* (DCP).

Changes to this SEMP should only occur with the approval of the Site Owner or Port Stephens Council. Alternative management approaches to those documented in this SEMP, will have to provide detailed explanations and justification on how the alternative approach will manage the risks to human health at safe levels and that the approach will meet the requirements of the site owner and consent authorities.

4.2 Mandatory Controls and Approvals

To facilitate implementation of the SEMP in accordance with planning controls, certain activities cannot be undertaken at the site without prior approval of Port Stephens Council (or other relevant Planning Authority). These activities include:

- Groundwater must not be extracted from the Stockton Rifle Range site unless additional monitoring confirms that any changes to water levels induced by groundwater extraction would not impact acid sulphate soils, and confirms that the water is suitable for the proposed use. Any extraction of groundwater should be approved by the Planning Authority.
- Waste material buried under the sand capping layer at the Target Mantle (**Figure 4, Appendix A**) must not be disturbed unless the work is undertaken in accordance with an excavation plan acceptable to the Planning Authority.
- No excavated soil from the open space/non-development landuse area shall be relocated onto the proposed residential/unrestricted landuse area unless chemical testing validates the soil as being suitable for the area where it is to be placed and the work is undertaken in accordance with an approval from the Planning Authority. The Planning Authority will monitor the following compliance:
  - For any excavated soil or buried material removed from the site, DECCW waste regulations regarding offsite disposal.
  - For the management of any excavated soil from the former Stop Butt, Auxiliary Range or other filled areas (refer **Figure 3, Appendix A**), DECCW waste regulations (off-site disposal) or chemical validation (onsite reuse).

Those activities which require Planning Authority approval and compliance monitoring are highlighted in **Tables 2, 3 and 4**. Approvals and compliance monitoring related to excavation and management of soils is highlighted in **Section 4.4**.

4.3 General Procedures and Controls

Table 2 summarises the potential risks and general management requirements for the Management Areas at the site. Management requirements and control measures are defined for both the “unrestricted” and “non-development” landuse areas.

Table 3 summarises the potential risks and general management requirements for fill and demolition/building waste materials that are known to remain at the site and that need to be managed.

Table 4 summarises the potential risks and general management requirements for unknown materials that may be unexpectedly found at the site.

Table 2 - Management Procedures and Controls for Known Materials/Management Areas

Area	Hazard	Risk	Management for Low Density Residential Land Use Setting	Management for Open Space Land Use Setting	Responsibility
Remnant Rifle Range Waste, including lead pellets and cartridges	Spent projectiles contain high levels of lead and copper	Ingestion and aesthetic	Remove and dispose of offsite in accordance with the relevant regulatory requirements	Maintain existing site conditions or if disturbance is required remove and dispose of offsite in accordance with the regulatory requirements	Site Owner, Occupants & Contractors Planning Authority (compliance monitoring)
Access Roads	Road material which is comprised of gravel, bitumen and traces of slag	Aesthetic impacts	Ensure road material is either retained in road corridors or disposed off-site	Ensure road material is either retained in road corridors or disposed off-site	Site Owner, Occupants & Contractors
Groundwater	Elevated zinc and copper	Ingestion and ecological impacts. Lowering of water levels and exposure of Acid Sulfate Soils; discharge to aquatic environments	No groundwater extraction without monitoring to confirm the groundwater table is not lowered. No permanent ongoing groundwater extraction unless studies confirm suitability for proposed use	No groundwater extraction without monitoring to confirm the groundwater table is not lowered. No permanent ongoing groundwater extraction unless studies confirm suitability for proposed use	Site Owner & Occupant Planning Authority (extraction approvals)
Acid Sulfate Soils	Release of dissolved metals in the ground/surface water	Environmental impacts	Refer to Port Stephens (September 2004) Acid Sulfate Soil policy	Refer to Port Stephens (September 2004) Acid Sulfate Soil policy	Site Owner, Occupants & Contractors

Table 3 - Management Procedures and Controls for Fill and Demolition/Building Waste

Area	Hazard	Risk	Management for Low Density Residential Land Use Setting	Management for Open Space Land Use Setting	Responsibility
Building and Demolition waste (General)	Building and demolition waste comprised of bricks, concrete and scrap metal	Aesthetic impacts and trip hazards	Acknowledge presence of these materials in small quantities. Maintain adequate vegetative cover to prevent erosion. Remove during construction if practicable.	Maintain adequate vegetative cover to prevent erosion. Review if more sensitive land use is proposed.	Site Owner & Occupant
Heritage Area (Links Anti Aircraft Battery) Building and Demolition Waste	Building and demolition waste comprised of bricks, concrete and scrap metal	Aesthetic impacts and trip hazards	Not applicable	Maintain adequate vegetative cover to prevent erosion. Review if more sensitive land use is proposed.	Site Owner & Occupant
Stockpile Area	Slag fill and occasional spent bullet waste	Aesthetic impacts for residential land use	Acknowledge presence of these materials in small quantities. Maintain adequate vegetative cover to prevent erosion. Remove during construction if practicable.	Maintain adequate vegetative cover to prevent erosion. Review if more sensitive landuse is proposed.	Site Owner & Occupant
10th Firing Yard, Auxiliary Range (RAC3) & RAC5a	Occasional Spent Bullet waste	Aesthetic impacts for residential land use	Acknowledge presence of these materials in small quantities. Maintain adequate vegetative cover to prevent erosion. Remove during construction if practicable.	Maintain adequate vegetative cover to prevent erosion. Review if more sensitive landuse is proposed.	Site Owner & Occupant
Target Mantle Fill	Comprised of Slag material and sand from the former Firing Mounds	Aesthetic impacts	Not applicable.	Maintain cap and do not disturb buried fill without approval and proper management.	Occupant & Site Owner Planning Authority (excavation plan approval)

Table 4 - Management Procedures and Controls for Unknown Materials that may be Unexpectedly Found at the Site

Material	Hazard	Risk	Management for Low Density Residential Land Use Setting	Management for Open Space Land Use Setting	Responsibility
ACM fragments (either on ground surface or buried)	Asbestos	Inhalation of asbestos fibres. Dispersion of asbestos fibres and ACM if uncovered and disturbed.	Remove and dispose off-site in accordance with regulatory requirements. Manage with Unexpected Findings Protocol (Section 4.4).	Remove and dispose off-site in accordance with regulatory requirements. Manage with Unexpected Findings Protocol (Section 4.4).	Site Owner, Occupant & Contractors Planning Authority (compliance monitoring)
Defence-related waste	Defence-related waste (e.g. Spent bullets, cartridges, packing)	Aesthetic impacts Ingestion	Remove and dispose off-site in accordance with regulatory requirements. Manage with Unexpected Findings Protocol (Section 4.4).	Remove and dispose off-site in accordance with regulatory requirements. Manage with Unexpected Findings Protocol (Section 4.4).	Site Owner, Occupant & Contractors Planning Authority (compliance monitoring)
UXO	Small arms ammunition and other types of Defence ordnance	Explosion. Chemical risks. Aesthetic impacts.	Do not touch and report immediately to NSW Police. Manage with Unexpected Findings Protocol (Section 4.4).	Do not touch and report immediately to NSW Police. Manage with Unexpected Findings Protocol (Section 4.4).	Site Owner, Occupant & Contractors

4.4 Earthworks Protocol – Activities, Hazards, Pathways and Controls

Approval is required from the Planning Authority for any proposed excavation works which will generate spoil requiring offsite disposal or onsite reuse.

As noted in **Section 4.2**, all excavated soils / materials requiring off-site disposal must be managed in accordance with DECCW waste regulations. No excavated soil shall be reused onsite unless chemical testing validates the soil as being suitable for the area where it is to be placed. The Planning Authority will monitor compliance with these requirements.

Table 5 provides a summary of the potential hazards and exposure pathways associated with each earthworks type activity and the related precautionary control measures. The list of activities is not intended to be exhaustive and relates (only) to the 'unrestricted landuse' portion of the site only (i.e. the portion assessed against low density residential criteria) and the Management Areas as shown on **Figure 3** in **Appendix A**.

If site activities are undertaken within a Management Area, then the following documentation should be maintained and incorporated into an updated SEMP where required:

- Activity diary – a daily dairy describing the works undertaken, how the works altered the management area and the condition of the management area at the completion of the works;
- Additional test reports – for example if further analytical testing is undertaken on groundwater at the site, to assess the suitability of groundwater for beneficial re-use;
- Daily photographs of site conditions; and
- Non-conformance register and remedial action statement.

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Table 5 - Summary of Potential Exposure Pathways and Control Measures – Earthworks in Unrestricted Landuse area

Activity	Hazard	Exposure Pathway	Precautionary Control Measure
Landscaping - Grass cutting - Tree lopping - Stump grinding - Planting trees	▪ Contaminated soil ▪ ACM fragments and services ▪ Building and Demolition Waste ▪ Defence related waste including lead pellets and cartridges	▪ Dermal contact with soil / materials ▪ Inhalation and ingestion of dust	▪ Review project documentation and SEMP to identify whether and what materials can be expected to be encountered by the works ▪ Inspect the work areas and conduct an Activity Risk Assessment ▪ Conduct additional investigations if required ▪ Establish appropriate safe work procedures ▪ Familiarise staff with potential issues [toolbox briefing] ▪ Identify, report, and safely manage any suspect material ▪ Wear long-sleeved shirts, long-pants and gloves ▪ Avoid creating dust (e.g. avoid working on high wind days) ▪ Wash hands and face immediately after works ▪ Remove (and collect) loose soil off equipment ▪ Wash soiled clothes separately ▪ Do not eat, drink or smoke in work areas
Construction - Disturbance of surface cover - Excavation - Stockpiling material - Offsite disposal of material - Work documentation	▪ Contaminated soil ▪ ACM ▪ Building and Demolition Waste ▪ Defence related waste including lead pellets and cartridges	▪ Dermal contact with soil / materials ▪ Inhalation and ingestion of dust	▪ Develop and implement Safe Work Methods Statement including: - Contact details - Legislation - WorkCover requirements - Proposed works - Summary of expected contamination ▪ Unexpected findings protocols ▪ Guidance by an appropriately qualified environmental practitioner ▪ Dust Control - Minimise drop height from excavator bucket to repository - Stop work in high wind conditions ▪ Wear long trousers, and long sleeved shirts ▪ Work upwind from the soil exposure area ▪ Wash hands, arms and face prior to consuming food, drinks, or smoking ▪ Change work clothing prior to leaving the site ▪ Launder work wear separate from other clothing ▪ Offsite disposal in accordance with NSW guidelines

Activity	Hazard	Exposure Pathway	Precautionary Control Measure
			▪ Effective truck wheel washing procedures to minimise the export of contamination from the site ▪ Machinery to remain on hard surfaces where possible ▪ Periodic cleaning of work corridors to avoid spreading of contamination ▪ Surfacewater discharge controls, following chemical analysis of excavation/stockpile run-off prior to discharge ▪ If groundwater is to be intercepted and pumped, a groundwater disposal plan, following chemical analysis of groundwater prior to discharge ▪ Stockpiling within bunds/containers ▪ Placing stockpiled material on impermeable barrier [e.g. HDPE] ▪ Covering of stockpiles with HDPE to prevent migration through dust and stormwater ▪ Minimum of 0.5m overlap of stockpile cover and base ▪ Effective and documented tracking of stockpiles, noting their origin, stockpiled location and end location ▪ Activity diary ▪ Additional testing reports of material for reuse or offsite disposal. ▪ Daily photographs of site conditions ▪ Non conformance register and remedial action statement

4.5 Unexpected Findings Protocol

In the event that any material suspected of containing potentially contaminated/hazardous substances is found, the following procedure should be implemented:

1. Stop/prevent any activity in the area and surround and secure the area. Do not touch or disturb the item/material.
2. Report the Unexpected Finding to the Site Owner or Nominated Representative.
3. Record location, visual appearance, odour, depth, surrounding material and mode of discovering the material to the Owner or Nominated Representative.
4. Obtain assistance from a suitably qualified practitioner in identifying the potential hazard to human health or the environment in accordance with NSW regulatory requirements. This may include sampling and laboratory analysis, but could be limited to inspections.
5. Establish management actions in compliance with NSW regulatory requirements.
6. Obtain the Site Owner or Nominated Representative's and regulator's approvals for the proposed management actions.
7. Do not recommence work until the appropriate approvals have been received.
8. Implement the approved management action plan and seek on-going advice as necessary.
9. Document the findings and compliance with the approved action plan and provide documentation to the Site Owner of Nominated Representative.
10. Update SEMP hazards and controls as required.

The potential for explosive ordnance to be remnant on the site is very low. However in the event than an item suspected to be ordnance-related is found, it should not be touched, tampered with or disturbed in any way. Its general appearance should be carefully noted along with the best route to the item. Its location should be marked and all site personnel instructed to clear the area. The NSW Police should be advised. The NSW Police may manage the incident or they may arrange for specialist Defence personnel to attend and render the site safe. It is noted that there is currently no charge for this service.

4.6 Documentation and Reporting

Site activities that involve the disturbance of known impacted materials and filled areas (**Tables 2 and 3**) are to be managed in accordance with a job-specific Excavation / Environmental Management Plan. The Plan must include the proposed management approach for excavated materials (e.g. offsite disposal). The Plan is to be prepared by a suitably qualified and experienced person and provided to the Planning Authority for Approval. A copy is to be retained by the Site Owner.

For all materials and areas listed in **Tables 2** - **4**, a report documenting completed activities should be prepared by the Contractor and provided to and retained by the Planning Authority and Site Owner.

An application for extraction must be submitted to and approved by the Planning Authority prior to extracting any groundwater from the site.

The Site Owner should keep a record of any incidents associated with work involving materials listed in **Tables 2** - **4**.

Any changes made to this SEMP, or the use of alternate management approaches shall be approved by the Planning Authority and recorded by the Site Owner.

4.7 Land Use Changes

This SEMP has been prepared for the intended land uses specified in Section 1.2 and shown on **Figure 2a** in **Appendix A**. In the event that a change in landuse is proposed, then a review of the SEMP, current land use restrictions and possibly additional detailed contamination investigations at the subject area may be required, so as to confirm the suitability of the area for the change in land use. Any investigations must be performed by an appropriately qualified and experienced environmental practitioner.

In accordance with planning requirements, no change in landuse shall occur without the approval of Port Stephens Council (or other relevant Planning Authority).

5 REFERENCES

Gibson Nominees (2010) *Former Stockton Rifle Range: Explosive Ordnance Related Contamination Issues*, Ref: 04/10.

National Environment Protection Council (1999) *National Environment Protection Measure, Guideline on the Investigation Levels for Soil and Groundwater*.

National Environment Protection Council (1999) *National Environmental Protection Measure, Assessment of Site Contamination - Schedule B series*.

NSW DEC (2006) *Guidelines for the NSW Site Auditor Scheme*.

NSW Environment Protection Authority (1997) *Guidelines for Consultants Reporting on Contaminated Sites*.

Port Stephens Council (2000) *Local Environment Plan*.

Port Stephens Council (September 2004) *Acid Sulfate Soils Policy*, File No. 9740-094, 5 pages.

Port Stephens Council (February 2007) *Acid Sulfate Soil Planning Map*.

SKM (April 2010) *Stockton Rifle Range Site Audit Report.*

SMEC/WSP (2008) *Stockton Rifle Range - Contamination Assessment*.

SMEC/WSP (2008) *Stockton Rifle Range Remedial Action Plan*.

SMEC/WSP (2008) *Stockton Rifle Range Delineation Sampling June 2008.*

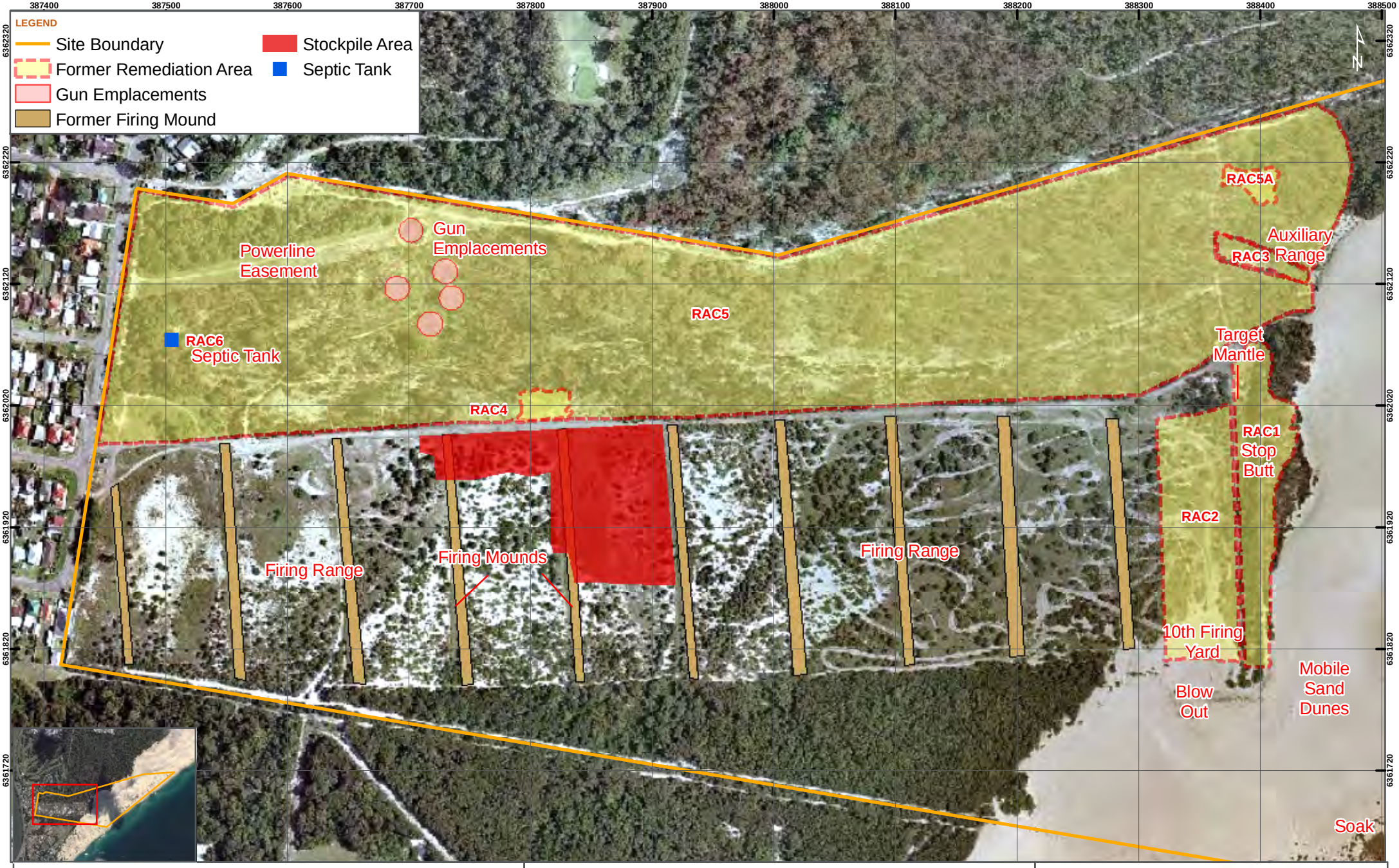
SMEC/WSP (2009) *Stockton Rifle Range Validation Sampling Analysis and Quality Plan*.

SMEC (March 2010) *Stockton Rifle Range Validation Report.*

APPENDIX A: FIGURES

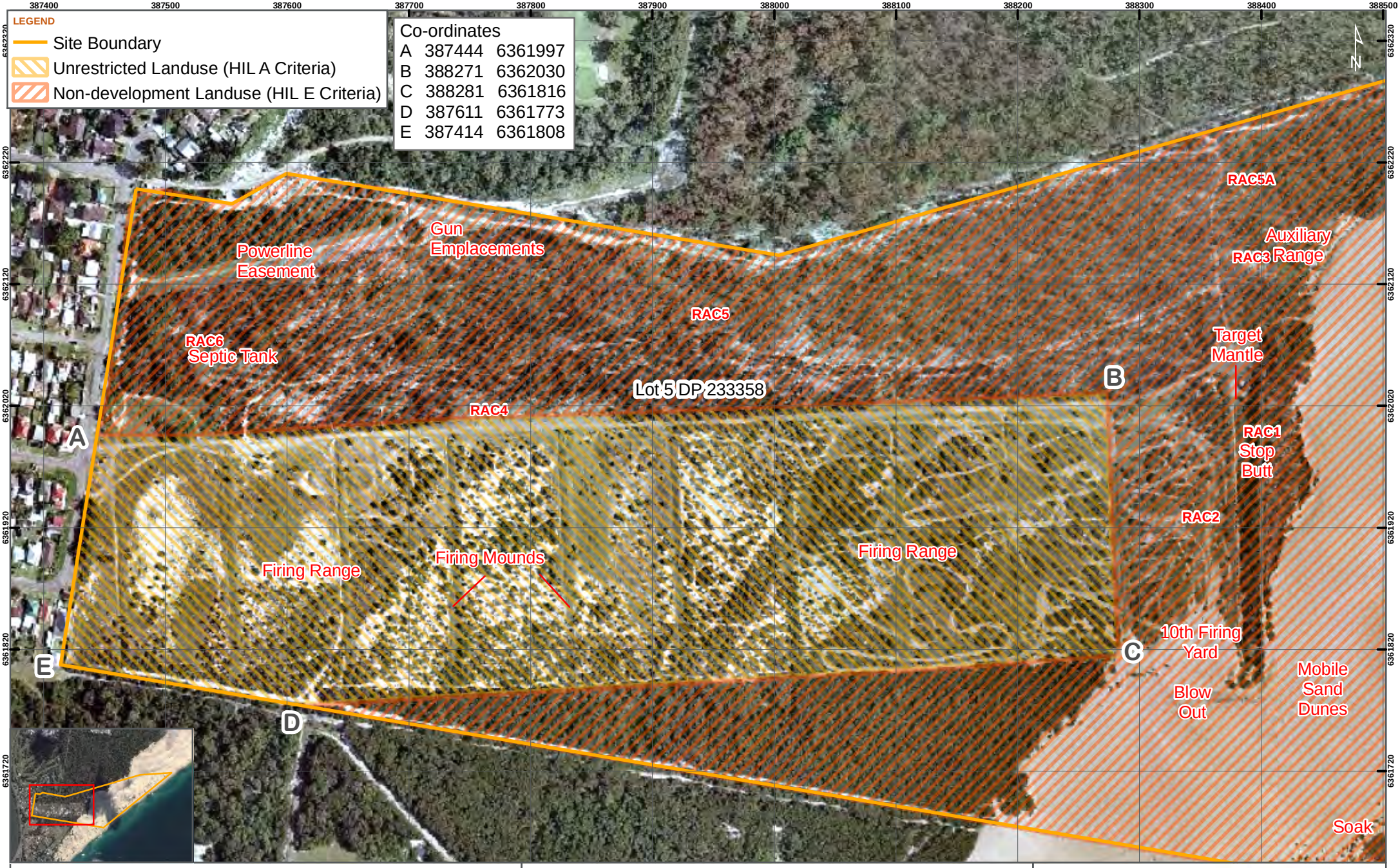
DATE 05/05/2010	**SCALE** 1:20,000 (0, 200, 400, 800 Meters)	**COORDINATE SYSTEM** MGA 94 Zone 56
PROJECT NO. 3001625.004	**PROJECT TITLE** Stockton Rifle Range Site Environmental Management Plan	
FIG NO. 1	**FIGURE TITLE** Site Location Plan	
CREATED BY B. Stewart	**LOCATION** R:\group information\Environment and Planning\EandP\Cassie\Projects\Stockton\Site Environmental Management Plan	

SMEC



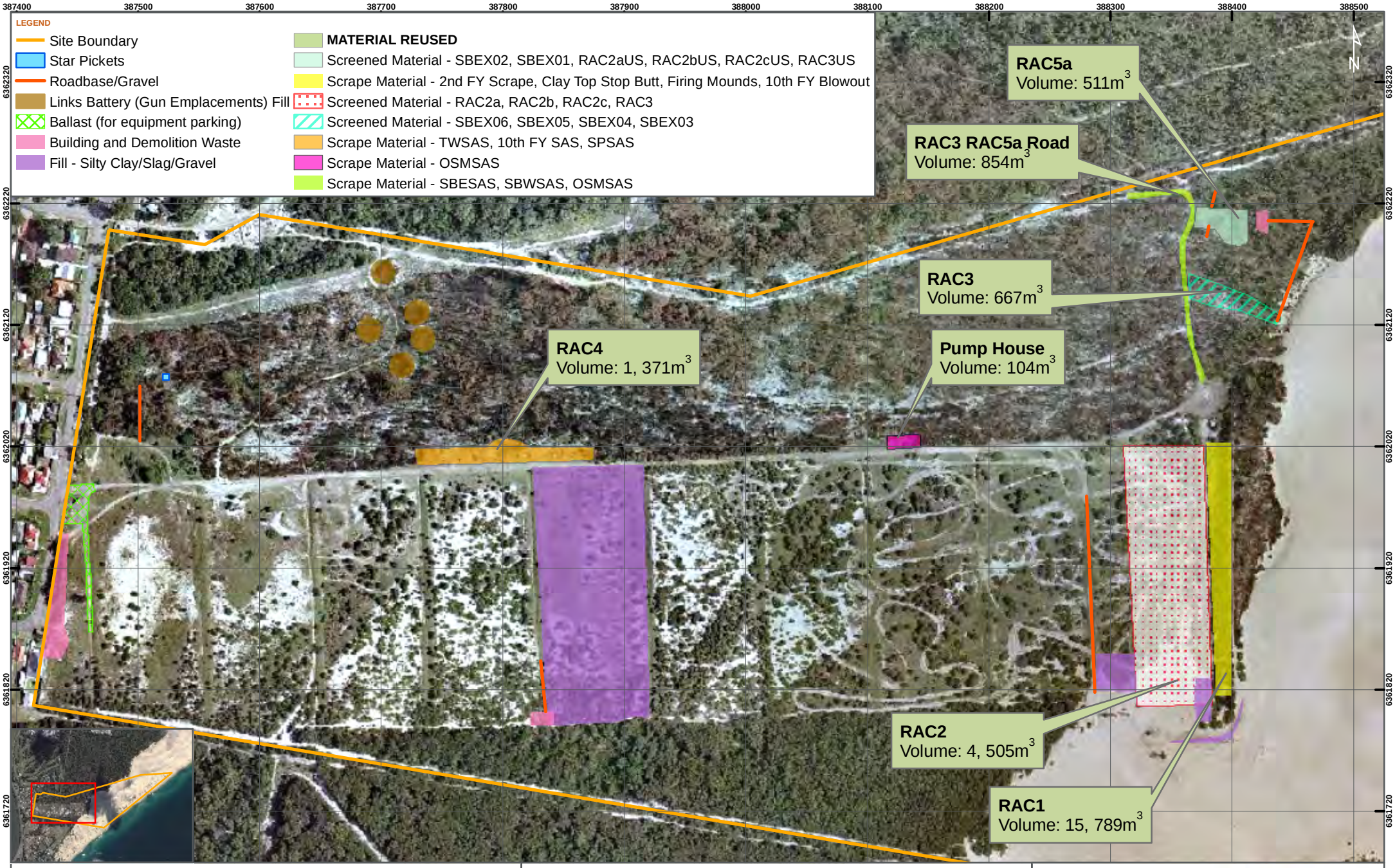
DATE 05/05/2010	**SCALE** 1:4,000 (0 25 50 100 Meters)	**COORDINATE SYSTEM** MGA 94 Zone 56	**FIG NO.** 2
FIGURE TITLE Site Plan			
PROJECT NO. 3001625.004	**PROJECT TITLE** Stockton Rifle Range Site Environmental Management Plan	**CREATED BY** B. Stewart	**LOCATION** R:\group information\Environment and Planning\EandP\Cassie\Projects\Stockton\Site Environmental Management Plan

SMEC



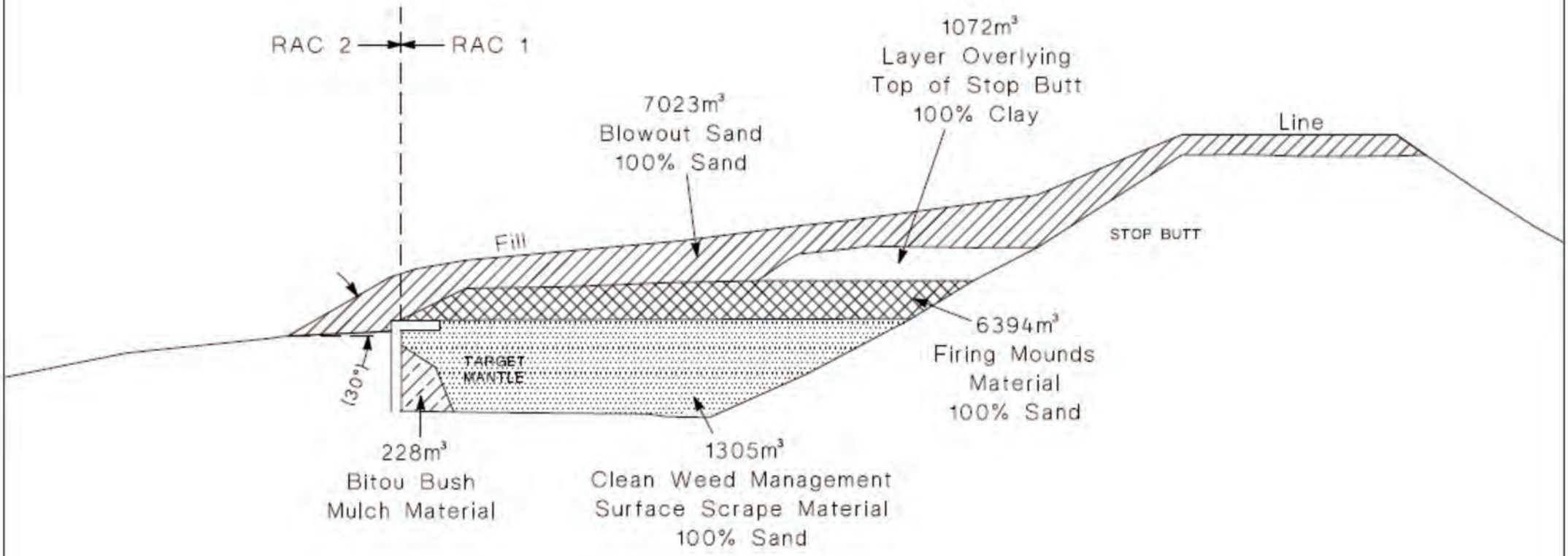
DATE 05/05/2010	**SCALE** 1:4,000 (0 25 50 100 Meters)	**COORDINATE SYSTEM** MGA 94 Zone 56	**FIG NO.** 2a
FIGURE TITLE Landuse Assessment Zones			
PROJECT NO. 3001625.004	**PROJECT TITLE** Stockton Rifle Range Site Environmental Management Plan	**CREATED BY** B. Stewart	**LOCATION** R:\group information\Environment and Planning\EandP\Cassie\Projects\Stockton\Site Environmental Management Plan

SMEC



DATE 05/05/2010	**SCALE** 1:4,000 (0 25 50 100 Meters)	**COORDINATE SYSTEM** MGA 94 Zone 56	**FIG NO.** 3
FIGURE TITLE Residual Material	**REFERENCE** SMEC 2010 Validation Report		
PROJECT NO. 3001625.004	**PROJECT TITLE** Stockton Rifle Range Site Environmental Management Plan	**CREATED BY** E. Kirchner	**LOCATION** R:\group information\Environment and Planning\EandP\Cassie\Projects\Stockton\Site Environmental Management Plan

SMEC



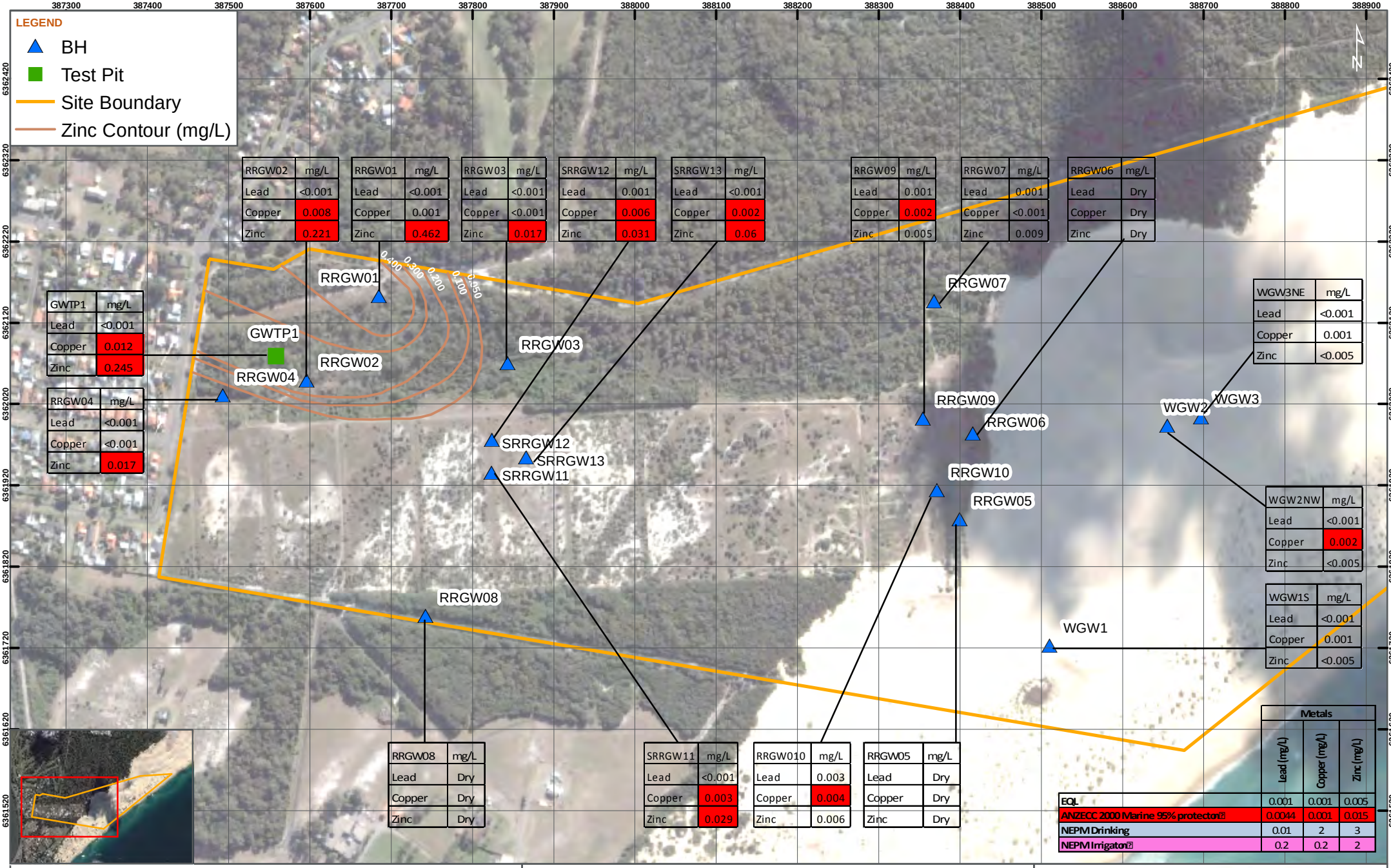
TYPICAL CROSS SECTION
LOOKING NORTH
APPROXIMATELY HALFWAY
ALONG TARGET MANTLE

NOTES:-
1. SCALE HORIZONTAL 1:100
VERTICAL 1:100

RAC1 & RAC2

DATE 05/05/2010	**FIGURE TITLE** Target Mantle Backfill Profile	**FIG NO.** 4	**SOURCE** Synergy Documentation
PROJECT NO. 3001625.004	**PROJECT TITLE** Stockton Rifle Range Site Environmental Management Plan	**CREATED BY** E. Kirchner	**LOCATION** R:\group information\Environment and Planning\EandP\Cassie\Projects\Stockton\Site Environmental Management Plans

SMEC



DATE 05/05/2010

SCALE 1:6,000 (0, 50, 100, 200 Meters)

COORDINATE SYSTEM MGA 94 Zone 56

FIG NO. 5

FIGURE TITLE Site Groundwater Condition

PROJECT NO. 3001625.004

PROJECT TITLE Stockton Rifle Range Site Environmental Management Plan

CREATED BY E. Kirchner

LOCATION R:\group information\Environment and Planning\EandP\Cassie\Projects\Stockton\Site Environmental Management Plan

SMEC

APPENDIX B: PHOTOGRAPHS

Photo 1: ACM fragment

Photo 2: ACM sheeting - Previously encountered within the Northern Heavily Vegetated Area

Photo 3: Building and Demolition Waste - Previously encountered in the Northern Heavily Vegetated Area

Photo 4: Examples of Rifle Range waste encountered onsite

Photo 5: Target Mantle - Prior to being filled with the former Firing Mound material

Photo 6: Fill surrounding Gun Emplacements within the Links Anti-Aircraft Battery.