Defence Infrastructure Organisation

Dalgety Bay Land Quality Assessment

Final Factual Investigation Report
DIO Project No. 13032

15 April 2013

Prepared by AMEC Environment & Infrastructure UK Limited for the Ministry of Defence, under commission DE4/4513

Defence Infrastructure Organisation

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No.	Details	Date
1	Working Draft Report	11 January 2013
2	Draft Report for Comment	13 March 2013
3	Final report	15 April 2013

Executive Summary

AMEC Environment and Infrastructure UK Ltd (AMEC) was commissioned by the Defence Infrastructure Organisation (DIO) to undertake a Phase Two Land Quality Assessment of an area surrounding the Dalgety Bay Sailing Club, Dalgety Bay, Fife, KY11 9SJ (the 'Study Site'), in support of DIO's Investigation Plan, dated February 2012, and in accordance with a design agreed with SEPA. The Phase Two Land Quality Assessment represents Stage 2 of DIO's Dalgety Bay Inspection Investigation Plan.

DIO's Investigation Plan and the Proposed Scope of Works are focussed on radium-226 only. The purpose of Stage 2 of DIO's plan is to undertake a targeted intrusive and non-intrusive investigation based on the findings of earlier stages of work, in particular the Stage 1 Conceptual Model produced by AMEC.

This report presents the factual data acquired during the Stage 2 intrusive site investigation.

Contents

Glossary of Terms

Site Specific

DE	-	Defence Estates
DBSC	-	Dalgety Bay Sailing Club
DIO	-	Defence Infrastructure Organisation
DSTL	-	Defence Science and Technology Laboratory
MOD	-	Ministry of Defence
RNAS	-	Royal Naval Air Station

Environmental

ACM	-	Asbestos Containing Material
AOD	-	Above Ordnance Datum
bgl	-	below ground level
GIS	-	Geographic Information System
HPA	-	Health Protection Agency
LQA	-	Land Quality Assessment
NGR	-	National Grid Reference
NGR	-	National Grid Reference
OS	-	Ordnance Survey
PPE	-	Personal Protective Equipment

1. Introduction

1.1 Terms of Reference

AMEC Environment and Infrastructure UK Ltd (AMEC), formerly Entec UK Ltd, was commissioned by the Defence Infrastructure Organisation (DIO) to undertake a Phase Two Land Quality Assessment of an area surrounding the Dalgety Bay Sailing Club, Dalgety Bay, Fife, KY11 9SJ (the 'Study Site'). The works were carried out under commission FTS3/ELMG/016 Amendment 2.

The Phase Two Land Quality Assessment represents Stage 2 of DIO's Dalgety Bay Inspection Investigation Plan, first published 29 February 2012, as subsequently amended by DIO following SEPA comment, and available at:

http://www.mod.uk/DefenceInternet/MicroSite/DIO/OurPublications/TechnicalDocuments/MTP/DalgetyBayApril2012InvestigationPlan.htm

DIO's Investigation Plan and the Proposed Scope of Works are focussed on radium-226 only. The purpose of Stage 2 of DIO's plan is to undertake a targeted intrusive and non-intrusive investigation based on the findings of earlier stages of work, in particular the Stage 1 Conceptual Model produced by AMEC. It should be noted that previous work at the site not undertaken by AMEC but used to inform the scope of work is not warranted by AMEC.

This document represents the factual report of the intrusive investigation.

1.2 Background

The Study Site formed part of the former military airfield and maintenance unit, Royal Naval Air Station (RNAS) Donibristle. A Site Location Plan is included as Figure 1 and a Site Layout Plan is included as Figure 2.

Radioactively contaminated materials have been identified on and in the vicinity of the Study Site. For several years, AMEC has provided support to DIO in connection with radioactive contamination identified on Dalgety Bay beach, and other consultants (Enviros) have previously reported intrusive investigations on the site and in the vicinity.

As part of Stage 1a of DIO's Investigation Plan, AMEC issued a Phase One Land Quality Assessment Report. The Conceptual Model presented in the Phase One Land Quality Assessment report has been used as the basis for the design of the site investigation.

The Stage 2 Investigation Proposed Scope of Works Final Report, dated 25 September 2012, presented in detail the proposed scope of works for the Stage 2 Investigation.

1.3 Objectives

The objective of the Stage 2 investigation is to reduce uncertainties identified within the Conceptual Site Model and the Conceptual Exposure Model associated with radium-226 at the site.

1.4 Scope of Work

DIO's Investigation Plan presented an Outline Scope for the Stage 2 Investigation, which comprised:

a) Further topographic surveys to understand changes in geomorphology;

b) Initial high level review of the coastal processes and sea defences at Dalgety Bay;

c) Further geophysical surveys to determine areas of ground disturbance and land filling/raising;

d) Targeted intrusive investigation using primarily trial pits in areas of known or suspected radium contamination to confirm the presence, nature and extent and inform the quantification of the environmental and health hazards. A number of pits were also dug to confirm the "null hypotheses". The number, nature, location and extent of trial pitting and sampling was determined by the findings of the topographical, geophysical and radiological surveys together with visual and historical information;

e) Development of a Sampling and Analysis Plan;

f) Facilitating assurance work by SEPA.

This report presents the factual findings of the targeted intrusive works (item d) within the Stage 2 Investigation. The other work items are reported separately.

2. Scope of Works

The scope of the investigation was developed using the Conceptual Model presented within the Land Quality Assessment Phase One Desk Study Report. The report defined key areas of uncertainty in both the conceptual site model and conceptual exposure model and provided a scope of work to reduce these uncertainties.

The Scope of Work is presented in Annex A Table A1; this defines the Conceptual Site Model uncertainties addressed by each of the investigation actions. Similarly, the uncertainties in the Conceptual Exposure Model investigated by each of the investigation actions are presented as Annex A Table A2.

For each area of the site and relevant linkage, the current uncertainties are shown as either investigated, partially investigated or not investigated using symbols presented in the key.

3. Execution of Work

3.1 Introduction

The intrusive site works were carried out over a five week period from 22 October 2012 to 23 November 2012.

The project was managed in accordance with the Construction (Design and Management) Regulations 2007 (subsequently referred to as the "CDM Regulations"). AMEC initially undertook the role of 'Designer' and 'Contractor', and Ground Technology Services (GTS) was appointed as sub-contractor for the intrusive works. As the scope, and therefore duration, of the investigation increased during the site works period, the project was notified to the HSE, and AMEC undertook the role of Principal Contractor for the remainder of the work.

AMEC provided full-time supervision of the fieldwork; sampling, logging and co-ordinating the works as the investigation progressed. Ground conditions were logged in accordance with BS5930:1999. The locations of the exploratory holes are shown on Figure 3. Borehole logs, trial pit logs and hand dug pit logs are presented in Annex B. Photographs from the site investigation are provided in Annex C.

The Stage 2 Intrusive Investigation was also attended on a full-time basis by representatives from SEPA.

3.2 Exploratory Hole Reference System

Each exploratory hole was assigned a unique reference number. The reference system comprised the following format:

AAB/C/DDD

Where:

- AA was either 'TP' (for Trial Pit) or 'BH' (for Borehole);
- B was a 1-digit identifier for the area of the site to be investigated (e.g. '2' represents the 'headland' area, comprising the raised and levelled area to the south of the current Sailing Club clubhouse);
- C was a 1-digit identifier which represents the Investigation Action required (e.g. '2/2' is to evaluate presence of point sources in Clubhouse mound within the 'headland' area of the site);
- DDD was a 3-digit identifier sequentially assigned to each exploratory hole (e.g. 001);
- Note that Identifiers 'B' and 'C 'were replaced by NH ('Null Hypothesis') for a number of trial pits where no specific investigation areas were targeted and where

no investigation actions were required (i.e. areas of background conditions anticipated).

3.3 Exploratory Hole Establishment

Each exploratory hole location was physically located on the ground by AMEC using plans of proposed exploratory hole locations. A GPS unit was then used to better define the exploratory hole location and the GPS coordinates recorded. The exploratory hole was shifted if constraints were present (e.g. bedrock at ground surface).

Each location was checked for the possible presence of underground services as follows:

- Checking of services locations shown on plans obtained from utility companies;
- Consultation with the site owners regarding the potential presence of unrecorded services;
- Inspection of field evidence for the presence of services (e.g. inspection covers, outfall pipes, lighting structures); and
- Scanning of each location using a cable avoidance tool (CATscan).

Wooden boards and plastic sheeting were laid down at the location of each exploratory hole to contain exploratory hole soil arisings and reduce the potential for cross-contamination at the ground surface.

The work area around each exploratory hole was demarcated with rigid barriers/barrier tape and warning signage prior to commencement of excavation to prevent unauthorised access to the work area.

A photographic record was made of the condition of the site surface at the location of each exploratory hole prior to excavation.

A permit to dig system was implemented by AMEC to control the works and the permit included checking the aspects referred to above.

3.4 Health Physics Monitoring

Monitoring of background radiological conditions was recorded at each exploratory hole using a 2” x 2” Sodium Iodide detector and Ludlum Instruments rate meter. Background radioactivity measurements (in counts per second (cps)) were obtained using the 2” x 2” detector at the ground surface at the exploratory hole location and also count rates recorded approximately 1.0 m above ground level during excavation. SEPA also recorded background conditions using a 2” x 2” Sodium Iodide detector before, during and after excavation of each exploratory hole for health physics monitoring purposes. A summary of field probe measurements is presented as Figure 4.

3.5 Trial Pits

Trial pits were selected as the principal method of ground investigation at the site. A total of 80 trial pits were proposed within the scope of intrusive investigation. These were supplemented by a further 9 trial pits to provide additional site characterisation information. The locations of additional pits were agreed by AMEC, DIO and SEPA representatives.

The trial pits were progressed using a JCB excavator with backhoe, and a toothed 500 mm width bucket.

The trial pits were excavated in small depth increments (typically 200 mm) as excavation progressed and soil arisings were temporarily stockpiled adjacent to the trial pit. Turf was cut where present. Near surface soils were stockpiled separately from deeper soils and retained for reinstatement purposes.

Representative samples were obtained of soils encountered, along with sampling of point sources (where encountered).

Once soils were logged and a photographic record made of the exploratory hole, the pits were backfilled with soil arisings. Turf was replaced at the ground surface where present.

The trial pit logs are included in Annex B. Trial pits were excavated to a maximum depth of 3.6 m below ground level (bgl).

3.6 Hand Dug Pits

Where access to proposed trial pit locations with a JCB was not possible due to site constraints, hand-dug trial pits were excavated. Site constraints were present at key locations as follows:

- Beach areas close to low water mark – no access for excavator due to soft ground conditions;
- Ross Plantation – no access for excavator due to trees and dense vegetation;
- Top of main slipway - due to structures, buildings and possible services.

A total of 17 hand dug pits were excavated using hand-tools to depths of up to 1.2 m bgl. Soil arisings were backfilled in the hand-dug pits on completion. Ground conditions encountered were logged by AMEC and excavations were supervised by AMEC and SEPA. Hand dug pit logs are included in Annex B.

3.7 Boreholes

Six boreholes were drilled using cable percussion drilling techniques. Boreholes were advanced using a combination of 150 mm and 200 mm diameter drilling equipment to a maximum depth of 6.9 m bgl. Boreholes were advanced to the maximum depth of penetration possible using the cable percussion technique; depths were restricted by the presence of bedrock.

All downhole tools and soil arisings were scanned for the presence of radioactivity using the 2” x 2” Sodium Iodide detector and Ludlum ratemeter.

Boreholes were completed with 50mm diameter HDPE standpipe installations for monitoring of groundwater conditions at the site. The construction of the standpipe and depth of response zones was specific to each borehole and the ground conditions encountered. Boreholes were completed with a lockable cover flush with ground level.

Borehole arisings were checked for the presence of radioactive materials and point sources. Where no elevated activity was encountered, the materials were temporarily stored in a skip on site, pending off-site disposal to landfill.

Borehole logs and details of standpipe installations are included in Annex B.

3.8 Soil Sampling

Selected representative soil samples were obtained from exploratory holes. In addition, where elevated radioactivity was encountered in soils or point sources were encountered in exploratory holes, additional samples were obtained. Active samples were transported to AWAF at Rosyth for temporary storage at an appropriate licensed storage facility.

Full chain of custody documentation (Transfer Inventory of Point Sources recovered from Dalgety Bay) was prepared for active samples transported off-site to AWAF Rosyth. Copies of the Transfer Inventory forms are included as Annex D. (Note that samples referenced with a 4-digit number were recovered during the on-going beach survey, and transferred to AWAF at the same time as intrusive investigation samples).

3.9 Water Monitoring and Sampling

Borehole standpipes were monitored for groundwater levels following installation of the standpipes. Boreholes were allowed a period of approximately two weeks following drilling to allow for stabilisation of groundwater conditions prior to monitoring.

Groundwater levels were dipped by AMEC using a portable dipmeter. Downhole Solinst data loggers were also deployed in boreholes to investigate potential tidal influence.

Surface water samples were also obtained from outfalls or surface waters identified at the site which discharge into Dalgety Bay. These include the following:

Table 3.1 Surface Water Samples from Discharges into Dalgety Bay

Reference	Description	Coordinates
SW1	Surface Water Outfall from Property at The Wynd	316440 683227
SW2	Storm/ Surface Water Outfall	316176 683371
SW3	Stream Discharge	316150 683408
SW4	Outfall Pipe Foul Water Discharge	316120 683450

Photographs of the surface water discharges at the sample locations are included in Annex C.

3.10 Disposal of Arisings

3.10.1 Soils

Trial pits were backfilled with arisings on completion. Surplus borehole arisings were disposed appropriately, following screening of soils for the presence of radioactivity using the Ludlum ratemeter and 2" x 2" Sodium Iodide detector. Surplus soils which displayed background count rates were stored in a temporary skip on site, pending off-site disposal to licensed landfill. Borehole arisings which displayed elevated count rates above background levels were transferred to AWAF for temporary storage.

3.10.2 Waters

Groundwater arisings not required for sampling were returned to the borehole of origin.

3.11 Additional Non-Intrusive Works

3.11.1 Ross Plantation

A radiological walkover survey was undertaken of the accessible portions of Ross Plantation. The survey was undertaken using a spatially referenced 3" NaI detector. The results of the survey are presented on Figure 5.

The total area of Ross Plantation identified for survey was 2.4 ha. Approximately 0.23 ha could not be accessed due to very dense undergrowth. This, and the presence of trees and other overgrown areas, resulted in survey coverage within Ross Plantation of less than 100%. No radiological results have been recorded for the areas marked 'no access' on Figure 5.

Due to poor satellite signal within the trees, it was not possible to record spatially referenced data in all areas of Ross Plantation. Where spatially referenced data could not be collected, radiological survey results were recorded manually. Where spatial reference information was gathered, the presence of trees has resulted in some 'scatter' in the positional data, which should therefore be considered to be of a relatively low positional accuracy, and indicative in nature.

A total of 8 excavations were undertaken at areas of elevated surface activity. Of these, 7 point sources were recovered from depths of between 0.03 m and 0.15 m. Based on the waste management instrument calibration factor of 130.4 cps/kBq, activities of the recovered point sources ranged from 1.92 kBq to 30.67 kBq. No specific point source was encountered in the remaining excavation on the southern boundary of Ross Plantation.

3.11.2 Slipways

A radiological walkover survey was undertaken of the hard standing areas comprising the three slipways south east of the Dalgety Bay Sailing Club. The results are presented on Figure 6.

Whilst areas of elevated count rates were detected, no point sources were encountered which were recoverable from the surface of the hardstanding.

4. Ground Conditions

Ground conditions are summarised by the Investigation Action (IA) on which the relevant exploratory holes were targeted, as defined in Annex A Table A1. In summary, these investigation actions consisted of:

- IA 1: Area East of New Harbour (IA1/1 only);
- IA 2: Headland Deposited Material:
  - IA2/1: Headland Area (Lateral Extent of Shallow Material);
  - IA2/2: Headland Area (Point Sources);
  - IA2/3: Headland Area (Deeper Stratigraphy);
  - IA2/4: Headland Area (Ash-Rich Fill);
- IA 3: Dalgety Bay Sailing Club and Boat Park Deposited Material:
  - IA3/1: Dalgety Bay Sailing Club and Boat Park (West);
  - IA3/2: Dalgety Bay Sailing Club and Boat Park;
  - IA3/3: Dalgety Bay Sailing Club and Boat Park (Central Portion);
- IA 4: Slipways and Jetty Development:
  - IA4/1: Surface Walkover Monitoring Survey;
  - IA4/2: Research on Construction Methods;
- IA 5: Ross Plantation Quarry:
  - IA5/1 Surface Walkover Monitoring Survey;
  - IA 5/2: Ross Plantation Quarry;
- IA 6: Ross Plantation Foreshore:
  - IA6/1 Surface Walkover Monitoring Survey;
  - IA6/2 Ross Plantation Foreshore;
- IA 7: Dalgety Bay Beach:
  - IA7/1: Definition of depth to bedrock;
  - IA7/2 Dalgety Bay Beach;
- IA 8: New Harbour (IA8/1 only).

The following sections provide detail of the investigation findings in each of these action areas. Figures 7 and 7a-7f provide the alignment and illustration of seven cross sections based on the intrusive data.

4.1 IA 1: East of New Harbour

Exploratory holes TP1/1/007 to TP1/1/008 were excavated to target the area east of New Harbour. This area was identified for investigation given that it was a recorded refuse tip, and ash had been encountered in previous investigations. Materials encountered are summarised below:

Table 4.1 IA 1/1: East of New Harbour

Strata	Typical Description	Location	Typical Depth Encountered	Radioactivity*
Made Ground	The material comprised a layer of sandy coarse gravel to 0.45 m depth, and silt, gravel, cobbles and boulders of sandstone, with a little recent anthropogenic material such as plastic bag, vented air-bricks and metal straps. Ash Made Ground was not encountered at this location.	TP1/1/008	GL - 2.0 m	No point sources identified.
Ash Made Ground	The ash comprised sandy ash and clinker gravel, with much anthropogenic material comprising pottery fragments, metal fragments, cement bonded asbestos containing materials (ACM), glass and bricks.	TP1/1/007	GL - 2.8 m	Count rates of up to 1 100 cps were recorded for radioactive point sources identified in the ash.
Solid Strata	Bedrock comprising buff sandstone.	TP1/007	2.8 m in TP1/1/007	

*: General comment on radioactivity observation for each stratum as a whole.

TP1/1/008 did not penetrate deeper than 2.0 m due to pit wall instability.

4.2 IA 2: Headland Deposited Material

Exploratory holes TP2/1/009 to TP2/1/014 were excavated in the Headland area to better define the extent of shallow material around previously investigated locations (Investigation Action 2/1).

Soils encountered during Investigation Action 2/1 are summarised as follows:

Table 4.2 IA 2/1: Headland Area

Strata	Typical Description	Location	Typical Depth Encountered	Radioactivity*
Shallow Made Ground – Reworked Soils	Gravelly silt.	TP2/1/009	GL-0.25 m in TP2/1/009	No point sources identified.
		TP2/1/012	GL-0.9 m inTP2/1/012	
Shallow Made Ground - Shallow Ash	Black sandy ash and clinker gravel.	TP2/1/009	0.25-0.45 m in TP2/1/009	No point sources identified.
		TP2/1/013	GL-0.3 m in TP2/1/013	
		TP2/1/014	GL-0.2 m in TP2/1/014	
Shallow Made Ground - Silt	Clayey sandy gravelly silt.	TP2/1/009	0.45-0.55 m in TP2/1/009	No point sources identified.
		TP2/1/011	GL-0.4 m in TP2/1/011	
Ash Made Ground	Ash comprised sandy ash and clinker gravel, with much anthropogenic material comprising pottery fragments, metal fragments, cement bonded asbestos containing materials (ACM), glass and bricks.	TP2/1/009	0.55-1.8 m inTP2/1/009	Point sources identified to 1 100 cps in TP2/1/009.
		TP2/11/011	0.4-1.3 m in TP2/11/011	
		TP2/1/013	0.4-0.9 m in TP2/1/013	
Coarse Made Ground	Cobbles of Sandstone and occasional brick.	TP2/1/011	0.5 m-2.2 m in TP2/1/011	No point sources identified.
		TP2/1/012B	0.45-1.2 m in TP2/1/012B	
Drift Deposits	Greenish brown clayey silt, with silty peat.	TP2/1/009	1.8 m	No point sources identified.
	Buff/yellow brown sand.	TP2/1/012B	1.2 m-1.75 m in TP2/1/012B	No point sources identified.
			0.3-0.6 m in TP2/1/012B	
Solid Strata	Buff/ yellow brown Sandstone.	TP2/1/009	3.60 m in TP2/1/009	No point sources identified.
		TP2/1/011	2.45 m in TP2/1/011	
		TP2/1/012	0.8 m in TP2/1/012	
		TP2/1/013	1.5-1.9 m in TP2/1/013.	
		TP2/1/014	0.6 m in TP2/1/014	

*: General comment on radioactivity observation for each stratum as a whole.

Soils encountered during Investigation Action 2/2: Excavation of trial pits to evaluate presence of point sources in Clubhouse Mound are summarised as follows:

Table 4.3 IA 2/2: Headland Area

Strata	Typical Description	Location	Typical Depth Encountered	Radioactivity*
Made Ground	Variable, comprising sand/ sandy clay, with gravel, a little clinker, plastic (dated 1976).	TP2/2/015	GL-0.2 m in TP2/2/015	No point sources identified.
		TP2/2/016	GL-0.25 m in TP2/2/016	
		TP2/2/017	GL-1.3 m in TP2/2/017	
Ash Made Ground	Grey sandy ash and clinker gravel, with red burnt ash and shale locally. Much anthropogenic material comprising pottery fragments, metal fragments, cement bonded asbestos containing materials (ACM), glass and bricks.	TP2/2/015	0.2-3.7 m in TP2/2/015	Point sources identified to 5 260 cps in TP2/2/015.
		TP2/2/016	0.25 m-2.5 m in TP2/2/016	Elevated activity in upper ash horizon to 3 000 cps in TP2/2/016.
		TP2/2/017	1.3-1.7 m in TP2/2/017	
Drift Deposits	Greenish grey sandy clay with gravel/ boulders of sandstone.	TP2/2/015	3.7-3.8 m in TP2/2/015	No point sources identified.
		TP2/2/016	2.5 m in TP2/2/016	
	Greenish grey sand.	TP2/2/016	3.05 m-3.25 m in TP2/2/016	No point sources identified.
Solid Strata	Buff/ yellow brown Sandstone.	TP2/2/015	3.8 m in TP2/2/015	No point sources identified.
		TP2/2/016	3.25 m in TP2/2/016	

*: General comment on radioactivity observation for each stratum as a whole.

Soils encountered during Investigation Action 2/3: Excavation of trial pits and boreholes to explore deeper stratigraphy to south and east of the headland are summarised as follows:

Table 4.4 IA 2/3: Headland Area

Strata	Typical Description	Location	Typical Depth Encountered	Radioactivity*
Made Ground/Topsoil	Dark brown sandy silty topsoil.	TP2/3/018 TP2/3/019 TP2/3/020	GL-0.2 m	No point sources identified.
Made Ground	Dark brown clayey sandy silt, sands and much anthropogenic material including concrete, kerbstones, slabs, tarmac, plastic artefacts.	TP2/3/018-019 TP2/3/020 BH2/3/001 BH2/3/02A	GL-2.0 m GL-2.0 m GL-2.0 m 0.3-3.0 m in BH2/3/001 0.5-5.0 m in BH2/3/02A	Rare point source to 300 cps.
Ash Made Ground	Grey sandy ash and clinker gravel, with red burnt ash and shale locally. Much anthropogenic material comprising pottery fragments, metal fragments, cement bonded asbestos containing materials (ACM), glass and bricks.	BH2/3/003 BH2/3/02A	0.3-4.2 m in BH2/3/003 4.3-5.0 m in BH2/3/02A	Dispersed elevated activity throughout ash in BH2/3/003 to 10 000 cps.
Drift Deposits	Brown and grey sandy gravelly clay, gravel and cobbles.	BH2/3/001 BH2/3/02A BH2/3/003	4.0 m-6.0 m in BH2/3/001 5.0 m-6.3 m in BH2/3/02A	No point sources identified.
Solid Strata	Buff/ yellow brown Sandstone.	BH2/3/001 BH2/3/002A BH2/3/003	6.0 m in BH2/3/001 6.9 m in BH2/3/002A 6.0 m in BH2/3/003	No point sources identified.

*: General comment on radioactivity observation for each stratum as a whole.

Note that the depth of excavation of trial pits in this area of the headland was limited by trial pit collapse in unstable materials. Boreholes also served to investigate Actions 2/5: Investigation of the sandstone bedrock profile.

Soils encountered during investigation of Investigation Action 2/4: Characterise lateral extent of ash-rich fill between previous Enviros investigation locations in the headland are summarised as follows:

Table 4.5 IA 2/4: Headland Area

Strata	Typical Description	Location	Typical Depth Encountered	Radioactivity*
Made Ground	Dark grey sandy gravelly ash and clinker gravel with anthropogenic material comprising pottery fragments, metal fragments, gaskets, wire.	TP2/4/021	GL-0.4 m	No point sources identified, count rates to 190 cps.
Made Ground	Clayey sand and gravel, ash pockets.	TP2/4/021	0.4-0.6 m	No point sources identified.
Made Ground	Silt, sand and gravel.	TP2/4/021	0.6-3.2 m	No point sources identified.
Made Ground	Sand and gravel with anthropogenic material including coke, leather.	TP2/4/021	3.2-3.5 m	No point sources identified.

*: General comment on radioactivity observation for each stratum as a whole.

Investigation Action 2/5 comprised investigation of sandstone bedrock profile and was addressed through the investigations carried out under Investigation Actions 2/1 to 2/4.

4.3 IA 3: Dalgety Bay Sailing Club and Boat Park Deposited Material

Exploratory holes TP3/1/022 to TP3/1/029 targeted the westernmost extent of Made Ground (beyond previous Enviros locations). Soils encountered during Investigation Action 3/1 are summarised as follows:

Table 4.6 IA 3/1: Dalgety Bay Sailing Club and Boat Park

Strata	Typical Description	Location	Typical Depth Encountered	Radioactivity*
Topsoil	Dark brown sandy topsoil with a little anthropogenic material, brick fragments, metal, tarmac.	TP3/1/022 TP3/1/023 TP3/1/024 TP3/1/026 TP3/1/027 TP3/1/028 TP3/1/029	GL-0.1 m, up to 0.45 m	No point sources encountered.

Table 4.6 (continued) IA 3/1: Dalgety Bay Sailing Club and Boat Park

Strata	Typical Description	Location	Typical Depth Encountered	Radioactivity*
Made Ground	Variable, sandy silty gravel, occasional plastic sweet wrapper, drinks can fragment.	TP3/1/023	0.05-0.4 m in TP3/1/023	No point sources encountered.
		TP3/1/024	0.8-1.4 m in TP2/1/024	
		TP3/1/026	0.45-0.95 m in TP3/1/026	
		TP3/1/027	0.35-1.1 m in TP3/1/027	
		TP3/1/028	0.05-0.4 m in TP3/1/028	
Ash Made Ground	Dark grey sandy ash and clinker gravel with much anthropogenic material comprising pottery fragments, metal fragments, cement bonded asbestos containing materials (ACM), glass and bricks.	TP3/1/024 TP3/1/025	1.4-1.5 m in TP3/1/024	Point sources identified, up to 2 100 cps in TP3/1/025.
			1.55-1.95 m in TP3/1/025	
		TP3/1/026	1.1-1.25 m in TP3/1/026	
Made Ground/ Disturbed Beach Deposits	Red fused sand and anthropogenic artefacts, metal, clinker.	TP3/1/025	1.95 m in TP3/1/025	Point sources identified, up to 340 cps in TP3/1/026.
		TP3/1/026	1.25 m in TP3/1/026	
Drift Deposits – Estuarine Alluvium	Grey silt/clay and shell fragments.	TP3/1/024	1.5-1.7 m in TP3/1/024	No point sources encountered.
		TP3/1/025	2.5-3.0 m in TP3/1/025	
Drift Deposits	Variable, sands and gravel, cobbles, boulders.	TP3/1/022	0.6-1.8 m in TP3/1/022	No point sources encountered.
		TP3/1/023	1.1-3.05 m in TP3/1/023	
		TP3/1/025	2.0-2.5 m in TP3/1/025	
		TP3/1/026	1.6-2.2 m in TP3/1/026	
Solid Strata	Buff/yellow brown Sandstone.	TP3/1/023	3.05 m in TP3/1/023	No point sources encountered.
		TP3/1/024	1.7 m in TP3/1/024	
		TP3/1/025	3.0 m in TP3/1/025	
		TP3/1/027	1.85 m in TP3/1/027	
		TP3/1/028	1.4 m in TP3/1/028	
		TP3/1/029	1.1 m in TP3/1/029	

*: General comment on radioactivity observation for each stratum as a whole.

Exploratory holes TP3/2/031 to TP3/2/033 (supplemented by TP7/2/073) targeted the northernmost extent of Made Ground (beyond previous Enviros locations).

Soils encountered during Investigation Action 3/2 are summarised as follows:

Table 4.7 IA 3/2: Dalgety Bay Sailing Club and Boat Park

Strata	Typical Description	Location	Typical Depth Encountered	Radioactivity*
Made Ground	Brown silty sand and gravel, much anthropogenic material comprising fragments of metal, concrete, tarmac, brick, plastic bag.	TP3/2/032	GL-1.3 m	No point sources encountered.
Ash Made Ground	Grey sandy ash and clinker gravel, with red burnt ash and shale locally. Much anthropogenic material comprising pottery fragments, metal fragments, cement bonded asbestos containing materials (ACM), glass and bricks.	TP3/2/031 TP3/2/033 TP7/2/073	0.3-1.9 m in TP3/2/031B 0.5-1.1 m in TP3/2/033 0.2-1.6 m in TP7/2/073	Point sources identified, up to 50 000 cps in TP3/2/031B.
Drift Deposits – Estuarine Alluvium	Grey sandy silt.	TP3/2/031B	1.9-2.0 m in TP3/2/031B	No point sources identified.
Solid Strata	Buff/ yellow brown Sandstone.	TP3/2/031B TP3/2/032 TP3/2/033 TP7/2/073	2.0 m in TP3/2/031B 1.3 m in TP3/2/032 1.1 m in TP3/2/033 1.6 m in TP7/2/073	No point sources identified.

*: General comment on radioactivity observation for each stratum as a whole.

Exploratory holes TP3/3/034 to TP3/3/047, BH3/3/004 and BH3/3/005 (supplemented by TP3/3/103, TP3/3/104 and TP3/3/106) targeted the vertical extent of Made Ground in the centre of the Boat Park.

Soils encountered during Investigation Action 3/3 are summarised as follows:

Table 4.8 IA 3/3: Dalgety Bay Sailing Club and Boat Park

Strata	Typical Description	Location	Typical Depth Encountered	Radioactivity*
Made Ground	Variable, silty sand and gravel with anthropogenic material comprising brick, concrete, tarmac, textile, locally with boulders.	TP3/3/035	GL-0.8 m in TP3/3/035	No point sources identified.
		TP3/3/036	GL-1.45 in TP3/3/036	
		TP3/3/038	GL-1.7 m in TP3/3/038	
		TP3/3/039	GL-1.5 m in TP3/3/039	
		TP3/3/040	GL-0.4 m in TP3/3/040	
		TP3/3/041	GL-0.4 in TP3/3/041	
		TP3/3/042	GL-0.6 m in TP3/3/042	
		TP3/3/044	GL-1.55 in TP3/3/044	
		TP3/3/045	GL-1.2 m in TP3/3/045	
		TP3/3/046	GL-1.05 m in TP3/3/046	
		TP3/3/047		
		TP3/3/103	GL-0.65 m in TP3/3/103	
		TP3/3/104	G--1.6 m in TP3/3/104	
		TP3/3/106	GL-1.6 m inTP3/3/106	
Ash Made Ground	Grey sandy ash and clinker gravel, with red burnt ash and shale locally. Much anthropogenic material comprising pottery fragments, metal fragments, cement bonded asbestos containing materials (ACM), glass and bricks.	TP3/3/034	0.95-1.25 m in TP3/3/034	Multiple point sources identified up to 6 200 cps.
		TP3/3/035	1.2-1.3 m in TP3/3/035	
		TP3/3/036	1.9-2.0 m in TP3/3/036	
		TP3/3/037	1.0-2.0 m in TP3/3/037	
		TP3/3/038	1.7-2.0 m in TP3/3/038	
		TP3/3/039	1.5-2.2 m in TP3/3/039	
		TP3/3/040	1.0-1.3 m in TP3/3/040	
		TP3/3/042	0.6-1.45 m in TP3/3/042	
		TP3/3/044	1.55-2.1 m in TP3/3/044	
		TP3/3/045	1.2-1.5 m in TP3/3/045	
		TP3/3/046	1.05-2.0 m in TP3/3/046	
		TP3/3/047	0.8-1.1 m in TP3/3/047	
		TP3/3/103	0.65-1.9 m in TP3/3/103	
		TP3/3/104	1.6-2.2 m in TP3/3/104	
		TP3/3/106	1.4-2.1 m in TP3/3/106	

Table 4.8 (continued) IA 3/3: Dalgety Bay Sailing Club and Boat Park

Strata	Typical Description	Location	Typical Depth Encountered	Radioactivity*
Drift Deposits – Sands & Gravel	Orange brown sand and fine to coarse gravel, cobbles and boulders.	TP3/3/034	1.25-1.45 m in TP3/3/034	No point sources identified.
		TP3/3/035	1.4-2.0 m TP3/3/035	
		TP3/3/038	2.0-2.3 m in TP3/3/038	
		TP3/3/039	2.2 m in TP3/3/039	
		TP3/3/040	1.3-2.0 m in TP3/3/040	
		TP3/3/041	0.4-0.8 m in TP3/3/041	
		TP3/3/042	1.45-1.55 in TP3/3/042	
		TP3/3/043	0.2-0.7 m in TP3/3/043	
		TP3/3/045	1.75-2.5 m in TP3/3/045	
		TP3/3/046	2.0-2.2 m in TP3/3/046	
Drift Deposits – Estuarine Alluvium	Grey sandy silt.	TP3/3/037	2.0-2.1 m in TP3/3/037	No point sources identified.
		TP3/3/044	2.1-2.2 m in TP3/3/044	
		TP3/3/103	1.9-2.0 m in TP3/3/103	
		TP3/3/104	2.2-2.5 m in TP3/3/104	
		TP3/3/106	2.2-2.5 m in TP3/3/106	
Solid Strata	Buff/ yellow brown Sandstone.	TP3/3/034	1.45 in TP3/3/034	No point sources identified.
		TP3/3/036	2.0 m in TP3/3/036	
		TP3/3/040	2.0 m in TP3/3/040	
		TP3/3/041	0.8 m in TP3/3/041	
		TP3/3/042	1.55 m in TP3/3/042	
		TP3/3/043	0.7 m in TP3/3/043	
		TP3/3/044	2.2 m in TP3/3/044	
		TP3/3/045	2.5 m in TP3/3/045	
		TP3/3/046	2.2 m in TP3/3/046	
		TP3/3/047	2.0 m in TP3/3/047	
		BH3/3/004	2.2 m in BH3/3/004	
		BH3/3/005	3.0 m in BH3/3/005	

*: General comment on radioactivity observation for each stratum as a whole.

4.4 IA 4: Slipways and Jetty Development

No specific intrusive work was proposed to investigate the slipways and jetty development. Surface walkover data, arising from the IA 4/1 action is illustrated on Figure 6. Research into the construction methods, arising from action IA 4/2, used in the Slipway/Jetty construction is reported in the AMEC Phase 1 CSM Coastal Engineering Report.

4.5 IA 5: Ross Plantation Quarry

IA 5/1 (surface walkover monitoring survey) is reported in Section 3.10 above.

Investigation action 5/2 comprised excavation of trial pits TP5/2/048 to TP5/2/052 to better evaluate depth and extent of the infilled Ross Plantation Quarry.

Soils encountered during Investigation Action 5/2 are summarised as follows:

Table 4.9 IA 5/2: Ross Plantation Quarry

Strata	Typical Description	Location	Typical Depth Encountered	Radioactivity*
Topsoil	Brown topsoil with roots.	TP5/2/048	GL-0.15 m in TP5/2/048	No point sources identified.
		TP5/2/049	GL-0.1 m in TP5/2/049	
		TP5/2/052	GL-0.4 m in TP5/2/052	
Made Ground	Brown gravelly sand/ gravelly clay, with brick and concrete.	TP5/2/048	0.15-1.0 m in TP5/2/048	No point sources identified.
		TP5/2/050	0.0-1.2 m in TP5/2/050	
		TP5/2/051	0.2-1.0 m in TP5/2/051	
Drift Deposits	Yellow brown fine to coarse sand and gravel.	TP5/2/049	0.7-1.2 m in TP5/2/049	No point sources identified.
		TP5/2/051	0.2-1.0 m in TP5/2/051	
		TP5/2/052	0.4-1.0 m in TP5/2/052	

*: General comment on radioactivity observation for each stratum as a whole.

4.6 IA 6: Ross Plantation Foreshore

IA 6/1 (surface walkover monitoring survey) is included and reported in the scope of the AMEC monthly Monitoring Surveys.

Investigation action 6/2 comprised excavation of trial pits TP6/2/053 to TP6/2/065 and borehole BH6/2/006 to provide greater definition of ashy material identified in previous Enviros exploratory holes on the Ross Plantation Foreshore.

Soils encountered during Investigation Action 6/2 are summarised as follows:

Table 4.10 IA 6/2: Ross Plantation Foreshore

Strata	Typical Description	Location	Typical Depth Encountered	Radioactivity*
Topsoil	Light grey/brown silty sandy topsoil and a little gravel.	TP6/2/053	GL-0.1 m in TP6/2/053	Point sources identified up to 600 cps.
		TP6/2/056	GL-0.3 m in TP6/2/056	
		TP6/2/057	GL-0.1 m in TP6/2/057	
		TP6/2/058	GL-0.3 m in TP6/2/058	
		TP6/2/059	GL-0.15 m in TP6/2/059	
		TP6/2/065	GL-0.3 m in TP6/2/065	
Ash Made Ground (Ash & Sand bands)	Grey ash and fine clinker gravel interbedded with sand. Much anthropogenic material comprising pottery fragments, metal fragments, cement bonded asbestos containing materials (ACM), glass.	TP6/2/053	0.05-0.5 m in TP6/2/053	Multiple point sources identified up to 8 080 cps.
		TP6/2/054	0.15-0.45 in TP6/2/054	
		TP6/2/055B	0.25-0.45 m in TP6/2/055B	
		TP6/2/056B	0.2-0.35 m in TP6/2/056B	
		TP6/2/057	0.1-0.4 m in TP6/2/057	
		TP6/2/059	0.15-0.4 m in TP6/2/059	
		TP6/2/060	GL-0.95 m in TP6/2/060	
		TP6/2/061	GL-0.35 m in TP6/2/061	
		TP6/2/063	GL-1.1 m in TP6/2/063	
		TP6/2/064	0.2-1.05 m in TP6/2/064	
		TP6/2/065	0.1-0.4 m in TP6/2/065	
Ash Made Ground	Grey sandy ash and clinker gravel. Much anthropogenic material comprising pottery fragments, metal fragments, cement bonded asbestos containing materials (ACM), glass and brick fragments.	BH6/2/006	0.3-1.6 m in BH6/2/006	Multiple point sources identified to 1 080 cps.
		TP6/2/060	0.95-1.5 m in TP6/2/060	
		TP6/2/061	0.35-0.60 m in TP6/2/061	
		TP6/2/062	0.4-0.6 m in TP6/2/062	
		TP6/2/065	0.4-0.8 m in TP6/2/065	
Drift Deposits (Estuarine Alluvium)	Grey silt/clay and a little gravel.	TP6/2/055A	0.55-0.60 m in TP6/2/055A	No point sources identified.
		TP6/2/055B	0.6-0.8 m in TP6/2/055B	
		TP6/2/057	0.4-1.1 m in TP6/2/057	
		TP6/2/064	1.05-1.5 m in TP6/2/064	
		TP6/2/065	0.9-1.0 m in TP6/2/065	

Table 4.10 (continued) IA 6/2: Ross Plantation Foreshore

Strata	Typical Description	Location	Typical Depth Encountered	Radioactivity*
Drift Deposits	Yellow brown fine to coarse clayey sand and gravel.	TP6/2/053	0.45-0.7 m in TP6/2/053	No point sources identified.
		TP6/2/054	0.45-0.65 m in TP6/2/054	
		TP6/2/055A	0.50-0.55 m in TP6/2/055A	
		TP6/2/055B	0.45-0.60 m in TP6/2/055B	
		TP6/2/056	0.3-0.6 m in TP6/2/056	
		TP6/2/056B	0.35-0.7 m in TP6/2/056B	
		TP6/2/057	0.4-1.1 m in TP6/2/057	
		TP6/2/058	0.3-1.3 m in TP6/2/058	
		TP6/2/059	0.4-1.8 m in TP 6/2/059	
		TP6/2/061	0.6-1.45 m in TP6/2/061	
		TP6/2/065	0.8-0.9 m in TP6/2/065	
		BH6/2/006	1.6-2.5 m in BH6/2/006	
Solid Strata	Buff/yellow brown Sandstone.	BH6/2/006	2.5 m in BH6/2/006	No point sources identified.
		TP6/2/053	0.7 m in TP6/2/053	
		TP6/2/054	0.65 m in TP6/2/054	
		TP6/2/055A	0.6 m in TP6/2/055A	
		TP6/2/055B	0.8 m in TP6/2/055B	
		TP6/2/056	0.6 m in TP6/2/056	
		TP6/2/057	1.1 m in TP6/2/057	
		TP6/2/060	1.5 m in TP6/2/060	
		TP6/2/061	0.8 m in TP6/2/061	
		TP6/2/062	0.6min TP6/2/062	
		TP6/2/063	1.1 m in T6/2/063	

*: General comment on radioactivity observation for each stratum as a whole.

4.7 IA 7: Dalgety Bay Beach

Investigation Action 7/1 required more definition of the depth to bedrock within the filled region. This was covered within the exploratory holes scoped for IA7/2, reported below.

Exploratory holes TP7/2/066 to TP7/2/086 (supplemented by additional pits TP7/2/097 to TP7/2/102) targeted the Dalgety Bay Beach; Investigation Action 7/2 comprised excavation of trial pits to investigate the composition of the beach material and depth profile, and confirm the depth to bedrock in the filled region.

Soils encountered during Investigation Action 7/2 are summarised as follows:

Table 4.11 IA 7/2: Dalgety Bay Beach

Strata	Typical Description	Location	Typical Depth Encountered	Radioactivity*
Sand/Sandy Gravel (Shallow Beach Deposits)	Grey coarse sand and fine to coarse gravel with clinker fragments and anthropogenic materials comprising pottery fragments, metal fragments, cement bonded asbestos containing materials (ACM), glass.	TP7/2/066	GL-0.1 m in TP7/2/066	Multiple point sources identified to 3 900 cps.
		TP7/2/067	GL-0.1 m in TP7/2/067	
		TP7/2/068	GL-0.3 m in TP7/2/068	
		TP7/2/070	GL-0.1 m in TP7/2/070	
		TP7/2/074	GL-0.2 m in TP7/2/074	
		TP7/2/075	GL-0.2 m in TP7/2/075	
		TP7/2/076	GL-0.15 m in TP2/2/076	
		TP7/2/077	GL-0.20 m in TP7/2/077	
		TP7/2/078	GL-0.45 m in TP7/2/078	
		TP7/2/079	GL-0.3 m in TP7/2/079	
		TP7/2/080	GL-0.4 m in TP7/2/080	
		TP7/2/081	GL-0.60 m in TP7/2/081	
		TP7/2/082	GL-0.3 m in TP7/2/082	
		TP7/2/083	GL-0.35 m in TP7/2/083	
		TP7/2/084	GL-0.2 m in TP7/2/084	
		TP7/2/085	GL-0.4 m in TP7/2/085	
		TP7/2/097	GL-0.1 m at TP7/2/097	
		TP7/2/098	GL-0.02 at TP7/2/098	
		TP7/2/102	GL-0.4 m in TP7/2/102	
Ash Made Ground (Ash and Sand bands)	Grey ash and fine clinker gravel interbedded with sand. Much anthropogenic material comprising pottery fragments, metal fragments, cement bonded asbestos containing materials (ACM), glass.	TP7/2/066	0.1-0.2 m in TP7/2/066	Multiple point sources identified to 2 300 cps.
		TP7/2/068	0.3-0.4 m in TP7/2/068	
		TP7/2/070	0.1-0.25 m at TP7/2/070	
		TP7/2/072	GL-0.6 m in TP7/2/072	
		TP7/2/074	0.2-0.8 m in TP7/2/074	
		TP7/2/082	0.35-1.1 m in TP7/2/082	
		TP7/2/097	0.1-0.34 m in TP7/2/097	
		TP7/2/100	GL-0.65 m in TP7/2/100	
		TP7/2/101	GL-0.6 m at TP7/2/101	
		TP7/2/102	0.2-0.27 m in TP7/2/102	

Table 4.11 (continued) IA 7/2: Dalgety Bay Beach

Strata	Typical Description	Location	Typical Depth Encountered	Radioactivity*
Ash Made Ground	Grey sandy ash and clinker gravel. Much anthropogenic material comprising pottery fragments, metal fragments, cement bonded asbestos containing materials (ACM), glass and brick fragments.	TP7/2/074	0.8-1.1 m in TP7/2/074	Multiple point sources identified to 30 000 cps.
		TP7/2/075	0.2-0.8 m in TP7/2/075	
		TP7/2/076	0.15-0.9 m in TP7/2/076	
		TP7/2/079	0.3-0.55 m in TP7/2/079	
		TP7/2/080	0.4-0.70 m in TP7/2/080	
		TP7/2/082	1.1-1.3 m in TP7/2/082	
		TP7/2/084	0.2-0.75 m in TP7/2/084	
		TP7/2/085	0.4-0.9 m in TP7/2/085	
		TP7/2/086	GL-0.7 m in TP7/2/086	
		TP7/2/099	GL-0.8 m in TP7/2/099	
		TP7/2/100	0.65-1.3 m in TP7/2/100	
Drift Deposits (Estuarine Alluvium)	Grey silt/clay and a little gravel.	TP7/2/066	0.2-1.0 m in TP7/2/066	No point sources identified.
		TP7/2/069	GL-1.0 m in TP7/2/069	
		TP7/2/070	0.35-0.60 m in TP7/2/070	
		TP7/2/071	GL-0.8 min TP7/2/071	
		TP7/2/075	0.8-1.0 m in TP7/2/075	
		TP7/2/076	0.9-1.6m in TP7/2/076	
		TP7/2/077	0.2-1.05 m in TP7/2/077	
		TP7/2/078	0.45-1.15 m in TP7/2/078	
		TP7/2/079	0.55-1.7 m in TP7/2/079	
		TP7/2/080	0.9-1.0 m in TP7/2/080	
		TP7/2/085	0.9-1.3 m in TP7/2/085	
		TP7/2/086	0.8-0.95 m in TP7/2/086	
		TP7/2/102	0.27-0.95 m in TP7/2/102	
Drift Deposits (Beach deposits with cobbles and boulders)	Sandy silt and cobbles and boulders of subangular to subrounded sandstone.	TP7/2/081	0.60-1.2 m in TP7/2/081	No point sources identified.
		TP7/2/098	0.02- 0.4 m in TP7/2/098	
		TP7/2/100	1.3-1.5 m in TP7/2/100	

Table 4.11 (continued) IA 7/2: Dalgety Bay Beach

Strata	Typical Description	Location	Typical Depth Encountered	Radioactivity*
Drift Deposits	Yellow brown fine to coarse clayey sand and gravel.	TP7/2/067	0.15-1.85 in TP7/2/067	No point sources identified.
		TP7/2/068	0.4-0.90 m in TP7/2/068	
		TP7/2/070	0.25-0.35 m in TP7/2/070	
		TP7/2/083	0.35-0.8 m in TP7/2/083	
		TP7/2/097	0.34-0.7m in TP7/2/097	
Solid Strata	Buff/ yellow brown Sandstone.	TP7/2/070	0.60 m in TP7/2/070	No point sources identified.
		TP7/2/072	0.6 m in TP7/2/072	
		TP7/2/074	1.1 m in TP7/2/074	
		TP7/2/076	1.6 m in TP7/2/076	
		TP7/2/078	1.15 m in TP7/2/078	
		TP7/2/079	1.7 m in TP7/2/079	
		TP7/2/080	1.0 m in TP7/2/080	
		TP7/2/081	1.2 m in TP7/2/081	
		TP7/2/082	1.3 m in TP7/2/082	
		TP7/2/083	0.8 m in TP7/2/083	
		TP7/2/085	1.3 m in TP7/2/085	
		TP7/2/097	0.7 m in TP7/2/097	
		TP7/2/099	0.8 m in TP7/2/099	
		TP7/2/100	1.5 m in TP7/2/100	
		TP7/2/101	0.6 m in TP7/2/101	
		TP7/2/102	0.95 m in TP7/2/102	

*: General comment on radioactivity observation for each stratum as a whole.

Investigation Actions 7/3, 7/4 and 7/5 comprised actions that are more logically reported in the Phase 1 CSM Coastal Engineering report.

4.8 IA 8: New Harbour

New Harbour is located beyond the identified study area boundary.

Exploratory holes TP8/1/087 (supplemented by additional pit TP8/1/105) targeted New Harbour, and Investigation Action 8/1 comprised excavation of pits to investigate composition of beach material and depth profile.

Soils encountered during Investigation Action 8/1 are summarised as follows:

Table 4.12 IA 8/1: New Harbour

Strata	Description	Location	Typical Depth Encountered	Radioactivity*
Beach Deposits	Buff coarse sand with gravel, cobbles and boulders.	TP8/1/087 TP8/1/105	GL-0.15 GL-0.6 m	Possible multiple dispersed point sources, maximum count rate 750 cps in excavation. No discrete point sources identified.

*: General comment on radioactivity observation for each stratum as a whole.

4.9 Samples and Point Sources

A summary of point sources and samples displaying elevated radioactivity are included as Annex E.

A selection of samples was proposed for confirmatory gamma spectroscopy analysis for the presence of Radium-226. The results of the analysis are not available to date.

4.10 Groundwater

Results of the groundwater monitoring are included in Table 4.13.

Table 4.13 Results of Groundwater Level Monitoring on 22 Nov 2012

Borehole	Easting	Northing	Time	Elevation (m AOD)	Depth to Base (m bgl)	Base Elevation (m AOD)	Depth to Water (m bgl)	Groundwater Level (m AOD)
BH2/3/001	316452.032	683055.938	0945	5.49	5.94	-0.45	4.21	1.28
BH2/3/002A	316472.554	683058.590	0930	5.17	6.88	-1.71	3.93	1.24
BH2/3/003	316457.171	683067.954	1000	5.30	5.83	-0.53	4.00	1.30
BH3/3/004	316504.260	683165.700	1015	4.13	3.00	1.13	2.09	2.04
BH3/3/005	316436.207	683249.686	1030	3.79	2.95	0.84	1.90	1.89
BH6/2/006	316337.750	683309.760	1045	3.40	2.89	0.51	0.79	2.61

Note: On 22 November, High Tide at 0941 of 4.7 m, Low tide at 1533 of 2.2 m.
Groundwater at the site is tidally influenced. See Annex F.

In addition groundwater levels were logged using Solinst groundwater level loggers from 23 January to 31 January 2013 to characterise variations in groundwater levels due to tidal influence. The results are presented graphically in Annex F, and indicate that groundwater levels in boreholes show tidal variation.

Groundwater samples obtained from the boreholes on 22 November were monitored using the Ludlum ratemeter and 2" x 2" Sodium Iodide detector. Groundwater samples displayed background count rates of 65cps as summarised below.

Table 4.14 Groundwater Sample Count Rates

Reference	Count Rate (cps)
BH2/3/001	65
BH2/3/002A	65
BH2/3/003	65
BH3/3/004	65
BH3/3/005	65
BH6/2/006	65

4.11 Surface Water

Surface water samples SW01 to SW04 were also monitored using the Ludlum ratemeter and 2" x 2" Sodium Iodide detector. Surface water samples displayed background count rates of 65cps as summarised below.

Table 4.15 Surface Water Sample Count Rates

Reference	Count Rate (cps)
SW01	65
SW02	65
SW03	65
SW04	65

Figures

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Dalgety Bay Stage 2 Site Investigation
Factual Report

Figure 1
Site Location

January 2013
23218-Shr189.ai barkr

amec

316000

316500

683500

683000

N

Coastal Path to Crow Hill & St Bride's Kirk

Sealstrand

Moray Way South

20/22

24

Sand and mud

Coastal Path

Un-named Burn

Sand and Mud

Area of Marsh / Bog

Sewage Outfall Pipe

Ross Plantation

Coastal Path

Dalgety Bay Beach

The Spinneys

Ross Plantation

Sand and mud

The Wynd

Sand, mud & rock outcrops

Dalgety Bay Sailing Club Boat Park

Slipway

The Wynd

The Knowe

The Beeches

Dalgety Bay Sailing Club Clubhouse

Jetty

Headland

Firth of Forth

Rocky Beach

New Harbour

Donibristle Gardens

Hopeward Mews

Key:

- Study Site Boundary
- Fife Coastal Path
- Footpath
- Low Water Mark
- High Water Mark

NB: This Figure Should be read in conjunction with the AMEC Phase One CSM Report, reference S23218rr295

0 50 100 150 Metres

Scale: 1:3,000 @ A3

\MOD Projects\23218 Dalgety Bay\Drawings\GIS Drawings\23218-Shr190

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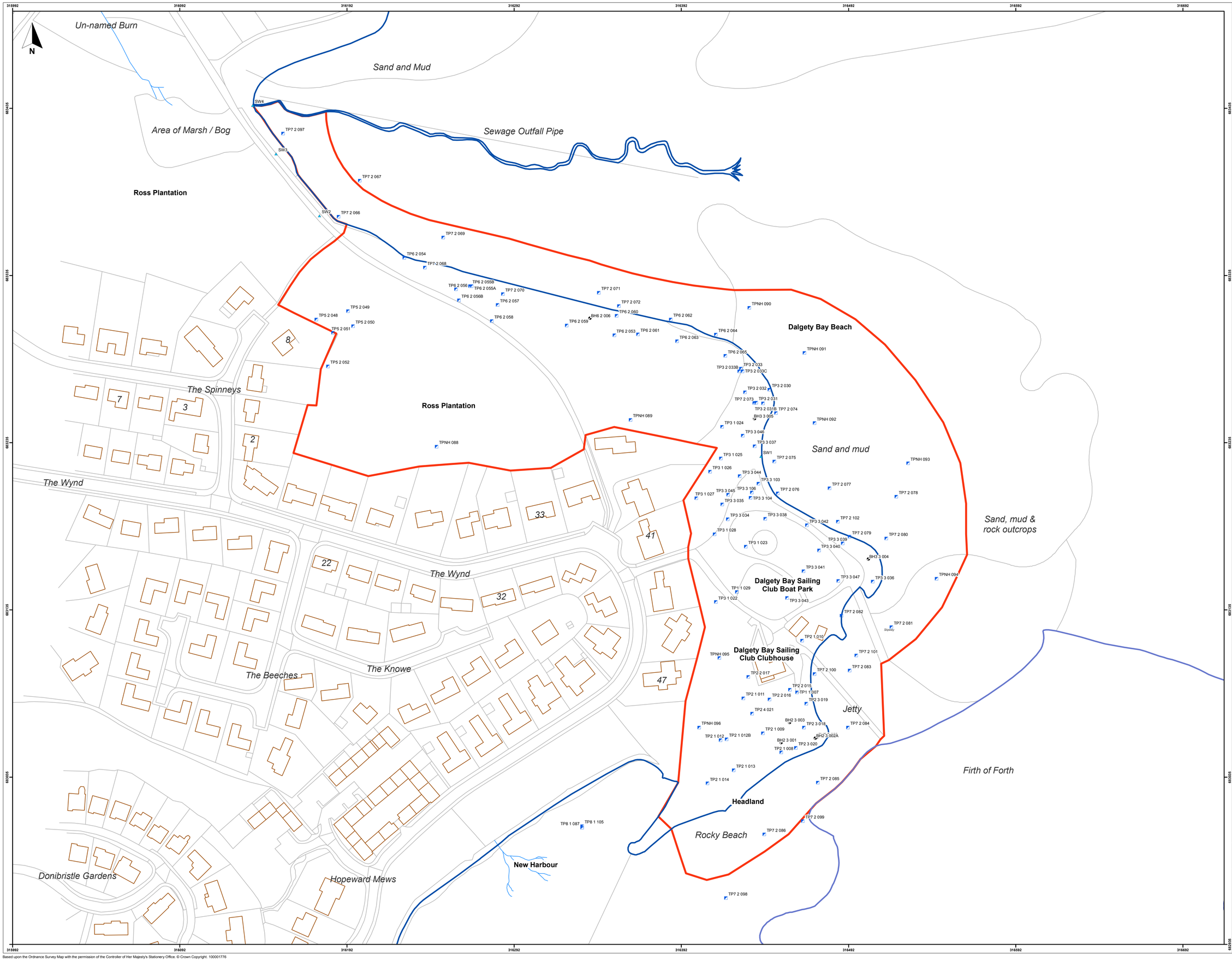
Dalgety Bay Stage 2 Site Investigation Factual Report

Figure 2
Site Layout Plan

January 2013
23218-Shr190 barkr

amec



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315992 316092 316192 316292 316392 316492 316592 316692

683435 683335 683235 683135 683035 682935

N

Un-named Burn

Sand and Mud

Area of Marsh / Bog

Sewage Outfall Pipe

Ross Plantation

The Spinneys

The Wynd

The Beeches

The Knowe

Donibristle Gardens

Hopeward Mews

Dalgety Bay Beach

Ross Plantation

Sand and mud

Dalgety Bay Sailing Club Boat Park

Dalgety Bay Sailing Club Clubhouse

Jetty

Firth of Forth

Headland

Rocky Beach

New Harbour

3 7 8 22 32 33 41 47

SW1 SW2 SW3 SW4

TP7 2 097 TP7 2 066 TP7 2 067 TP7 2 068 TP7 2 069 TP7 2 070 TP7 2 071 TP7 2 072 TP7 2 073 TP7 2 074 TP7 2 075 TP7 2 076 TP7 2 077 TP7 2 078 TP7 2 079 TP7 2 080 TP7 2 081 TP7 2 082 TP7 2 083 TP7 2 084 TP7 2 085 TP7 2 086 TP7 2 098 TP7 2 099 TP7 2 100 TP7 2 101 TP7 2 102

TP6 2 054 TP6 2 055A TP6 2 055B TP6 2 056 TP6 2 056B TP6 2 057 TP6 2 058 TP6 2 059 TP6 2 060 TP6 2 061 TP6 2 062 TP6 2 063 TP6 2 064 TP6 2 065

TP5 2 048 TP5 2 049 TP5 2 050 TP5 2 051 TP5 2 052

BH6 2 006

TP3 2 033 TP3 2 033B TP3 2 033C TP3 2 022 TP3 2 030 TP3 2 031 TP3 2 031B BH3 3 005 TP3 3 046 TP3 3 037 TP3 1 024 TP3 1 025 TP3 1 026 TP3 3 044 TP3 3 103 TP3 3 106 TP3 3 104 TP3 1 027 TP3 3 045 TP3 3 035 TP3 3 034 TP3 3 038 TP3 3 042 TP3 1 028 TP3 1 023 TP3 3 039 TP3 3 040 BH3 3 004 TP3 3 041 TP3 3 047 TP3 3 036 TP3 1 022 TP3 3 043

TP1 1 029 TP2 1 010 TP2 2 017 TP2 2 015 TP1 1 007 TP2 1 011 TP2 2 016 TP2 3 019 TP2 4 021 BH2 3 003 TP2 3 018 TP2 1 009 TP2 1 012 TP2 1 012B BH2 3 002A BH2 3 001 TP2 3 020 TP2 1 008 TP2 1 013 TP2 1 014 TP2 1 087 TP8 1 105

TPNH 088 TPNH 089 TPNH 090 TPNH 091 TPNH 092 TPNH 093 TPNH 094 TPNH 095 TPNH 096

TP6/2/055B
Sample Ref	Count Rate
0.2m	180
0.3m	1300

TP6/2/055A
Sample Ref	Count Rate
0.3m	240

TP7/2/097
Sample Ref	Count Rate
0.3m	350

TP6/2/066
Sample Ref	Count Rate
0.2m	650

TP7/2/068
Sample Ref	Count Rate
0.3m	280

TP6/2/057
Sample Ref	Count Rate
0.35m	250

TP6/2/059
Sample Ref	Count Rate
0.1m	190
0.15-0.4m	345

TP6/2/053
Sample Ref	Count Rate
0.2m	500
0.4m	4800

TP6/2/061
Sample Ref	Count Rate
0.2m	800
0.5m at 5mSW	3400

TP6/2/063
Sample Ref	Count Rate
0.1m	250
Restored Surface	300

TP3/3/046
Sample Ref	Count Rate
1.0m	475
1.45m	1600
1.5m	1300

TP7/2/070
Sample Ref	Count Rate
0.25m	204

TP6/2/060
Sample Ref	Count Rate
0m	430
1.0m	1080

TP6/2/062
Sample Ref	Count Rate
0.08m	437
0.1-0.6m	180

TP6/2/064
Sample Ref	Count Rate
0.5m	2600
0.5-0.8m	1300

TP6/2/065
Sample Ref	Count Rate
0m 2mN	600
0.25m	8080

TP3/1/025
Sample Ref	Count Rate
1.55-1.95m	2100

TP3/1/026
Sample Ref	Count Rate
1.1-1.25m	340

TP3/3/044
Sample Ref	Count Rate
1.55-2.0m	1510

TP7/2/106
Sample Ref	Count Rate
1.8m	8730
1.4-2.2m	500

TP3/2/033
Sample Ref	Count Rate
0.4m	250
0.65m	170
1.05m	840

TP3/2/033B
Sample Ref	Count Rate
0.1m	800

TP3/2/033C
Sample Ref	Count Rate
0.35m	570

TP/2/073
Sample Ref	Count Rate
0.08m	1400
0.7m	622
1.5m	660
0.08m 2mN	450

TP3/2/030
Sample Ref	Count Rate
0.6m	1100
0.45-0.6m	260

TP3/2/031B
Sample Ref	Count Rate
0.3-0.4m	350
0.6m	300
0.6-0.85m	1500
1.1m	2250
1.4m	1000
1.6m	50000

TP3/2/031
Sample Ref	Count Rate
0.7m	1300
0.75m	1900
0.85m	1300
1.2m	1600

TP7/2/074
Sample Ref	Count Rate
0.5m	990
0.75m	2300

TP3/3/037
Sample Ref	Count Rate
0.4m	400
1.8m	5000

TP3/3/103
Sample Ref	Count Rate
0.7m	3500
1.2m	550
1.4m	11000

TP3/3/104
Sample Ref	Count Rate
1.6-2.2m	550

TP7/2/076
Sample Ref	Count Rate
0.7m	14000
Surface	300

TP3/3/042
Sample Ref	Count Rate
0.8m A	200
1.1m	3100

TP7/2/102
Sample Ref	Count Rate
0.2m	1000

TP7/2/079
Sample Ref	Count Rate
0.4m B	900

TP3/3/039
Sample Ref	Count Rate
1.5m A	4100

TP7/2/080
Sample Ref	Count Rate
0.05	1067

TP3/3/047
Sample Ref	Count Rate
1.0m	1470

TP3/3/036
Sample Ref	Count Rate
1.9m A	170
1.9m B	660

TP7/2/082
Sample Ref	Count Rate
0.9m	2100
0.9m	300
1.1m	1800
0.1m N	1270

TP7/2/081
Sample Ref	Count Rate
0.2m	1000
0.3m	3900
0.5m	1000
0.6m	390

TP7/2/101
Sample Ref	Count Rate
0.0m	550
0.3m	560
GL 0.6m	210

TP7/2/083
Sample Ref	Count Rate
0.1m	1160
0.35m	700
0.35m B	1680

TP2/2/015
Sample Ref	Count Rate
2.0m	408
2.7m	5260

TP1/1/007
Sample Ref	Count Rate
0.5m A	1100
0.5m B	600
1.4m	1100

TP7/2/084
Sample Ref	Count Rate
0.05m	340
0.14m	410
0.2m	1440

TP2/3/020
Sample Ref	Count Rate
1.05m	300

TP7/2/085
Sample Ref	Count Rate
0.0m	550
0.7m	1020
0.7m	30000

TP7/2/086
Sample Ref	Count Rate
0.0m	3300
0.1m	730
0.7m	10000

TP2/1/009
Sample Ref	Count Rate
1.5m	1100

TP2/2/016
Sample Ref	Count Rate
0.25-0.35m	230
0.25m	300

TPNH/096
Sample Ref	Count Rate
0.2m	320

BH2/2/003
Sample Ref	Count Rate
0.5m	700
0.8m	700
1.0m	700
1.2m	800
1.5m	800
1.7m	750
1.9m	750
2.0m	600
3.2m	600
3.5m	400
0.4A	300
0.4B	200

TP2/2/015
Sample Ref	Count Rate
2.0m	408
2.7m	5260

TP/2/100
Sample Ref	Count Rate
GL	650
0.2m	350
0.95m B	320
1.2m	200
1.3m	250
GL 4m NW	600

Key:

- Study Site Boundary
- Trial pit
- Borehole
- Surface water sample
- Footpath
- Low Water Mark
- High Water Mark

Note:

Count rate recorded in counts per second using 2" NaI probe and Ludlum Rate Meter

0 m 50 m

Scale 1:1000 @ A1

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Defence Infrastructure Organisation

Dalgety Bay Stage 2 Site Investigation Factual Report

Figure 4
Results of Radioactivity Field Probe Measurements

January 2013
23218-Shr192 barkr

amec

316250

N

Sewage Outfall Pipe

Coastal Path

8

Ross Plantation

Nothing Specific

33

41

22

23218-S1297

23218-S1299

23218-S1293

23218-S1298

23218-S1296

23218-S1295

23218-S1294

23218-S1292

683250

683250

316250

Key

Radiological survey results (cps)

- <100 cps
- >100 - <150 cps
- >150 - <200 cps
- >200 - <250 cps
- >250 - <300 cps
- >300 - <500 cps
- >500 - <1000 cps
- >1000 - <2500 cps
- >2500 - <5000 cps
- >5000 cps

Manually recorded results (cps)

- <200cps
- >200 - <300 cps
- No Access

NB: Applied colour shading to the measured count rate, which is inclusive of background, is for the purpose of elevated count visibility only, and does not neccesarily indicate contamination.

Radiological readings are represented by a 0.5m radius circle to aid visual interpretation and are not indicative of the area covered by that reading.

0 5 10 20 30 Metres

Scale: 1:1000 @ A3

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Dalgety Bay Stage 2 Site Investigation Factual Report

Figure 5
Radiological Walkover Survey of Ross Plantation

January 2013
23218-S182 miffl

amec

316500

N

IRB

Sta

Shingle

Slipway

Dalgety Bay Sailing Club Clubhouse

Jetty

Headland

Firth of Forth

316500

Key

Radiological survey results (cps)

- <100 cps
- >100 - <150 cps
- >150 - <200 cps
- >200 - <250 cps
- >250 - <300 cps
- >300 - <500 cps
- >500 - <1000 cps
- >1000 - <2500 cps
- >2500 - <5000 cps
- >5000 cps

NB: Applied colour shading to the measured count rate, which is inclusive of background, is for the purpose of elevated count visibility only, and does not neccesarily indicate contamination.

Radiological readings are represented by a 0.5m radius circle to aid visual interpretation and are not indicative of the area covered by that reading.

0 2.5 5 10 15 Metres

Scale: 1:500 @ A3

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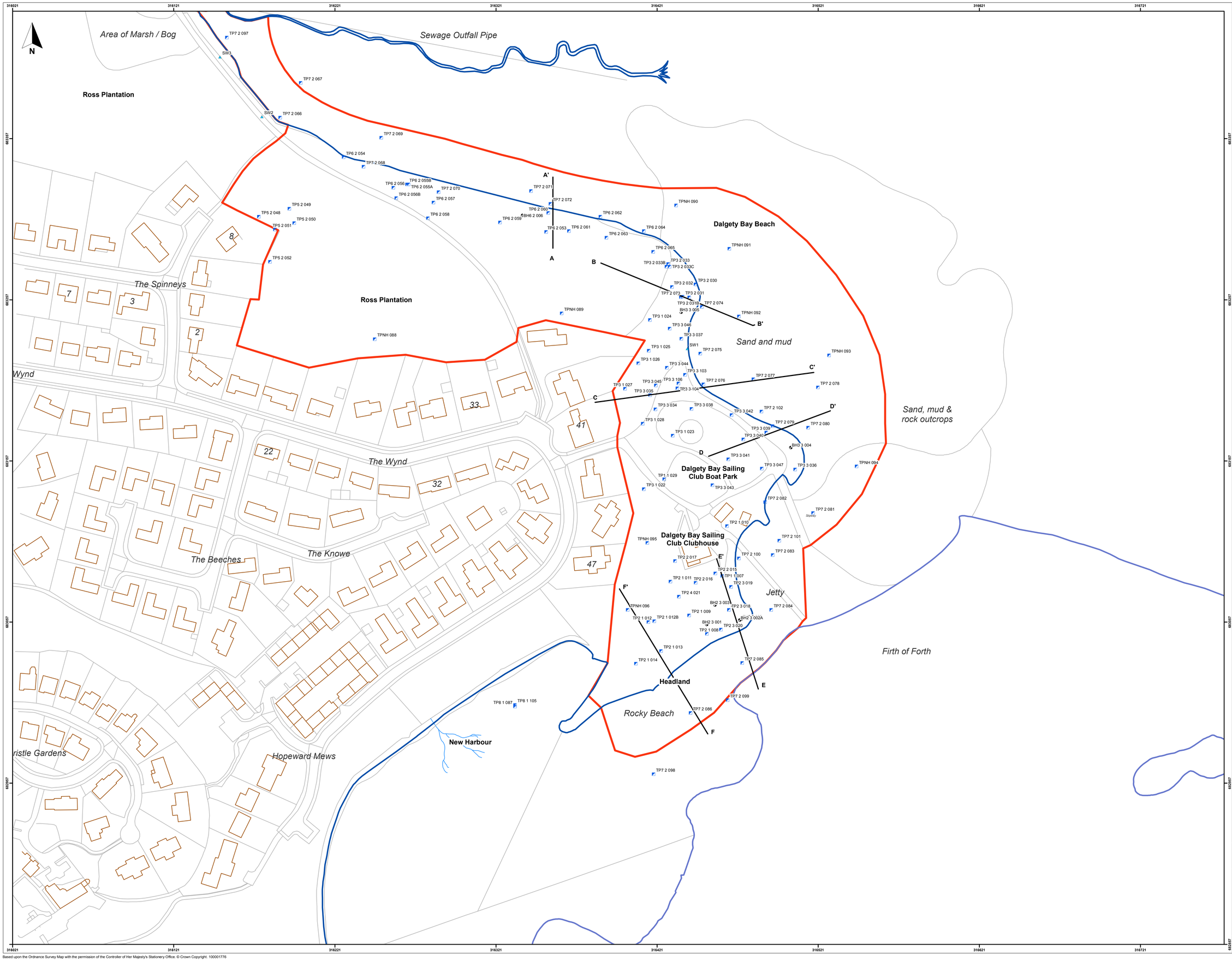
Dalgety Bay Stage 2 Site Investigation Factual Report

Figure 6
Radiological Walkover Survey of Slipways

December 2012
23218-S183 miffl

amec



Key:

- Study Site Boundary
- Trial pit
- Borehole
- Surface water sample
- Footpath
- Low Water Mark
- High Water Mark

0 50 Metres

Scale: 1:1,000 @ A1

\MOD Projects\23218 Dalgety Bay\Drawings\GIS Drawing \23218-Shr191

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Dalgety Bay Stage 2 Site Investigation Factual Report

Figure 7
Cross Section

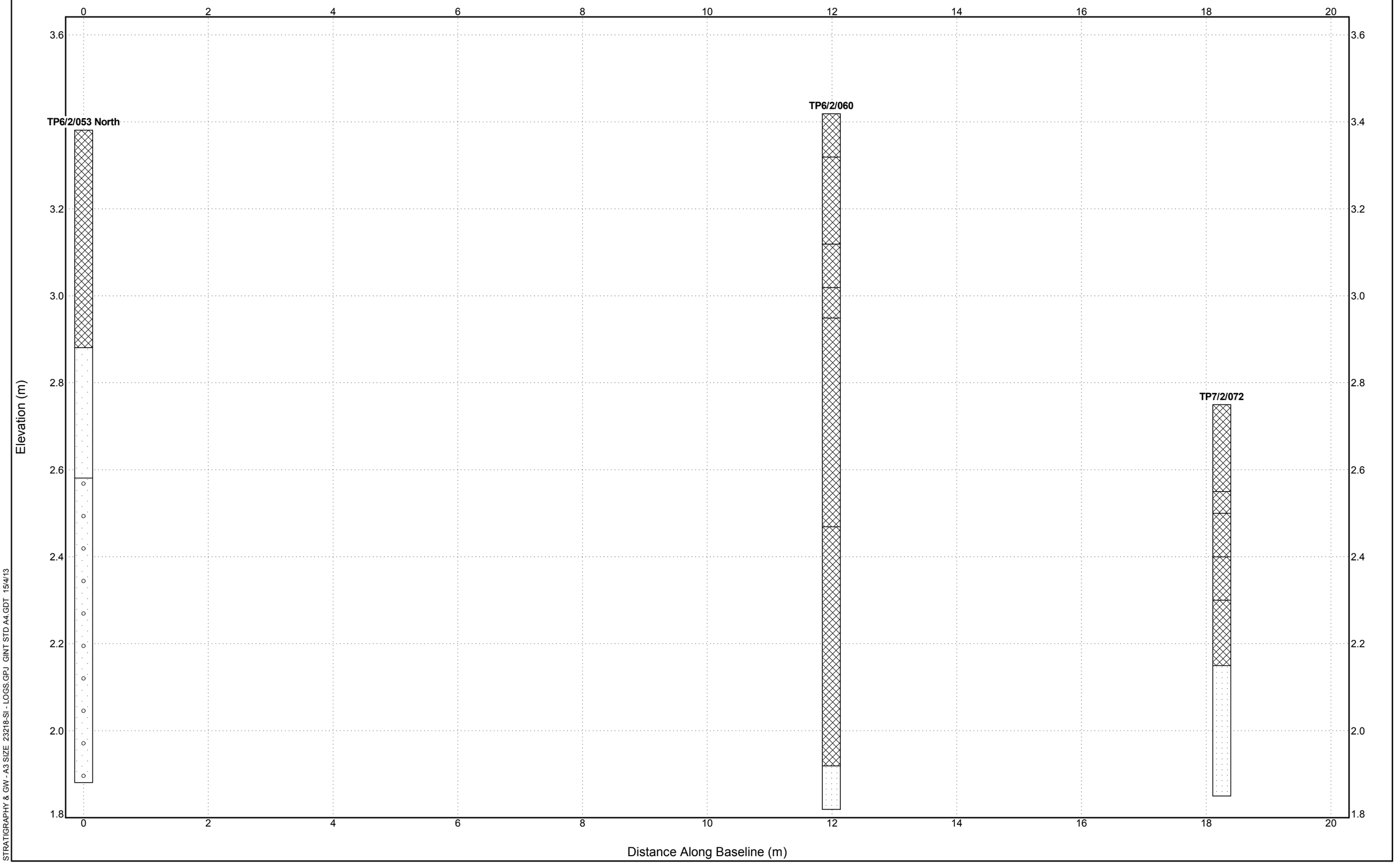
March 2013
23218-Shr216 barkr

amec

SUBSURFACE DIAGRAM
Figure 7A: Section A-A'

Fill (made ground)
BSI Sand
BSI Gravelly Sand
Sandstone

CLIENT Defence Infrastructure Organisation
PROJECT NAME Dalgety Bay
PROJECT NUMBER 23218
PROJECT LOCATION



STRATIGRAPHY & GW - A3 SIZE 23218-SI - LOGS.GPJ GINT STD A4.GDT 15/4/13

SUBSURFACE DIAGRAM
Figure 7B: Section B-B'

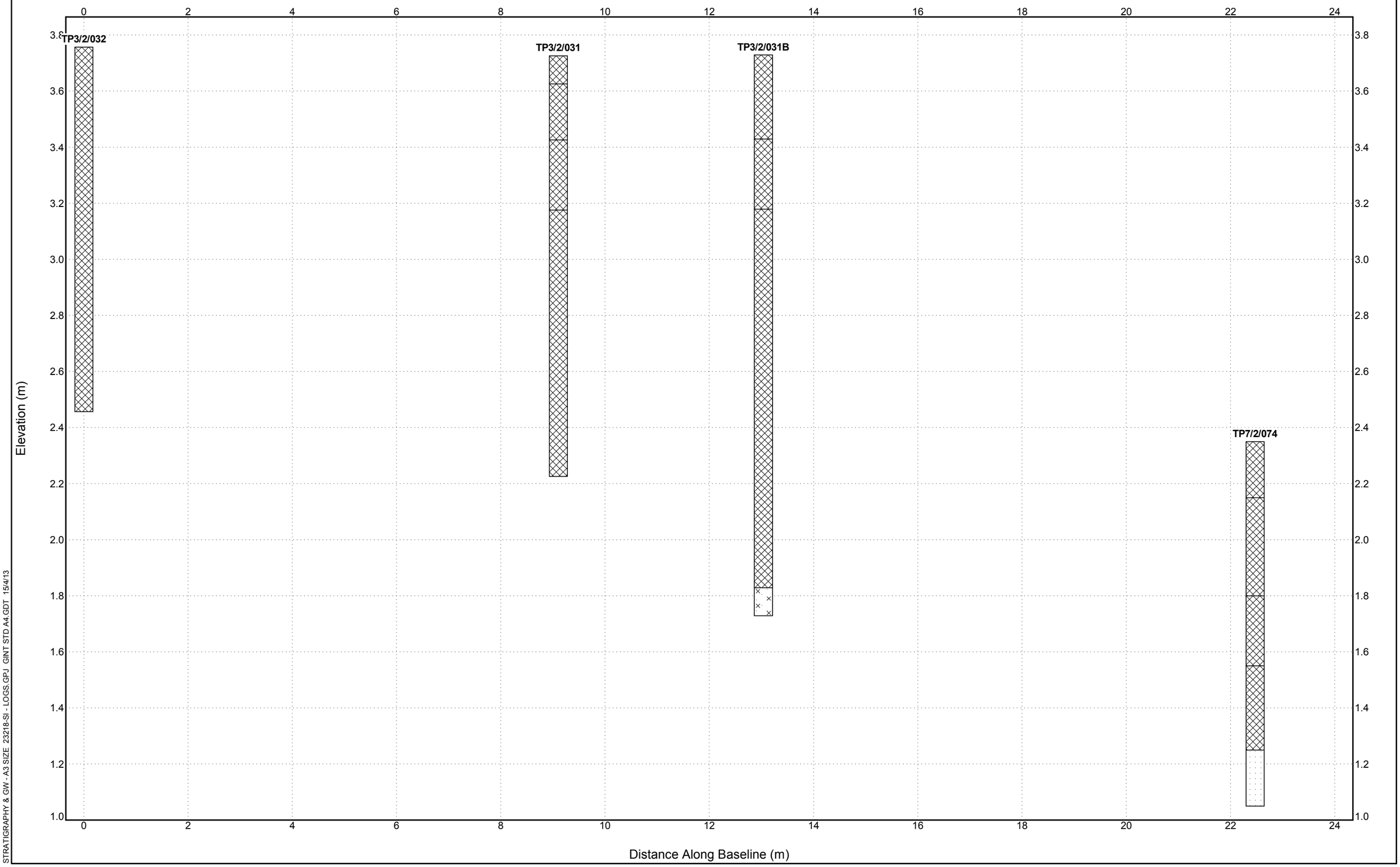
Fill (made ground) | BSI Silty Sand | Sandstone

CLIENT Defence Infrastructure Organisation

PROJECT NAME Dalgety Bay

PROJECT NUMBER 23218

PROJECT LOCATION

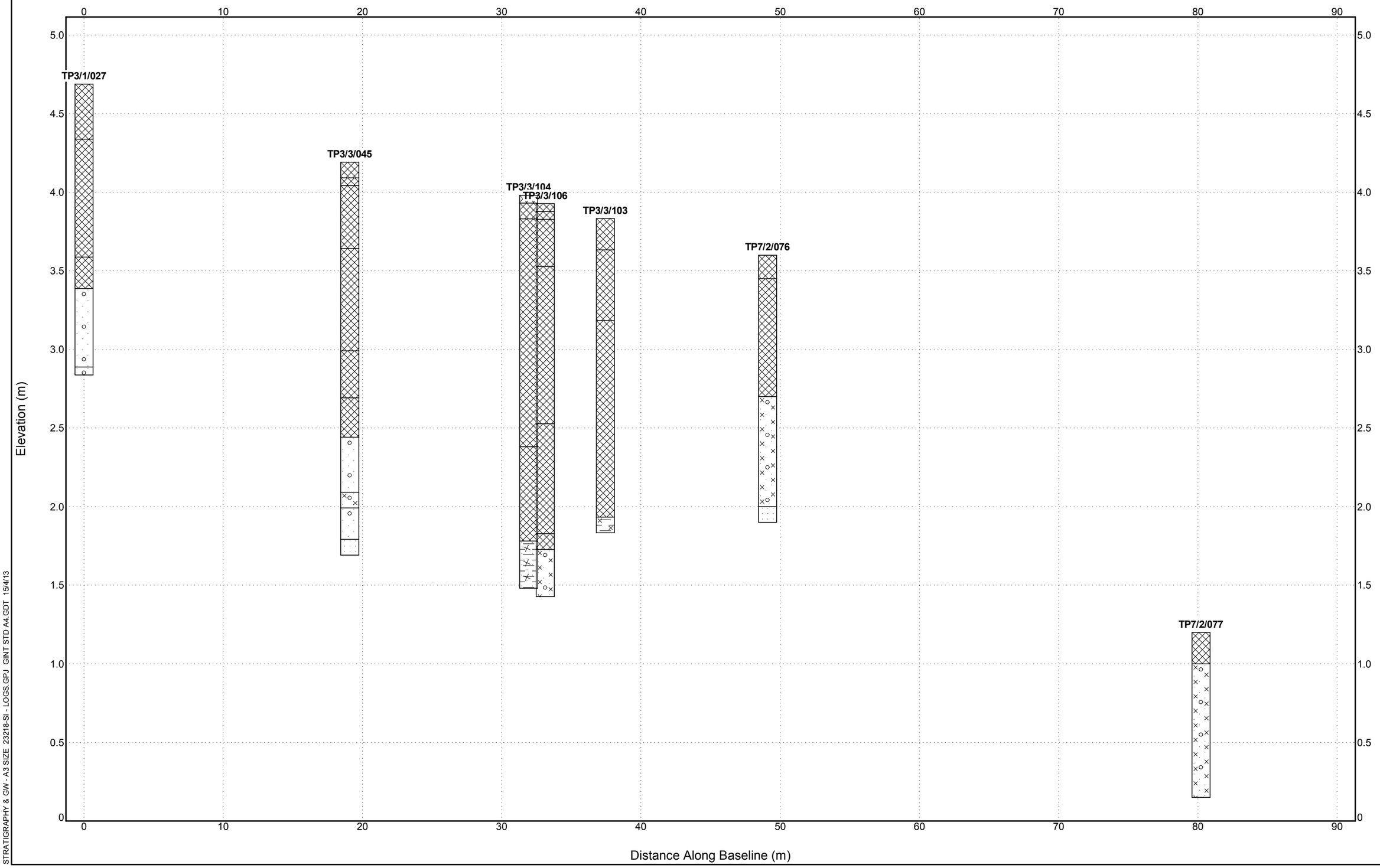


STRATIGRAPHY & GW - A3 SIZE 23218-SI - LOGS.GPJ GINT STD A4.GDT 15/4/13

SUBSURFACE DIAGRAM
Figure 7C: Section C-C'

Fill (made ground)
Sandstone
BSI Gravelly Sand
BSI Silty Clay
BSI Sandy gravelly silt
BSI Sandy silty CLAY

CLIENT Defence Infrastructure Organisation
PROJECT NUMBER 23218
PROJECT NAME Dalgety Bay
PROJECT LOCATION



STRATIGRAPHY & GW - A3 SIZE 23218-SI - LOGS.GPJ GINT STD A4.GDT 15/4/13

amec

SUBSURFACE DIAGRAM
Figure 7D: Section D-D'

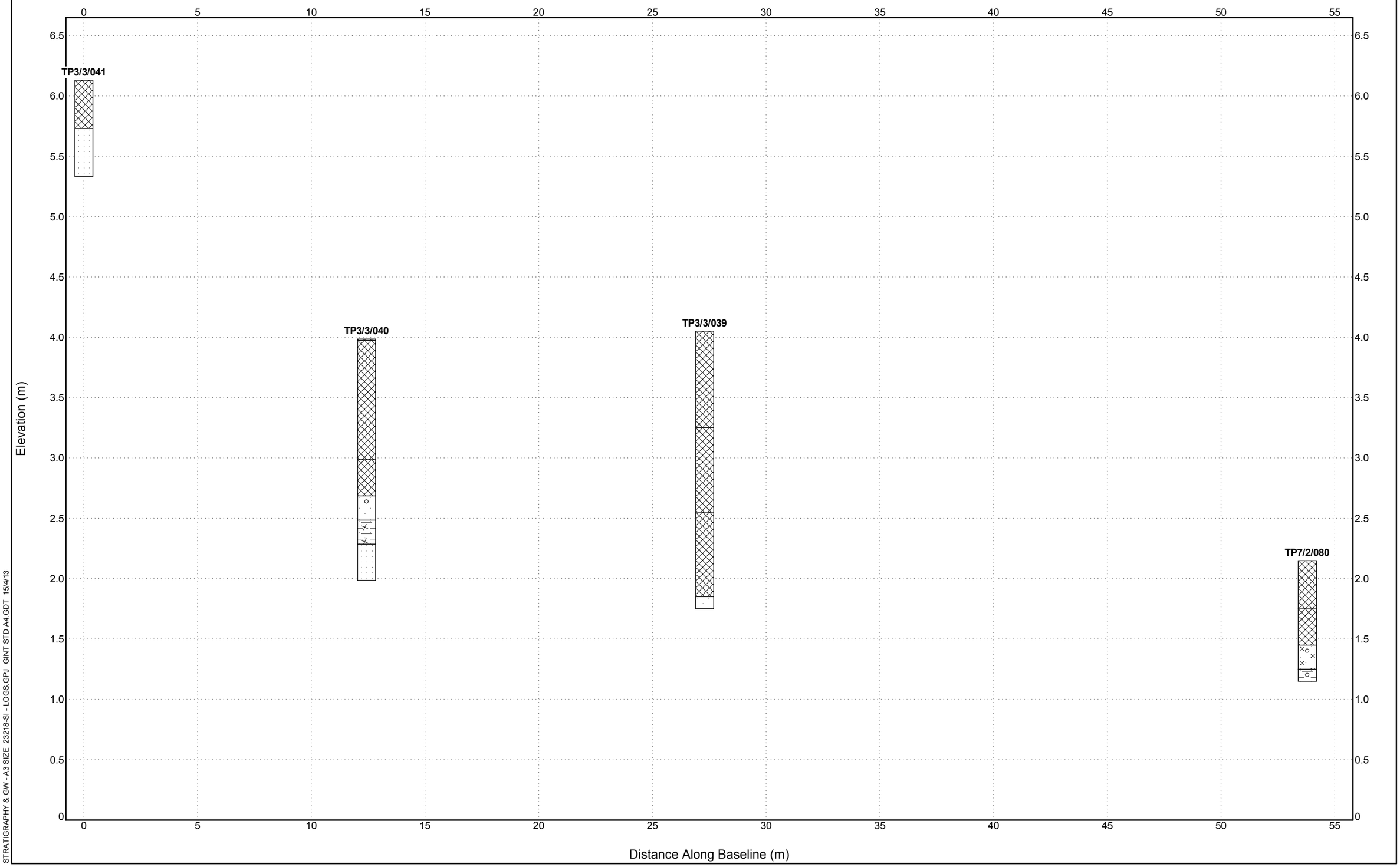
CLIENT Defence Infrastructure Organisation

PROJECT NUMBER 23218

PROJECT NAME Dalgety Bay

PROJECT LOCATION

Fill (made ground)
BSI Sandy silty CLAY
BSI Sandy gravelly clay
BSI Sand
Sandstone
BSI Gravelly Sand
BSI Sandy gravelly silt

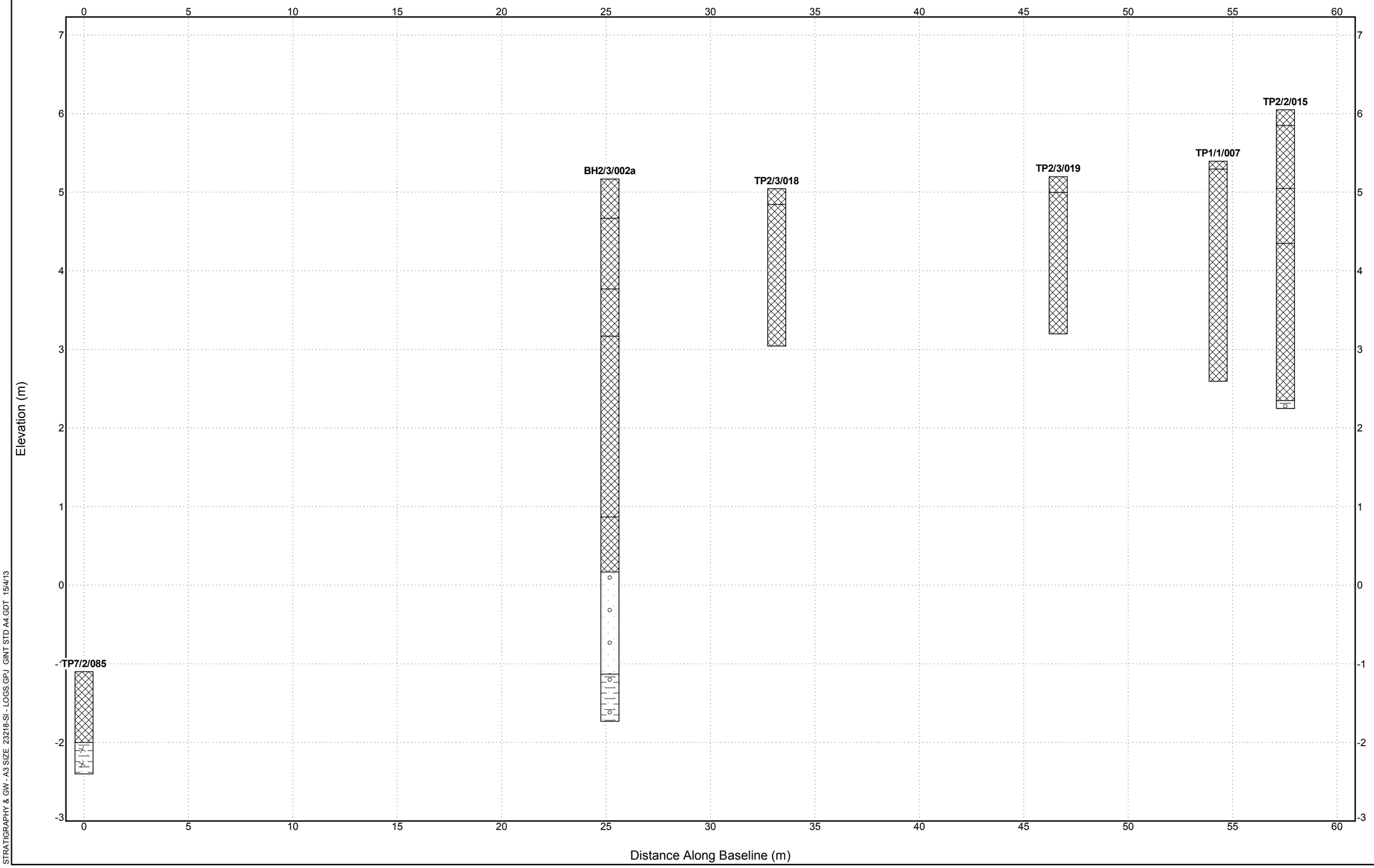


STRATIGRAPHY & GW - A3 SIZE 23218-SI - LOGS.GPJ GINT STD A4.GDT 15/4/13

SUBSURFACE DIAGRAM
Figure 7E: Section E-E'

Fill (made ground)
BSI Gravelly Sand
BSI Sandy gravelly clay
BSI Sandy silty CLAY

CLIENT Defence Infrastructure Organisation
PROJECT NAME Dalgety Bay
PROJECT NUMBER 23218
PROJECT LOCATION

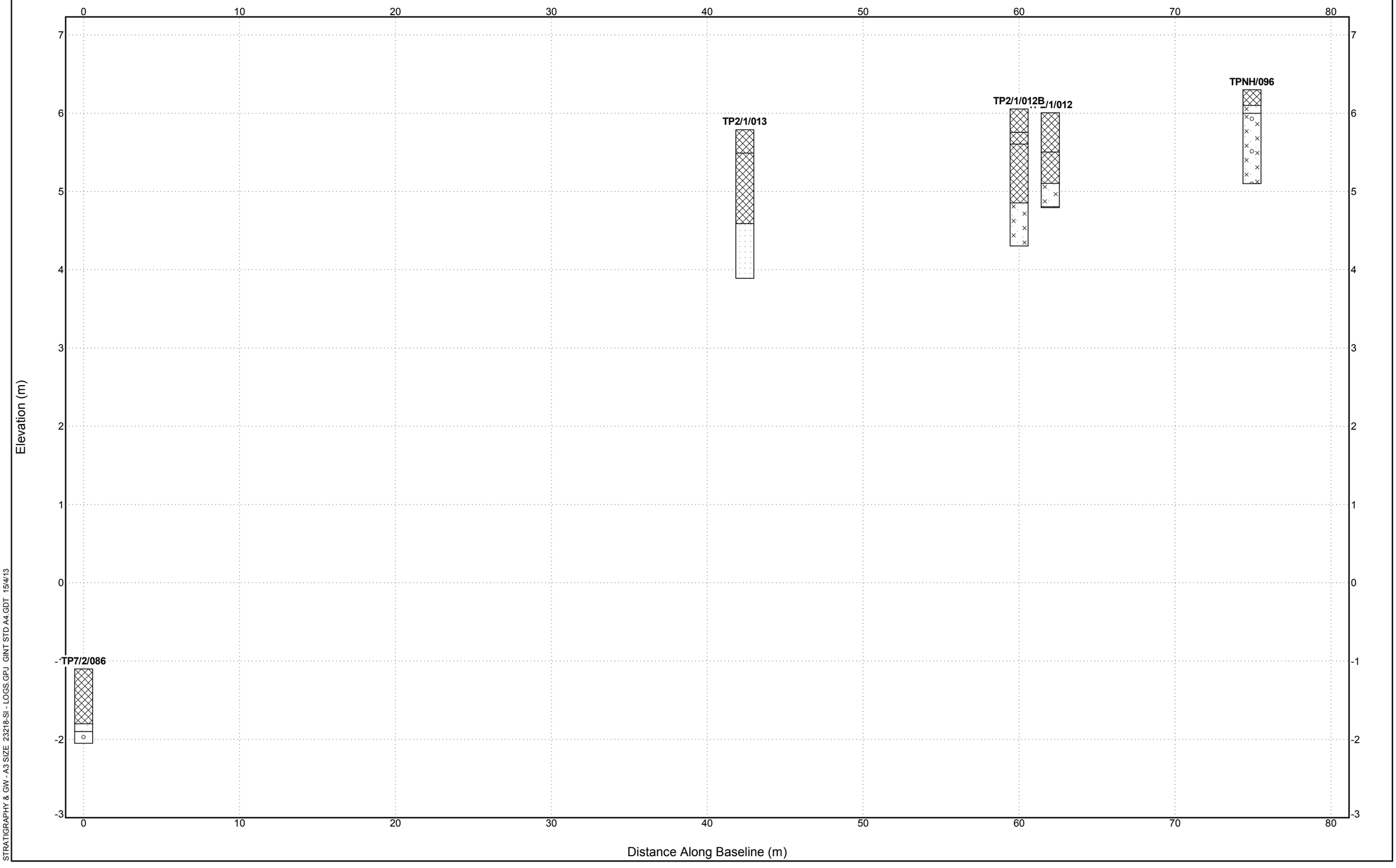


STRATIGRAPHY & GW - A3 SIZE 23218-SI - LOGS.GPJ GINT STD A4.GDT 15/4/13

SUBSURFACE DIAGRAM
Figure 7F: Section F-F'

Fill (made ground) | BSI Silty Sand | Sandstone
BSI Sand | BSI Gravel | BSI Sandy gravelly silt

CLIENT Defence Infrastructure Organisation
PROJECT NAME Dalgety Bay
PROJECT NUMBER 23218
PROJECT LOCATION



STRATIGRAPHY & GW - A3 SIZE 23218-SI - LOGS.GPJ GINT STD A4.GDT 15/4/13

Annex A
Proposed Scope

3 Pages

Proposed Scope of Works to Reduce Conceptual Site Model Uncertainty
Table A1

Ref.	Area/ Activity	Description	Conceptual Site Model Uncertainty	Associated Relevant Exposure Areas from Conceptual Exposure Model	Investigation Actions	Exploratory Location Reference (If Applicable)	Origin of Deposited Material	Volume, Depth, Spatial Extent and Magnitude of Material.	Presence and Extent of Radioactivity	Extent of Coastal Erosion (past actual/future likelihood)	Coastal/Tidal Processes	Natural Ground Profiles
1	East of New Harbour: Deposited Material	East of the New Harbour: Recorded/ Known Refuse Tip(s). Ash encountered during previous investigations. Radioactive material suspected.	Origin of deposited material; Presence and extent of radioactive material; Extent of erosion pre and post coastal protection measures.	1, 2	1/1: Excavation of Trial Pits to investigate location of historically deposited material.	TP1/1/007 to TP1/1/008	⊙	⊙	●	⊙	○	○
2	'Headland': Deposited Material, Sailing Club Development, Erosion or Disturbance of Material	Raised and levelled area to the south of the current Sailing Club clubhouse. Radioactive material identified.	Origin of deposited material; Characterisation of headland deposited; Presence and extent of radioactive material. Extent of erosion pre and post coastal protection measures.	1, 2	2/1: Excavation of Trial Pits to define extent of shallow deposited material between Enviros locations WS2/HS25, WS137/TP35, WS136/HS13, WS134/HS8, around TP38/HS7/WS131 area, and HS6/WS132/TP39.	TP2/1/009 to TP2/1/014	⊙	●	●	⊙	○	○
					2/2: Excavation of Trial Pits to evaluate presence of point sources in Clubhouse mound.	TP2/2/015 to TP2/2/017	○	○	●	○	○	○
					2/3: Excavation of Trial Pits and Boreholes to explore deeper stratigraphy to south and east of WS130 - the headland.	TP2/3/018 to TP2/3/020	⊙	⊙	●	⊙	○	○
					2/4: Characterise lateral extent of ash-rich fill (i.e. not shallow deposited ash-rich material) between Enviros TP33/TP56, HS5/10/11/12/13 area.	BH2/3/001 to BH2/3/003 TP2/4/021	⊙	⊙	●	⊙	○	○
					2/5: Profile of sandstone bedrock - See Investigation Actions 2/3 and 7/2.	BH2/4/003 BH2/3/001 to BH2/3/003 TP7/2/084 to TP7/2/086	○	○	○	○	○	⊙
3	'Boat Park': Deposited Material, Sailing Club Development, Erosion or Disturbance of Material	Northern Boat Park area; Repeated extensions by coastline extension.	Origin and nature of deposited material; Presence and extent of radioactive material; Extent of erosion pre and post coastal protection measures.	1, 2	3/1: Excavation of Trial Pits to evaluate westernmost extent of Made Ground, beyond Enviros WS125, WS124, TP42, TP54, TP49, TP50.	TP3/1/022 to TP3/1/029	⊙	●	●	⊙	○	⊙
					3/2: Excavation of Trial Pits to characterise northern extent of Made Ground, beyond Enviros TP40, TP41	TP3/2/030 to TP3/2/033	⊙	●	●	⊙	○	⊙
					3/3: Excavation of Trial Pits to characterise vertical extent of Made Ground in centre of Boat Park	TP3/3/034 to TP3/3/047 BH3/3/004 to BH3/3/005	⊙	●	●	⊙	○	○
4	'Slipways and Jetty' Development:	Slipway Area.	Origin and nature of material used for construction of slipways and jetty; Presence and extent of radioactive material.	1	4/1: Surface walkover contamination survey of Slipways and Jetty	n/a	○	○	●	○	○	○
					4/2: Research into construction methods including discussions with DBSC.	n/a	⊙	○	○	○	○	○
5	Ross Plantation Quarry: Deposited Material, Erosion and Disturbance of Material	Small quarry in western area of Ross Plantation; Ash-rich deposited material and radioactive material identified.	Origin of deposited material; Presence and extent of radioactive material.	3, 4	5/1: Surface Walkover contamination survey (preferably positionally referenced, but trees may interfere with GPS signal) of Ross Plantation	n/a	○	⊙	●	○	○	○
					5/2: Excavation of Trial Pits to evaluate depth and extent of infilled Quarry.	TP5/2/048 to TP5/2/052	⊙	●	●	○	○	⊙
6	Ross Plantation Foreshore: Deposited Material, Erosion and Disturbance of Material	Northern edge of the Plantation area: Ash encountered in investigation and associated with radioactive material.	Origin of deposited material; Extent of deposited material; Presence and extent of radioactive material. Extent of erosion pre and post coastal protection measures.	1, 3, 4	6/1: As 5/1 above: Surface Walkover contamination survey (preferably positionally referenced, but trees may interfere with GPS signal) of Ross Plantation Foreshore.	n/a	○	⊙	●	○	○	○
					6/2: Excavation of Trial Pits to provide greater definition of ashy material in Enviros TP13/TP20/TP25/TP26 and survey locations SS28/SS29/SS7/SS5/SS30.	TP6/2/053 to TP6/2/065 BH6/2/006	⊙	●	●	⊙	○	⊙
7	Dalgety Bay Beach: Deposited Material, Erosion or Disturbance of Material.	Radioactive material identified on the beach; Possible historical disposal directly onto the beach.	Origin of radioactive material identified on the beach; Coastal/tidal processes leading to repopulation of radioactive material on beach.	1	7/1:Phase Two Coastal Process Review: Confirm depth to bedrock of filled region.	TP7/2/066 to TP7/2/086	○	⊙	⊙	○	○	⊙
					7/2: Phase Two Coastal Process Review: Excavation of Trial Pits to investigate composition of beach material and depth profile.	TP7/2/066 to TP7/2/086	⊙	●	●	⊙	○	●
					7/3: Phase Two Coastal Process Review: Characterise Coastal processes in beach environment	To be confirmed following completion of Investigation Action 7/5, High Level Coastal Process Review and Armour Survey.	○	⊙	⊙	○	○	○
					7/4: Topographic surveys and cross-comparisons between surveys to evaluate beach profile changes over the near-term	n/a	○	○	○	⊙	⊙	○
					7/5: High level Coastal Process Review and: Armour Survey.	n/a	○	○	○	⊙	⊙	○
8	New Harbour	Radioactive material identified on the beach	n/a	n/a	8/1: Excavation of Trial Pit to investigate composition of beach material and depth profile	TP8/1/087	○	⊙	⊙	○	○	○

● Uncertainty Investigated
⊙ Uncertainty Partially Investigated
○ Uncertainty Not Investigated

Proposed Scope of Works to Reduce Conceptual Exposure Model Uncertainty
Table A2

Exposure Area								Main Uncertainties Addressed								
Area		**Conceptual Exposure Model Uncertainties: Contaminant Definition**	**Receptor**	**Pathway**	**Conceptual Exposure Model Uncertainties: Pathway Definition**	**Investigation Actions**	**Exploratory Location Reference (If Applicable)**	**Volume, Depth, Spatial Extent and Magnitude of Contaminated Material**	**Physical Characteristics of Material**	**Coastal Processes Affecting Repopulation of Radioactive Point Sources; Effect of Jetty/Slipway on Coastal Processes**	**Mobility of Point Sources, Likelihood of Mobilisation of Dust**	**Probability of Encountering Point Source**	**Potential Presence of Point Sources at Depth**	**Nature, Likelihood and Frequency of Potential Activities Resulting in Ground Disturbance**	**Groundwater Regime, Presence of Contamination in Groundwater, Solubility of Radium.**	**Coastal Processes and Potential Effects of Storm Events**
1	Dalgety Bay Beach	Origin and transport mechanism unconfirmed; Volume, depth, spatial extent and magnitude of contaminated material; Physical characteristics of material; Coastal processes affecting repopulation of radioactive point sources;	Humans - Non-intrusive activities (Beach)	Dermal Contact, Ingestion, Dust Inhalation, Irradiation.	Mobility of point source due to size and possible breakdown due to fragile nature of sources; Probability of encountering point source; Likelihood of mobilisation in dust; Potential for presence of point sources at depth.	Ongoing Radiological Surveys.	n/a	●	●	○	○	●	○	○	○	○
		Effect of jetty/ slipway construction on coastal processes.				See Conceptual Site Model Investigation Actions Item 8/1: Additional geophysical survey along southern beach frontage to evaluate bedrock contours and potential basal contours of filled region.	n/a	●	⊙	⊙	○	○	○	○	○	○
						See Conceptual Site Model Investigation Actions Item 7/1 and 7/2: Trial Pits to investigate depth to bedrock and composition of beach material and depth profile.	TP8/2/076 to TP8/2/090	●	●	○	●	●	●	○	○	○
			Humans - Intrusive Activities (Beach)	Dermal Contact, Ingestion, Dust Inhalation, Irradiation.	Mobility of point source due to size and possible breakdown due to fragile nature of sources. Probability of encountering point source. Nature, likelihood and frequency of potential activities resulting in ground disturbance.	Ongoing Radiological Surveys.	n/a	●	●	○	○	●	○	○	○	○
						See Conceptual Site Model Investigation Actions Item 8/1: Additional geophysical survey along southern beach frontage to evaluate bedrock contours and potential basal contours of filled region.	n/a	●	⊙	⊙	○	○	○	○	○	○
						See Conceptual Site Model Investigation Actions Item 7/2: Trial Pits to investigate composition of beach material and depth profile.	TP7/2/066 to TP7/2/086	●	●	○	●	●	●	○	○	○
						Survey of usage of beach including activities undertaken, frequency of visits, length of time spent on beach, etc.	n/a	○	○	○	○	○	○	●	○	○
			Off-site Humans	Migration of dust	Point source size and possible breakdown due to fragile nature of sources; Likelihood of mobilisation in dust.	No specific investigation actions proposed at the current stage.	n/a	□	□	□	○	○	○	○	○	○
			Water Environment - Groundwater	Leaching	Groundwater regime in strata underlying the beach. Presence of contamination in groundwater. Solubility of radium form present on site.	No specific investigation actions proposed at the current stage.	n/a	○	○	○	○	○	○	○	○	○
			Water Environment - Surface Water (Firth of Forth)	Groundwater	Groundwater regime in strata underlying the beach. Presence of contamination in groundwater. Solubility of radium form present on site.	No specific investigation actions proposed at the current stage.	n/a	○	○	○	○	○	○	○	○	○
				Tidal Action (Including Storm Events)	Coastal processes and potential for movement of material. Potential effects of storm events.	See Conceptual Site Model Investigation Actions 7/3 and 7/4	n/a	○	○	●	○	○	○	○	○	●
2	Dalgety Bay Sailing Club and Boat Park	Presence of radioactive point sources within deposited material; Volume, depth, spatial extent and magnitude of contaminated material; Characterisation of Headland deposited material; Characterisation of Boat Park deposited material; Vertical and lateral extent of deposited material (including western extent of Headland ash-rich fill); Underlying natural ground profile; Effect of jetty/ slipway construction on coastal processes; Likelihood of re-erosion of material from Headland; Likelihood of re-erosion of material from Boat Park.	Humans - Non-intrusive activities (Sailing Club and Boat Park)	Dermal Contact, Ingestion, Dust Inhalation, Irradiation.	Mobility of point source due to size and possible breakdown due to fragile nature of sources. Probability of encountering point source; Likelihood of mobilisation in dust; Potential for presence of point sources at depth.	See Conceptual Site Model Investigation Actions 1/1, 2/1, 2/2, 2/3, 2/4, 2/5, 3/1, 3/2, 3/3.	TP1/1/007 to TP3/3/047	●	●	○	○	●	●	○	○	○
						Survey of usage of the area including activities undertaken, frequency of visits, length of time spent on beach, etc.	n/a	○	○	○	○	○	○	●	○	○
			Off-site Humans	Migration of dust	Depth to radioactive material; Probability of encountering point source; Point source size and possible breakdown in size; Likelihood of mobilisation in dust.	No specific investigation actions proposed at the current stage.	n/a	○	○	○	○	○	○	○	○	○
			Water Environment - Groundwater	Leaching	Groundwater regime in strata underlying the Sailing Club and Boat Park. Presence of contamination in groundwater. Solubility of radium form present on site.	See Conceptual Site Model Investigation Actions 2/3 and 3/3.	BH2/3/001 to BH2/3/003 BH3/3/004 to BH3/3/005	⊙	⊙	○	○	○	○	○	●	○
			Water Environment - Surface Water (Firth of Forth)	Groundwater	Groundwater regime in strata underlying the Sailing Club and Boat Park. Presence of contamination in groundwater. Solubility of radium form present on site.	See Conceptual Site Model Investigation Actions 2/3.	BH2/3/001 to BH2/3/003 BH3/3/004 to BH3/3/005	⊙	⊙	○	○	○	○	○	●	○
				Surface water run-off	Coastal processes and potential for movement of material. Potential effects of storm events.	See Conceptual Site Model Investigation Actions 7/3 and 7/4	n/a	○	○	●	○	○	○	○	○	●

Exposure Area							Main Uncertainties Addressed								
Area		Conceptual Exposure Model Uncertainties: Contaminant Definition	Receptor	Pathway	Conceptual Exposure Model Uncertainties: Pathway Definition	Investigation Actions	Exploratory Location Reference (If Applicable)	Volume, Depth, Spatial Extent and Magnitude of Contaminated Material	Physical Characteristics of Material	Coastal Processes Affecting Repopulation of Radioactive Point Sources; Effect of Jetty/Slipway on Coastal Processes	Mobility of Point Sources, Likelihood of Mobilisation of Dust	Probability of Encountering Point Source	Potential Presence of Point Sources at Depth	Nature, Likelihood and Frequency of Potential Activities Resulting in Ground Disturbance	Groundwater Regime, Presence of Contamination in Groundwater, Solubility of Radium.	Coastal Processes and Potential Effects of Storm Events
3	Ross Plantation	Volume, depth, spatial extent and magnitude of contaminated material.	Humans – Non-intrusive activities (Woodland)	Dermal Contact, Ingestion, Dust Inhalation, Irradiation.	Mobility of point source due to size and possible breakdown due to fragile nature of sources. Probability of encountering point source;	See Conceptual Site Model Investigation Actions 5/1, 5/2, 6/1 and 6/2	TP5/2/047 to TP5/2/052	●	●	○	○	●	●	○	○	○
					Likelihood of mobilisation in dust;		TP6/2/053 to TP6/2/065									
					Potential for presence of point sources at depth.											
			Humans – Non-intrusive activities (Fife Coastal Path)	Dermal Contact, Ingestion, Dust Inhalation, Irradiation.	Mobility of point source due to size and possible breakdown due to fragile nature of sources. Probability of encountering point source;	See Conceptual Site Model Investigation Actions 5/1, 5/2, 6/1 and 6/2	TP5/2/047 to TP5/2/052	●	●	○	○	●	●	○	○	○
					Likelihood of mobilisation in dust;		TP6/2/053 to TP6/2/065									
					Potential for presence of point sources at depth.											
			Humans - Intrusive Activities (Ross Plantation	Dermal Contact, Ingestion, Dust Inhalation, Irradiation.	Mobility of point source due to size and possible breakdown due to fragile nature of sources. Probability of encountering point source. Nature, likelihood and	See Conceptual Site Model Investigation Actions 5/1, 5/2, 6/1 and 6/2	TP5/2/047 to TP5/2/052 TP6/2/053 to TP6/2/065	●	●	○	○	●	●	○	○	○
						Survey of usage of the area including activities undertaken, frequency of visits, length of time spent on beach, etc.	n/a	○	○	○	○	○	○	●	○	○
			Off-site Humans	Migration of dust	Depth to radioactive material; Probability of encountering point source; Point source size and possible breakdown in size; Likelihood of mobilisation in dust.	No specific investigation actions proposed at the current stage.	n/a	○	○	○	○	○	○	○	○	○
			Water Environment - Groundwater	Leaching	Groundwater regime in strata underlying Ross Plantation. Presence of contamination in groundwater. Solubility of radium form present on site.	See Conceptual Site Model Investigation Action 6/2	BH6/2/006	○	○	○	○	○	○	○	●	○
			Water Environment - Surface Water (Firth of Forth)	Groundwater	Groundwater regime in strata underlying Ross Plantation. Presence of contamination in groundwater. Solubility of radium form present on site.	See Conceptual Site Model Investigation Action 6/2	BH6/2/006	○	○	○	○	○	○	○	●	○
4	Fife Coastal Path	Volume, depth, spatial extent and magnitude of contaminated material; Likelihood of re-erosion of material from this area.	Humans - Non-intrusive activities (Fife Coastal Path)	Dermal Contact, Ingestion, Dust Inhalation, Irradiation.	Mobility of point source due to size and possible breakdown due to fragile nature of sources. Probability of encountering point source; Likelihood of mobilisation in dust; Potential for presence of point sources at depth.	See Conceptual Site Model Investigation Actions 6/1 and 6/2	TP6/2/053 to TP6/2/065	●	●	○	○	●	●	○	○	○
			Humans - Intrusive Activities (Fife Coastal Path)	Dermal Contact, Ingestion, Dust Inhalation, Irradiation.	Mobility of point source due to size and possible breakdown due to fragile nature of sources. Probability of encountering point source. Nature, likelihood and frequency of potential activities resulting in ground disturbance.	See Conceptual Site Model Investigation Actions 6/1 and 6/2	TP6/2/053 to TP6/2/065	●	●	○	○	●	●	○	○	○
						Survey of usage of the area including activities undertaken, frequency of visits, length of time spent on beach, etc.	n/a	○	○	○	○	○	○	●	○	○
			Off-site Humans	Migration of dust	Point source size and possible breakdown due to fragile nature of sources; Likelihood of mobilisation in dust.	No specific investigation actions proposed at the current stage.	n/a	○	○	○	○	○	○	○	○	○
			Water Environment - Groundwater	Leaching	Groundwater regime in strata underlying the Ross Plantation Foreshore Area. Presence of contamination in groundwater. Solubility of radium form present on site.	See Conceptual Site Model Investigation Action 6/2	BH6/2/006	○	○	○	○	○	○	○	●	○
			Water Environment - Surface Water (Firth of Forth)	Groundwater	Groundwater regime in strata underlying the Ross Plantation Foreshore Area. Presence of contamination in groundwater. Solubility of radium form present on site.	See Conceptual Site Model Investigation Action 6/2	BH6/2/006	○	○	○	○	○	○	○	●	○
				Surface water run-off	Coastal processes and potential for movement of material. Potential effects of storm events.	See Conceptual Site Model Investigation Actions 8/3, 8/4 and 8/5	n/a	○	○	●	○	○	○	○	○	●

● Uncertainty Investigated
◘ Uncertainty Partially Investigated
○ Uncertainty Not Investigated

Annex B
Exploratory Hole Logs

114 Pages

Annex C
Photographic Record of Site Investigation

1 CD

Annex D
Transfer Inventories of Point Sources Recovered from Dalgety Bay

27 Pages

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
	TPNH96 02m	23/10/12	½ circle metal strip	Dry	320 c.p.s	LUDLUM	2.45	—

Consignment Date & Time:	23/10/2012	Packed by:	WILL ALLAWAY	Received in good condition @ AWAF by:	A. BURTON.
No. of packages:	1	No. of Transfer Inventory Forms:	1 / 1	Signature:	
No. of point sources in consignment:	1			Placed in drum at AWAF:	23218/DRUM/008

S23218 Q289i1 Transfer Inventory for Point Sources recovered from Dalgety Bay

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	TP2/1009	1.5m 23/10/22	Ash + Clinker	Dry	1100cps	LUDLUM	8.44	—

Consignment Date & Time:	25/10/2022 16:00	Packed by: WILL ALLAWAY		Received in good condition @ AWAF by:	JR WALLACE
No. of packages:	1	No. of Transfer Inventory Forms:	1 1 1	Signature:	JRWallace
No. of point sources in consignment:	1	Outside of coolbox tested with Radeye (Yes)		Placed in drum at AWAF:	23218/DRUM/008

S23218 [redacted] 39i1 Transfer Inventory for Point Sources recovered from D [redacted] ty Bay

29/10/12

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	TP2/2/016	0.25	Clinker		300	Ludlum 2" NaI	2 - 30	
	TP2/2/016	0.25-0.35			230		1.76	
	TP3/3/036A	1.9			160		1.23	
	TP3/3/036B	1.9			680		5.21	
	TP7/2/084	0.05			340		2.61	
	TP7/2/084	0.14			410		3.14	
	TP7/2/084	0.2			1440		11.04	

Consignment Date & Time:	29/10/12	Packed by:	MIFL	Received in good condition @ AWAF by:	2328 JRWALLACE
No. of packages:	1	No. of Transfer Inventory Forms:	1 & 3	Signature:	
No. of point sources in consignment:	7 in 7 Tubs			Placed in drum at AWAF:	23218/DRUM/008

S23218 9i1 Transfer Inventory for Point Sources recovered from D ty Bay

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	TP1/1/007	26/10/12	0.5m B	D	600	LUDLUM	4.60	
	TP2/2/015	26/10/12	2.7m	D	5260	"	40.33	
	TP1/1/007	"	0.5mA	D	1100	"	8.43	
	TP2/2/015	"	2.0m	D	500	"	3.83	
		"	1.4m	D	1100	"	8.43	

Consignment Date & Time:	30.10.12	Packed by:	C. NEWSTEAD	Received in good condition @ AWAF by:	S WALLACE
No. of packages:	1	No. of Transfer Inventory Forms:	3 / 3	Signature:	
No. of point sources in consignment:	5 IN TOTAL 4 IN TUBS 1 BAGGED			Placed in drum at AWAF:	23218/DRUM/008

S23218 9i1 Transfer Inventory for Point Sources recovered from D ty Bay

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	BH2/3/002a	30.10.12	5.0-5.2m	W	160	LUDLUM	1.22	
	TP2/3/020	"	1.05m	D	330	"	2.53	
	TP7/2/086	"	0.0m	W	3300	"	25.30	
	TP7/2/086	"	0.1m	W	730	"	5.59	
	TP7/2/086	"	0.8m	W	10000	"	76.68	

Consignment Date & Time:	30.10.12	Packed by:	C. NEWSTEAD	Received in good condition @ AWAF by:	JRWALLACE
No. of packages:	1	No. of Transfer Inventory Forms:	2 / 3	Signature:	
No. of point sources in consignment:	5 in 5 Tubs			Placed in drum at AWAF:	23218/DRUM/008

S23218-Q289i1 Transfer Inventory for Point Sources recovered fro 'gety Bay

BH 2/3/003

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	BAG 1	30/10/12	Ash	Dry	600	Ludlum 2" NaI	4.60	2.5kg
2	BAG 2	30/10/12	↓	↓	600	↓	4.60	↓
3	BAG 3	30/10/12			1300		9.97	
4	BAG 4	30/10/12			700		5.37	
5	BAG 5	30/10/12			400		3.07	
6	BAG 6	30/10/12			800		6.13	
7	BAG 7	30/10/12			500		3.83	
8	BAG 8	30/10/12			700		5.37	
9	BAG 9	30/10/12			1100		8.43	

Consignment Date & Time:	30/10/12	Packed by:	MGF/NEWSC	Received in good condition @ AWAF by:	SR WALLACE
No. of packages:	9	No. of Transfer Inventory Forms:	1 / 1	Signature:	
No. of point sources in consignment:	Diffuse contam in 9 bags	Free from extend contam	(Yes) ~~No~~	Placed in drum at AWAF:	23218/DRUM/008

* Samples from hand pit, GL – 1.0 m.bgl.

S23218 89i1 Transfer Inventory for Point Sources recovered from ...gety Bay .

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	BH2/3/003	31/10/12	0.5m ASH	W	700	LUDLUM	5.36	
	BH2/3/003	"	0.8m ASH	W	700		5.36	
	BH2/3/003	"	1.0m ASH	W	700		5.36	
	BH2/3/003	"	1.2m ASH	W	800		6.13	
	BH2/3/003	"	1.5m ASH	W	800		6.13	
	BH2/3/003	"	1.7m ASH	W	750		5.75	
	BH2/3/003	"	1.9m ASH	W	750		5.75	
	BH2/3/003	"	2.0m ASH	W	600		4.60	
	BH2/3/003	"	3.2m CLAY WITH ASH	W	600		4.60	
	BH2/3/003	"	3.5m CLAY WITH ASH	W	400		3.06	
	TP3/3/047	"	1.5m CLINKER	D	550		4.21	
	TP3/3/039	"	1.5m A CLINKER	D	4100		31.44	
	TP2/3/020	"					3	
	TP7/2/085	"	0.7m CLINKER	D	1000		7.66	
	TP7/2/085	"	0.0m S+G	D	550		4.21	
	TP3/3/039	"	1.6m CLINKER	D	160		1.22	
	BH2/3/003	"	0.4A S+G	D	300		2.30	
	BH2/3/003	"	0.4B S+G	D	200		1.53	
	TP3/3/047	"	1.0m CLINKER	D	1470		11.27	
	TP7/2/085	"	CLINKER	D	34400		263.80	

Consignment Date & Time:	31.10.12	Packed by:	C. NEWSTEAD	Received in good condition @ AWAF by:	A. BURTON.
No. of packages:	1	No. of Transfer Inventory Forms:	1 / 1	Signature:	
No. of point sources in consignment:	10 BULK BAGS 9 TUBS			Placed in drum at AWAF:	23218/DRUM/008

U 27

S23218 Q289i1 Transfer Inventory for Point Sources recovered from Dalgety Bay

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	TP3/3/046	1·11·12	1·0M ASH	D	475	LUDLUM 2×2	3·64	
	TP3/3/046	〃	1·45M ASH	D	1600	〃	12·26	
	TP3/3/046	〃	1·5M ASH	D	1300	〃	9·96	

Consignment Date & Time:	1·11·12	Packed by:	N. KEYWORTH	Received in good condition @ AWAF by:	J WALLACE
No. of packages:	1	No. of Transfer Inventory Forms:	1 /	Signature:	
No. of point sources in consignment:	3 TUBS			Placed in drum at AWAF:	23218/DRUM 008

DOSE READINGS: FROM DRIVER 0.0008
AROUND VEHICLE 0.0008

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	TP4/2/083 0.85	1/11/12	Clinker	Dry	630	Ludlum 2" NaI	4.83	
	TP4/2/083 3.5B				1680		12.88	
	TP4/2/082 1.3				1080		8.28	
	TP3/3/037 0.4				400		3.07	
	TP7/2/082 0.9				2100		16.10	
TP3/3/037 ←	TP3/3/037 1.8				5000		38.34	
	TP7/2/082 0.1				1270		9.74	
	TP7/2/083 0.2				1100		8.44	
	TP7/2/082 0.9B				300		2.30	
	TP7/2/082 1.1				1800		13.80	
	TP3/3/040 Bd				2600		19.94	
	TP3/3/042 1.1				300		23.77	
	TP3/2/042 0.8A				200		1.53	

Consignment Date & Time:	1/11/12	Packed by:	MGFC	Received in good condition @ AWAF by:	JLWALLACE
No. of packages:	1	No. of Transfer Inventory Forms:	1 / 1	Signature:	
No. of point sources in consignment:	13 in 13 tubs	Free from external contam	(Yes) / ~~No~~	Placed in drum at AWAF:	23218/DRUM/008

External package dose = 1μSv/hr
Diver dose = 55cps - 0.04μSv/hr

S2321[illegible]Q289i1 Transfer Inventory for Point Sources recovered from Dalgety Bay

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	TP7/2/0S1 0-2	2/11/12	Ash / clinker	D	1000	Ludlum 2" NaI	7.66	
2	TP7/2/0S1 0-3	↓	Ash / clinker	D	3900	↓	29.90	
3	TP7/2/0S1 0-5	↓	Ash / clinker	D	1000	↓	7.66	
4	TP7/2/0S1 0-6	↓	Ash / clinker	D	390	↓	2.99	

Consignment Date & Time:	2/11/12	Packed by:	N. KEYWORTH	Received in good condition @ AWAF by:	SR WALLACE
No. of packages:	1	No. of Transfer Inventory Forms:	1	Signature:	
No. of point sources in consignment:	4			Placed in drum at AWAF:	23218/DRUM 008

DOSE READINGS = DRIVERS SEAT = 0.076
OUTSIDE CONTAINER = 0.076

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
B1	TP7/2/071	04B 7/11/12	Clinker	Wet	900	Ludlum 2" NaI	6.90	
	TP7/2/080	0.05			1067		8.18	
	TP7/2/076	0.7			14000		107.36	
	TP7/2/076	for dig			340		2.61	
	2328-S1183		S+G		1200		9.20	
	1184		S+G		380		2.91	

Consignment Date & Time:	5/11/12	Packed by:	MEFL	Received in good condition @ AWAF by:	STWALLACE
No. of packages:	1	No. of Transfer Inventory Forms:	1 / 1	Signature:	
No. of point sources in consignment:	6 in 5 tubs	Free from external contam	(Yes) / N/A	Placed in drum at AWAF:	23218/DRUM 008

Package external dose – 1.9 µSv/hr

Driver seat dose – 60cps = 0.05 µSv/hr

S232 289i1 Transfer Inventory for Point Sources recovered from gety Bay

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	1185	6·11·12	CLINKER	W	1490	LUDLUM 2"NAI	11·42	
	1186	"	MUD	W	1130	"	8·66	
	TP7/2/068		0·3m CLINKER	D	280	"	2·14	
	TP7/2/070		0·0M CLINKER	D	180	"	1·38	
	TP7/2/070		0·25m S+G	D	204	"	1·56	25·16

Consignment Date & Time:	6·11·12	Packed by:	L. MIFFLING	Received in good condition @ AWAF by:	JRWALLACE
No. of packages:	1	No. of Transfer Inventory Forms:	1 / 1	Signature:	JRWallace
No. of point sources in consignment:	5 IN 4 TUBS	free from External Contam (Yes) / ~~No~~		Placed in drum at AWAF:	23218/DRUM/008

PACKAGE DOSE RATE = 0·21 μSv/hr
DRIVER DOSE RATE = 60cps - 0·05 μSv/h

S232[illegible]289i1 Transfer Inventory for Point Sources recovered from [illegible]algety Bay

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	TP3/2/030	7/11/12	0.6m CLINKER	D	1100	LUDLUM 2" NAI	8.43	
	TP7/2/074	"	0.75 CLINKER	D	2330	"	17.86	
	TP7/2/073	"	2ME MUD	D	450	"	3.45	
	TP7/2/073	"	0.70 CLINKER	D	620	"	4.75	
	TP3/2/030	"	0.45 - 0.60m	D	260	"	1.99	
	TP7/2/073	"	0.08m CLINKER	D	1400	"	10.73	
	TP7/2/073	"	1.5m CLINKER	D	660	"	5.06	
	TP7/2/074	"	0.50m CLINKER	D	990	"	7.59	
	1187	"	S+G	D	1040	"	7.98	
	1188	"	S+G	D	360	"	2.76	
	1189	"	S+G	D	375	"	2.88	
	1190	"	S+G	D	500	"	3.83	
	1191	"	S+G	D	350	"	2.68	
	1192	"	S+G	D	260	"	1.99	
	1193	"	CLINKER	D	400	"	3.07	
	1194	"	S+G	D	200	"	1.53	
	1195	"	S+G	D	300	"	2.30	
	1196	"	S+G	D	240	"	1.84	
	1197	"	S+G	D	~~360~~	"	~~2.76~~	
	1198	"	S+G	D	~~500~~	"	~~3.83~~	
	1199	"	S+G	D	300	"	2.30	

100.31

Consignment Date & Time:	7/11/12	Packed by:	L. MIFFLING	Received in good condition @ AWAF by:	S.W. ALLAN
No. of packages:	1	No. of Transfer Inventory Forms:	1 / 1	Signature:	
No. of point sources in consignment:	21 in 11 tubs	FREE FROM EXTERNAL CONTAMINATION (YES) / NO		Placed in drum at AWAF:	23218/DRUM 008

EXTERNAL PACKAGE DOSE = 0.614 μSv/hr

DRIVER DOSE = 0.059 μSv/hr.

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
	1200	8.11.12	Sand + Gravel (S+G)	W	550	LUDLUM	4.22	
	1201	8.11.12	Clinker	W	150	"	1.15	
	1202	"	S+G	W	300	"	2.30	
	1203	"	SAND	W	260	"	1.99	
	1204	"	S+G	W	350	"	2.68	
	1205	"	S+G	W	2000	"	15.34	
	1206	"	S+G	W	420	"	3.22	
	1207	"	S+G	W	450	"	3.45	
	1208	"	CLINKER	W	3600	"	27.61	
	1209	"	S+G	W	280	"	2.15	
	1210	"	S+G	W	430	"	3.30	
	1211	"	S+G	W	500	"	3.83	
	1212	"	CLINKER	W	350	"	2.68	
	1213	"	S+G	W	1500	"	11.50	
	1214	"	CLINKER	W	3800	"	29.14	
	1215	"	S+G	W	400	"	3.07	
	1216	"	CLINKER	W	140	"	1.07	
	TP6/2/060	"	0.0 CLINKER	W	430	"	3.29	
	TP6/2/057	"	0.35 CLINKER	W	250	"	1.91	
	TP6/2/053	"	0.2 CLINKER	W	500	"	3.83	

Consignment Date & Time:	8/11/12	Packed by:	L. MIFFLING	Received in good condition @ AWAF by:	S WALLACE
No. of packages:	1	No. of Transfer Inventory Forms:	1 / 2	Signature:	
No. of point sources in consignment:	23 IN 9 TUBS			Placed in drum at AWAF:	23218/DRUM 1008

S2321[illegible]289i1 Transfer Inventory for Point Sources recovered from Dalgety Bay

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
	TP6/2/060	8/11/12	1 ME CLINKER	W	10,000	CUDLUM	76.68	
	TP6/2/053	"	0.4 CLINKER	W	4800	LUDLUM	36.80	
	TP6/2/060	"	1.0 CLINKER	W	1080	LUDLUM	8.28	249.49

Consignment Date & Time:	8.11.12	Packed by:	L. MIFFLING	Received in good condition @ AWAF by:	SLWALLACE
No. of packages:	1	No. of Transfer Inventory Forms:	2 / 2	Signature:	
No. of point sources in consignment:	23 IN 9 TUBS	FREE FROM EXTERNAL CONTAM (YES) / NO		Placed in drum at AWAF:	23218/DRUM/008

PACKAGE DOSE RATE = 1.520 μSv/hr

DRIVER DOSE RATE = 83 cps −0.67 μSv/hr

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	1217	9/11/12	Sand + Gravel	Wet	260	LUDLUM	1.99	
	1218				560		4.29	
	1219				3500		26.84	
	1220				450		3.45	
	1221				550		4.22	
	1222				250		1.92	
	1223				2000		15.34	
	1224				250		1.92	
	1225				800		6.13	
	1226				310		2.38	
	1227				190		1.46	
	1228				250		1.92	
	1229				220		1.69	
	1230				400		3.07	
	1231				260		1.99	
	1232				210		1.61	
	1233				370		2.84	
	1234				215		1.65	
	1235				1250		9.59	
	1236				230		1.76	

Consignment Date & Time:	9/11/12	Packed by:	MIFL	Received in good condition @ AWAF by:	SRWALLACE
No. of packages:	1	No. of Transfer Inventory Forms:	1 / 3	Signature:	S Wallace
No. of point sources in consignment:	42 in 12 tubs	free from external contam	Yes ~~NO~~	Placed in drum at AWAF:	23218/DRUM 1008

Package dose rate = 1.53μSv/hr
Driver dose rate = 100cps
~0.08μSv/hr

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
	1237	9/11/12	Sand + Gravel	Wet	230	Ludlum 2" NaI	1.76	
	1238				350		2.68	
	1239				450		3.45	
	1240				235		1.80	
	1241				530		4.06	
	1242				250		1.92	
	1243				630		4.83	
	1244				280		2.15	
	1245				1500		11.50	
	1246			Dry	450		3.45	
	1247				320		2.45	
	1248				550		4.22	
	1249				400		3.07	
	1250				2500		19.17	
	TP6/2/064		0.5-0.8 clinker	WET	1300		9.97	
	TP6/2/064		0.5 clinker		2600		19.94	
	TP6/2/062		0.1-0.6 Dyst		180		1.38	
	TP6/2/065		0.25 clinker		8020		61.50	
	TP6/2/065		0.02me clinker		600		4.60	
	TP6/2063		0.1		1000		7.67	

Consignment Date & Time:	9/11/12	Packed by:	MEFL	Received in good condition @ AWAF by:	SKWALLACE
No. of packages:	1	No. of Transfer Inventory Forms:	2 / 3	Signature:	SKDallard
No. of point sources in consignment:	42 in 12 tubs			Placed in drum at AWAF:	23218/DRUM/008

S232[illegible]Q289i1 Transfer Inventory for Point Sources recovered from [illegible]algety Bay

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
	TP62/062	9/11/12	0.08 clinker	Dry	430	Ludlum 2" NaI	3.30	
	TP62/063		0.1 clinker	"	250	"	1.92	269.96

Consignment Date & Time:	9/11/12	Packed by:	MIFL	Received in good condition @ AWAF by:	JRWALLACE
No. of packages:	1	No. of Transfer Inventory Forms:	3 / 3	Signature:	JRWallace
No. of point sources in consignment:	42 in 12 tubs			Placed in drum at AWAF:	23218/Drum/008

S232_ Q289i1 Transfer Inventory for Point Sources recovered from Dalgety Bay

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	TP7/2/066	12/11/12	0.05m S+G	D	340	Sodium 2"NAI	2.61	
	1251		S+G	D	250		1.92	
	1252			D	160		1.23	
	1253			D	1250		9.59	
	1254			D	350		2.68	
	1255			D	350		2.68	
	1256			D	1600		12.27	
	1257			W	1200		9.20	
	1258			D	4250		32.59	
	1259			W	370		2.84	
	1260			W	320		2.45	
	1261			W	300		2.30	
	1262			D	200		1.53	
	1263			D	260		1.99	
	1264		CLINKER	D	260		1.99	
	1265		S+G	D	200		1.53	
	1266		S+G	D	800		6.13	
	1267		S+G	D	350		2.68	
	TP7/2/066		0.20 CLINKER	D	650		4.98	103.19

Consignment Date & Time:	12 / 11 / 12	Packed by:	L. MIRLING	Received in good condition @ AWAF by:	A. BURTON
No. of packages:	1	No. of Transfer Inventory Forms:	1 / 1	Signature:	
No. of point sources in consignment:	19 IN 4 TUBS	Free from external contam	Y / ~~N~~	Placed in drum at AWAF:	23218/DRUM/008

DRIVER DOSEAGE = 0.076

PACKAGE DOSEAGE = 0.75 µSv/hr

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	1268	13 NOV 12	CLINKER	D	1100	LUDLUM	8.44	
	1269	13 NOV 12	SAND	D	255	LUDLUM	1.96	
	1270	13 NOV 12	CLINKER	D	6500	LUDLUM	49.85	
	TP6/2/055A	13 NOV 12	0.3m CLINKER	D	240	LUDLUM	1.84	
	TP6/2/055B	13 NOV 12	0.3m CLINKER	D	1300	LUDLUM	9.97	
	TP3/3/044	13 NOV 12	1.55-2.0m CLINKER	D	1510	LUDLUM	11.58	
	TP6/2/055B	13 NOV 12	0.2m CLINKER	D	180	LUDLUM	1.38	

85-02

Consignment Date & Time:	13 NOV 12	Packed by:	LEWIS MIFFLING	Received in good condition @ AWAF by:	A. BURTON
No. of packages:	1	No. of Transfer Inventory Forms:	1 / 1	Signature:	
No. of point sources in consignment:	7 in 5 tubs.	Free from external contam (Yes) / ~~No~~		Placed in drum at AWAF:	23218 / DRUM / 008

Package dose rate = 0.59 µSv/hr
Driver dose rate = 70cps
0.06µSv/hr

S232 289i1 Transfer Inventory for Point Sources recovered from lgety Bay

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	TP3/2/03	14/11/12	1.2m Clinker	Dry	1600	Ludlum 2" NaI	12.27	
	TP6/2/06		0.2m		800		6.13	
	TP6/2/06		0.05m		3400		26.07	
	TP3/2/03		0.7m		1300		9.97	
	TP2/3/03		0.75m		1900		14.57	
	TP3/2/03		0.85m		1250		9.59	
	TP6/2/05		0.1m		190		1.46	
	TP6/2/059		0.15-0.4		345		2.65	

Consignment Date & Time:	14/11/12	Packed by:	NewSC	Received in good condition @ AWAF by:	JRWALLACE
No. of packages:	1	No. of Transfer Inventory Forms:	1 / 1	Signature:	
No. of point sources in consignment:	8 in 8 tubs	Free from external contam	(Yes) / ~~No~~	Placed in drum at AWAF:	23218/DRUM/008

Package dose rate = 0.85μSv/h
Driver dose rate = 100cps.
0.08μSv/h

S23218 289i1 Transfer Inventory for Point Sources recovered from D ty Bay

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	TP3/1/026	15/11/12	1.1-1.25m Clinker	Dry	340	Ludlum 2" NaI	2.61	
	TP7/2/097	↓	0.3m ↓	↓	350	↓	2.68	
	TP3/1/025	↓	1.55-1.95m ↓	↓	2100	↓	16.10	21.39

Consignment Date & Time:	15/11/12	Packed by:	MIFFL	Received in good condition @ AWAF by:	JRWALLACE
No. of packages:	1	No. of Transfer Inventory Forms:	1 / 1	Signature:	JRWallace
No. of point sources in consignment:	3 in 3 tubs	Free from external contam (Yes) / ~~No~~		Placed in drum at AWAF:	DRUM 23218/DRUM/008

Package dose rate = 0.53μSv/hr
Driver dose rate = 0.05μSv/hr

S2321[illegible]89i1 Transfer Inventory for Point Sources recovered from D[illegible]gety Bay

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	1271	16/11/12	CLINKER	D	380	LUDLUM	2.91	
1	1273	"	CLINKER	D	1600	"	12.23	
1	1274	"	CLINKER	D	24 000	"	183.49	
1	1275	"	SAND + GRAVEL	W	700	"	5.35	
1	1276	"	CLINKER	W	200	"	1.53	
2	1272	"	SAND + GRAVEL + CLINKER	W	2500	"	19.11	
3	1277	"	SAND	D	450	"	3.44	
3	1278	"	CLINKER	D	160	"	1.22	

Consignment Date & Time:	16/11/12	Packed by:	WILL SEWARD	Received in good condition @ AWAF by:	SRWALLACE
No. of packages:	3	No. of Transfer Inventory Forms:	1 / 1	Signature:	SRWallace
No. of point sources in consignment:	8 in 3 tubs	Free from external contamination		Placed in drum at AWAF:	23218/Drum/008

Package dose rate = 22 µSv/hr
Driver dose rate = 0.11 µSv/hr

S23218 289i1 Transfer Inventory for Point Sources recovered from Dalgety Bay

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	TP3/2/0318	19/11/12	1.6m CLINKER	D	50000	SODIUM 2"NAI	383.43	
	TP3/2/0318	"	1.4m	D	1000	"	7.66	
	TP3/2/0318	"	0.6m	D	300	"	2.30	
	TP3/2/0318	"	0.3-0.4m	D	330	"	2.53	
	TP3/2/0318	"	1.6m B	D	685	"	5.25	
	TP3/2/0318	"	1.1m	D	2250	"	17.25	
	TP3/2/0318	"	0.6-0.85m	D	1500	"	11.50	
	TP3/2/0318	"	GL - 2.0m	D	650	"	4.98	434.90

Consignment Date & Time:	19/11/12	Packed by:	W. ALLAWAY	Received in good condition @ AWAF by:	J.T.WALLACE
No. of packages:	1	No. of Transfer Inventory Forms:	1 / 1	Signature:	
No. of point sources in consignment:	8 ~~4~~ in 8 ~~4~~ TUBS.	FREE FROM EXTERNAL CONTAMINATION (YES) / ~~NO~~		Placed in drum at AWAF:	23218/DRUM/008

DRIVER DOSE = 0.076 μSv/hr

PACKAGE DOSE = 2.12 μSv/hr

S23218 Q289i1 Transfer Inventory for Point Sources recovered from Dalgety Bay

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
	TP7/2/100	1.3m	(Surface - 1.0m SE of Pit)	D	250	LUDLUM	1.92	
	TP3/2/033	0m		D	1730	"	13.27	
	TP3/2/033	0.4m		D	250	"	1.92	
	TP7/2/100	1.2m		D	200	"	1.53	
	TP3/2/033c	0.35m		D	850	"	6.52	
	TP3/2/033	GL		D	650	"	4.98	
	TP7/2/100	0.2m		D	350	"	2.68	
	TP3/2/033	1.05m		D	840	"	6.44	
	TP7/2/100	0.95B		D	320	"	2.45	
	TP7/2/100	GL		D	650	"	4.98	
	TP3/2/033	0.65		D	170	"	1.30	
	TP7/2/100 - 4MNW	GL		D	600	"	4.60	
	TP3/2/033B			D	800	"	6.13	58.72

Consignment Date & Time:	20/11/2012 13:11	Packed by:	WILL ALLAWAY	Received in good condition @ AWAF by:	SRWALLACE
No. of packages:	~~2~~ 1	No. of Transfer Inventory Forms:	1 / 1	Signature:	
No. of point sources in consignment:	13	Cool Box Clean.		Placed in drum at AWAF:	23218/Drum/008

S23218 Q289i1 Transfer Inventory for Point Sources recovered from Dalgety Bay

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	1279	20/11/12	STG	W	450	COPLUM	3.45	
1	1280	"	Clinker	W	800	"	6.13	
1	1281	"	STG	W	1400	"	10.74	
2	TP3/3/103	1.2m	Clinker	D	550	"	4.22	
3	TP3/3/103	0.1m	Clinker	D	500	"	3.83	
4	TP3/3/103	1.4m	STG	D	11 000	"	84.36	
5	TP3/3/103	0.65-1.90	Clinker	D	950	"	7.29	
6	TP3/3/103		STG	D	3500	"	26.84	146.86

Consignment Date & Time:	20/11/2012 17:00	Packed by:	WILL ALLAWAY	Received in good condition @ AWAF by:	STWALLACE
No. of packages:	6	No. of Transfer Inventory Forms:	1 / 1	Signature:	STWallace
No. of point sources in consignment:	9	COOLBOX CHECKED		Placed in drum at AWAF:	23218/PRUM/007

DRIVER DOSE = [illegible] : 0.01 μSv/h
PACKAGE DOSE = [illegible] 0.90 μSv/h.

S23218 Q289i1 Transfer Inventory for Point Sources recovered from Dalgety Bay

Package No.	Sample Reference	Date & Time Taken	Material Description / Main Constituents	Wet / Dry	Field Probe Reading (cps)	Probe Used	Total Nominal Activity*** in Sample (kBq)	Total Weight (g)
1	S1282	21.11.12	CEINVER	W	420	SODIUM 2"NAI	3.22	
	S1283		S+G	W	630	"	4.83	
	S1284		S+G	W	215	"	1.64	
	S1285		S+G	W	600	"	4.60	
	TP3/3/106		1.4 - 2.2m	D	500	"	3.83	
	TP3/3/106		1.8m	D	7500	"	57.51	
	TP7/2/101		0.75m	D	220	"	1.68	
	TP7/2/101		0.0 - 0.4m	D	360	"	2.76	
	TP7/2/101		G.L. - 0.6m	D	210	"	1.61	
	TP7/2/102		0.2m	D	650	"	4.98	
	TP7/2/101		0.0	D	550	"	4.21	
	TP3/3/104		1.6 - 2.2m	D	550	"	4.21	
	TP7/2/101		0.3m	D	750	"	5.75	100.83

Consignment Date & Time:	21.11.12	Packed by:	N. KEYWORTH	Received in good condition @ AWAF by:	J.R.WALLACE
No. of packages:	1	No. of Transfer Inventory Forms:	1 / 1	Signature:	
No. of point sources in consignment:	13 in 10 TUBS	FREE FROM EXTERNAL CONTAMINATION (YES)/NO		Placed in drum at AWAF:	23218/DRUM/007

PACKAGE DOSE = 0.932 MSv/hr
DRIVER DOSE = 0.007 MSv/hr

Annex E
Summary of Radioactive Samples and Point Sources

3 Pages

Dalgety Bay Stage 2 Investigation
Radioactive Samples Recovered during Intrusive Sampling

Exploratory Hole	Location	Method	Sample Reference	Count Rate (cps)	Comments
Trial Pits TP1/1/007	East of New Harbour	JCB	0.5m A	1100	
			0.5m B	600	
			1.4m	1100	Ash Encrusted Pipe
Trial Pits TP1/1/008	East of New Harbour	JCB			
Trial Pits TP2/1/009	South of the Clubhouse	JCB	1.5m	1100	3 discrete active point sources sampled
Trial Pits TP2/1/010	South of the Clubhouse	Hand Pit			
Trial Pits TP2/1/011	South of the Clubhouse	JCB			
Trial Pits TP2/1/012	South of the Clubhouse	JCB			
Trial Pits TP2/1/013	South of the Clubhouse	JCB			
Trial Pits TP2/1/014	South of the Clubhouse	JCB			
Trial Pits TP2/2/015	Clubhouse Mound	JCB	2.0m	408	Red clinker 1cm diameter
			2.7m	5260	Blue-green clinker 3-5cm diameter
Trial Pits TP2/2/016	Clubhouse Mound	JCB	0.25-0.35m	230	
			0.25m	300	
Trial Pits TP2/2/017	Clubhouse Mound	JCB			
Trial Pits TP2/3/018	Headland	JCB			
Trial Pits TP2/3/019	Headland	JCB			
Trial Pits TP2/3/020	Headland	JCB	1.05m	300	Clinker
Trial Pits TP2/4/021	Headland	JCB			
Trial Pits TP3/1/022	Boat Park	JCB			
Trial Pits TP3/1/023	Boat Park	JCB			
Trial Pits TP3/1/024	Boat Park	JCB			
Trial Pits TP3/1/025	Boat Park	JCB	1.55-1.95m	2100	Fine Clinker
Trial Pits TP3/1/026	Boat Park	JCB	1.1-1.25m	340	Clinker
Trial Pits TP3/1/027	Boat Park	JCB			
Trial Pits TP3/1/028	Boat Park	JCB			
Trial Pits TP3/1/029	Boat Park	JCB			
Trial Pits TP3/2/030	Boat Park	JCB	0.6m	1100	
			0.45-0.6m	260	
Trial Pits TP3/2/031	Boat Park	JCB	0.7m	1300	
			0.75m	1900	Fine Clinker
			0.85m	1300	
			1.2m	1600	
Trial Pit TP3/2/031B	Boat Park	JCB	0.3-0.4m	350	
			0.6m	300	
			0.6-0.85m	1500	3 clinker artefacts
			1.1m	2250	
			1.4m	1000	2 clinker artefacts (650cps + 350cps)
			1.6m	50000	Clinker
Trial Pits TP3/2/032	Boat Park	JCB			
Trial Pits TP3/2/033	Boat Park	JCB	0.4m	250	
			0.65m	170	
			1.05m	840	
Trial Pits TP3/2/033B	Boat Park	Hand Pit	0.1m	800	
Trial Pits TP3/2/033C	Boat Park	Hand Pit	0.35m	570	
Trial Pits TP3/3/034	Boat Park	JCB			
Trial Pits TP3/3/035	Boat Park	JCB			
Trial Pits TP3/3/036	Boat Park	JCB	1.9m A	170	
			1.9m B	660	
Trial Pits TP3/3/037	Boat Park	JCB	0.4m	400	
			1.8m	5000	2 artefacts 3990cps & 400 cps
Trial Pits TP3/3/038	Boat Park	JCB			
Trial Pits TP3/3/039	Boat Park	JCB	1.5m A	4100	
Trial Pits TP3/3/040	Boat Park	JCB			
Trial Pits TP3/3/041	Boat Park	JCB			
Trial Pits TP3/3/042	Boat Park	JCB	0.8m A	200	Clinker with light green colouration
			1.1m	3100	
Trial Pits TP3/3/043	Boat Park	JCB			
Trial Pits TP3/3/044	Boat Park	JCB	1.55-2.0m	1510	
Trial Pits TP3/3/045	Boat Park	JCB			
Trial Pits TP3/3/046	Boat Park	JCB	1.0m	475	
			1.45m	1600	
			1.5m	1300	
Trial Pits TP3/3/047	Boat Park	JCB	1.0m	1470	2 clinker artefacts (900cps & 240 cps)
Trial Pits TP5/2/048	Ross Plantation Quarry	Hand Dug			
Trial Pits TP5/2/049	Ross Plantation Quarry	Hand Dug			
Trial Pits TP5/2/050	Ross Plantation Quarry	Hand Dug			
Trial Pits TP5/2/051	Ross Plantation Quarry	Hand Dug			
Trial Pits TP5/2/052	Ross Plantation Quarry	Hand Dug			
Trial Pits TP6/2/053	Ross Plantation Foreshore	JCB	0.2m	500	Fine Clinker gravel
			0.4m	4800	Clinker 1-2cm
Trial Pits TP6/2/054	Ross Plantation Foreshore	JCB			
Trial Pits TP6/2/055	Ross Plantation Foreshore	JCB			

Dalgety Bay Stage 2 Investigation
Radioactive Samples Recovered during Intrusive Sampling

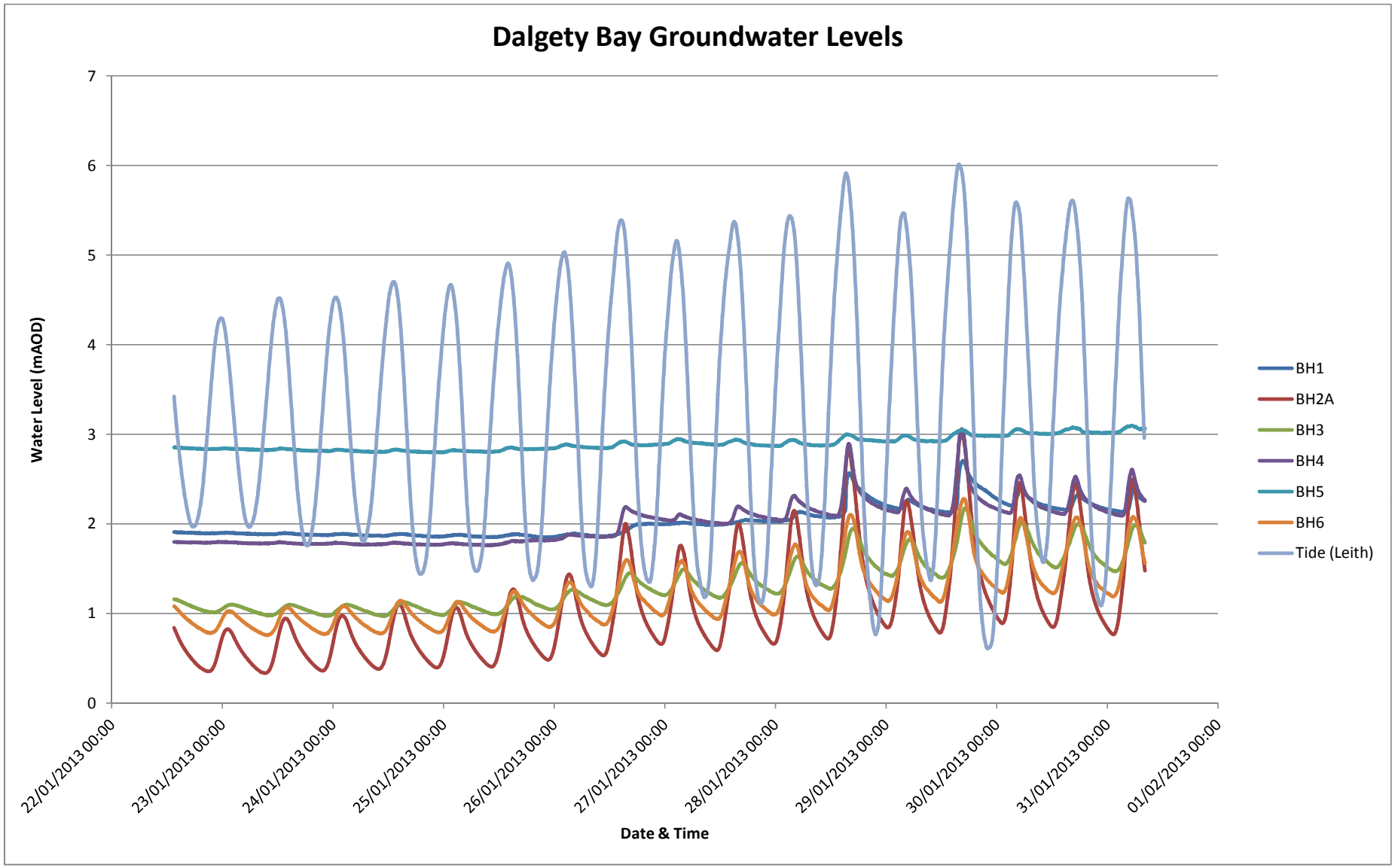
Exploratory Hole	Location	Method	Sample Reference	Count Rate (cps)	Comments
Trial Pits TP6/2/055A	Ross Plantation Foreshore	JCB	0.3m	240	
Trial Pits TP6/2/055B	Ross Plantation Foreshore	JCB	0.2m	180	
			0.3m	1300	Fine clinker (<2mm)
Trial Pits TP6/2/056	Ross Plantation Foreshore	JCB			
Trial Pits TP6/2/057	Ross Plantation Foreshore	JCB	0.35m	250	
Trial Pits TP6/2/058	Ross Plantation Foreshore	JCB			
Trial Pits TP6/2/059	Ross Plantation Foreshore	JCB	0.1m	190	clinker
			0.15-0.4m	345	
Trial Pits TP6/2/060	Ross Plantation Foreshore	JCB	0m	430	clinker at surface
			1.0m	1080	3 artefacts, 1 of clinker (670cps), 2 of sand (450cps & 140cps)
			0.1m North east of Pit		3 artefacts at surface (2950cps, 1100cps, 3145cps)
Trial Pits TP6/2/061	Ross Plantation Foreshore	JCB	0.2m	800	
			0.05m at 5m SW of pit	3400	
Trial Pits TP6/2/062	Ross Plantation Foreshore	JCB	0.08m	437	clinker
			0.1-0.6m	180	
Trial Pits TP6/2/063	Ross Plantation Foreshore	JCB	0.1m	250	
			Restored Surface	300	
Trial Pits TP6/2/064	Ross Plantation Foreshore	JCB	0.5m	2600	Fine Clinker 2 artefacts
			0.5-0.8m	1300	Fine clinker
Trial Pits TP6/2/065	Ross Plantation Foreshore	JCB	0.0m 2m to North	600	Artefact in surface 2m to north of pit
			0.25m	8080	Sand artefact and clinker
Trial Pits TP7/2/066	Beach	JCB	0.2m	650	Clinker
Trial Pits TP7/2/067	Beach	JCB			
Trial Pits TP7/2/068	Beach	JCB	0.3m	280	Fine clinker
Trial Pits TP7/2/069	Beach	Hand Dug			
Trial Pits TP7/2/070	Beach	JCB	0.25m	204	
Trial Pits TP7/2/071	Beach	Hand Dug			
Trial Pits TP7/2/072	Beach	JCB			
Trial Pits TP7/2/073	Beach	JCB	0.08m	1400	
			0.7m	622	
			1.5m	660	
			0.08m 2m to North east	450	Fine sand/silt
Trial Pits TP7/2/074	Beach	JCB	0.5m	990	
			0.75m	2300	
Trial Pits TP7/2/075	Beach	JCB			
Trial Pits TP7/2/076	Beach	JCB	0.7m	14000	3 artefacts clinker (7000cps), Clinker (13000cps) and paint flecks (600cps)
			Surface	300	Sampled from restored surface
Trial Pits TP7/2/077	Beach	JCB			
Trial Pits TP7/2/078	Beach	JCB			
Trial Pits TP7/2/079	Beach	JCB	0.4 B	900	2 artefacts of clinker
Trial Pits TP7/2/080	Beach	JCB	0.05	1067	clinker
Trial Pits TP7/2/081	Beach	JCB	0.2m	1000	2 artefacts (550cps & 300cps)
			0.3m	3900	
			0.5m	1000	
			0.6m	390	
Trial Pits TP7/2/082	Beach	JCB	0.9m	2100	
			0.9m	300	
			1.1m	1800	
			0.1m to north of Pit	1270	
Trial Pits TP7/2/083	Beach	JCB	0.1m	1160	
			0.35m	700	
			0.35m B	1680	
Trial Pits TP7/2/084	Beach	JCB	0.05m	340	
			0.14m	410	
			0.2m	1440	
Trial Pits TP7/2/085	Beach	JCB	0.0m	550	
			0.7m	1020	
			0.7m	30000	
Trial Pits TP7/2/086	Beach	JCB	0.0m	3300	Sampled from restored surface
			0.1m	730	
			0.7m	10000	
Trial Pit TP8/1/087	New Harbour Beach	JCB			
Trial Pits TPNH/088	Ross Plantation	Hand Dug			
Trial Pits TPNH/089	Ross Plantation	Hand Dug			
Trial Pits TPNH/090	Beach	Hand Dug			
Trial Pits TPNH/091	Beach	Hand Dug			
Trial Pits TPNH/092	Beach	Hand Dug			

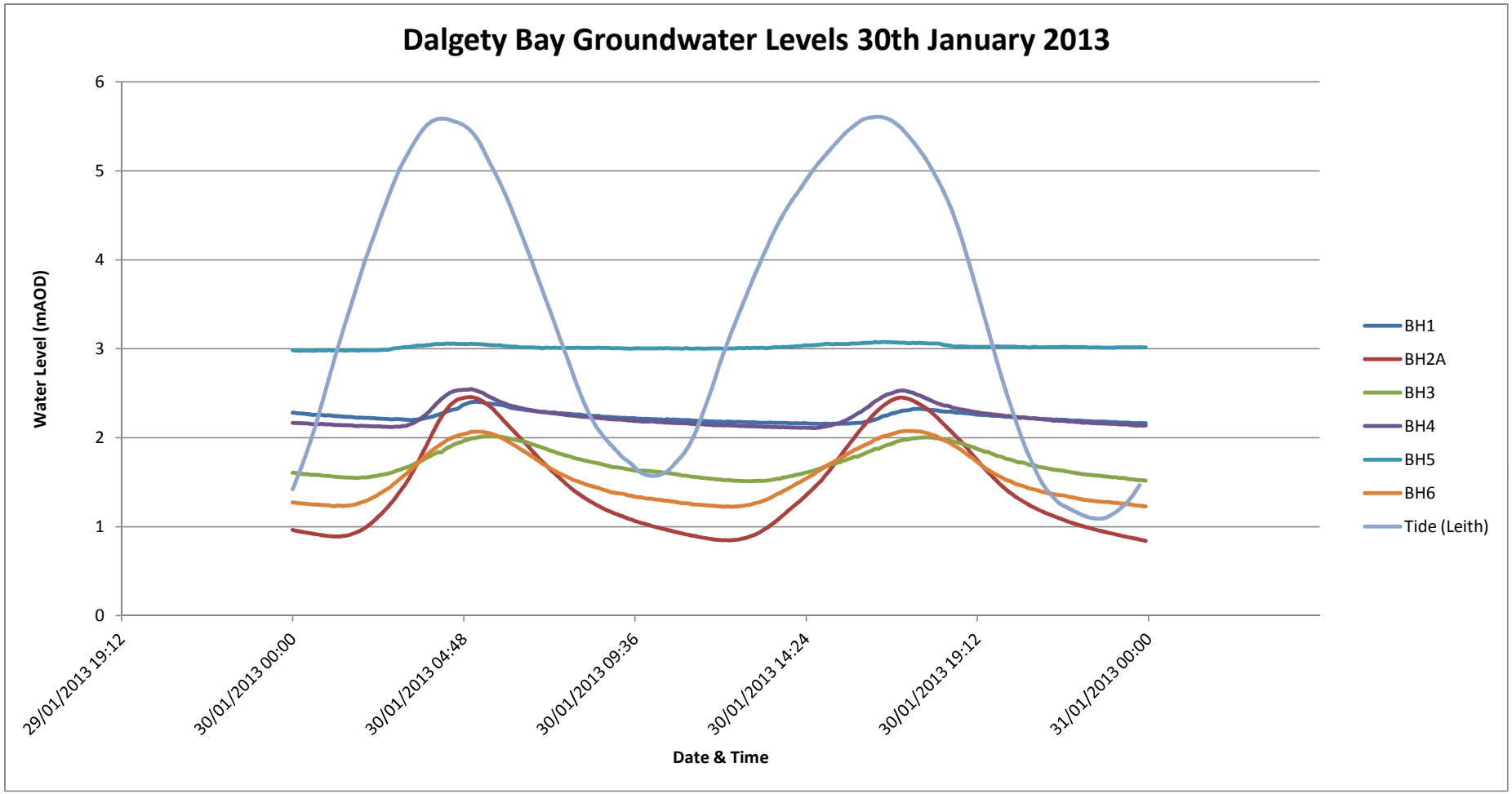
Dalgety Bay Stage 2 Investigation
Radioactive Samples Recovered during Intrusive Sampling

Exploratory Hole	Location	Method	Sample Reference	Count Rate (cps)	Comments
Trial Pits TPNH/093	Beach	Hand Dug			
Trial Pits TPNH/094	Beach	JCB			
Trial Pits TPNH/095	Sailing Club	JCB			
Trial Pits TPNH/096	Sailing Club	JCB	0.2m	320	semi-circular clip/ instrument backing
Trial Pit TP7/2/097	Beach	JCB	0.3m	350	
Trial Pit TP7/2/098	Headland Beach	JCB			
Trial Pit TP7/2/099	Headland Beach	JCB			
Trial Pit TP7/2/100	Headland Beach	JCB	GL	650	
			0.2m	350	
			0.95m B	320	
			1.2m	200	clinker
			1.3m	250	sand
			GL 4m to north west	600	
Trial Pit TP7/2/101	Beach	JCB	0.0m	550	1cm clinker
			0.3m	560	2 artefacts (560cps & 450cps)
			GL-0.6m	210	
Trial Pit TP7/2/102	Beach	JCB	0.2m	1000	Sand (2 artefacts 650cps, 450cps)
Trial Pit TP3/3/103	Boat Park	JCB	0.7m	3500	Sand
			1.2m	550	
			1.4m	11000	
Trial Pit TP3/3/104	Boat Park	JCB	1.6-2.2m	550	
Trial Pit TP8/1/105	Hew Harbour Beach	JCB			
Trial Pit TP7/2/106	Boat Park	JCB	1.8m	8730	(3 artefacts (430cps, 2100cps, 6200cps)
			1.4-2.2m	500	
BH2/3/001	Clubhouse Headland	Drill Rig			
BH2/3/002	Clubhouse Headland	Drill Rig			
BH2/3/003	Clubhouse Headland	Drill Rig	0.5m	700	
			0.8m	700	
			1.0m	700	
			1.2m	800	
			1.5m	800	
			1.7m	750	
			1.9m	750	
			2.0m	600	
			3.2m	600	
			3.5m	400	
			0.4A	300	
			0.4B	200	
BH3/3/004	Boat Park	Drill Rig			
BH3/3/005	Boat Park	Drill Rig			
BH3/3/006	Ross Plantation Foreshore	Drill Rig			

Annex F
Groundwater Level Monitoring Results Using Dataloggers

2 Pages


Dalgety Bay Groundwater Levels
Water Level (mAOD)
7
6
5
4
3
2
1
0
22/01/2013 00:00
23/01/2013 00:00
24/01/2013 00:00
25/01/2013 00:00
26/01/2013 00:00
27/01/2013 00:00
28/01/2013 00:00
29/01/2013 00:00
30/01/2013 00:00
31/01/2013 00:00
01/02/2013 00:00
Date & Time
BH1
BH2A
BH3
BH4
BH5
BH6
Tide (Leith)


Dalgety Bay Groundwater Levels 30th January 2013
Water Level (mAOD)
6
5
4
3
2
1
0
29/01/2013 19:12
30/01/2013 00:00
30/01/2013 04:48
30/01/2013 09:36
30/01/2013 14:24
30/01/2013 19:12
31/01/2013 00:00
Date & Time
BH1
BH2A
BH3
BH4
BH5
BH6
Tide (Leith)