Appendix 1
WASTE MANAGEMENT PLANS

Schedule C5 Site Waste Management Plan

This declaration is to be used in conjunction with and uploaded into BAM Site – the web-based sustainability monitoring and reporting tool

Project reference	BAA.4008
Project title	Rothera Modernisation
Client	Natural Environmental Research Council / British Antarctic Survey
Principal contractor	BAM
Site waste coordinator / Environment engineer	NG
Contract value	
Address/location	Rothera Research Station, Rothera Point, Adelaide Island, Antarctica **Position Lat. 67°35'8"S, Long. 68°7'59"W**
Project description	Modernisation of Rothera Research Station including: • The demolition of Fuch's House, Old Bransfield House, Bingham's, Chippy Shed, Generator Shed, Vehicle Garage and the Miracle Span • Constructing new Science and Operations Buildings • Removal of existing utilities • Provision of new utilities
Document prepared by	NG

Declaration: We the client and principal contractor confirm that all reasonable steps will be taken to ensure that: a) all waste from the site is dealt with in accordance with the duty of care in section 34 of the Environmental Protection Act b) materials will be handled efficiently and waste managed appropriately	
Client:	Signed:

Principal contractor:	Signed:
Key subcontractor(s):	Signed:

This plan is reviewed at least every three months by the site waste coordinator and updated as necessary to ensure that waste management practices are in accordance with this plan.

Reviewed by	Date	Rev no.	Revision details (where applicable)

Introduction

This site waste management plan identifies and monitors:

- Legislative requirements for waste management
- Types and quantities of waste expected to be generated during the Rothera Modernisation works
- reuse of materials on the project e.g. cut and fill, site won materials
- waste minimisation methods to be implemented on the project
- waste management options for waste generated during the works including waste generated by subcontractors
- Storage and disposal options for each waste stream
- any cost savings achieved through waste minimisation

Materials identified within this SWMP are not necessarily statutory waste as they do not fall within the legal definition of waste i.e. 'any substance or object which the holder discards intends to discard or is required to discard.' There is no intention to discard materials such as:

- site won excavated materials
- aggregates crushed in accordance with the WRAP Quality Protocol (on or off site)
- pre-planned use of materials

All materials whether they are imported, reused 'as is' on site, recycled (on or off site) or sent off site for disposal are identified within the plan.

(See Appendix 1 for roles and responsibilities.)

Legislation

Antarctic Environmental Legislation

To ensure the protection of the Antarctic environment, the Antarctic Treaty nations adopted the Protocol on Environmental Protection to the Antarctic Treaty in 1991. The UK enforces the provisions of the Protocol through the Antarctic Act, 1994, the Antarctic Act 2013, and the Antarctic Regulations, 1995/490 (as amended). Following the guidance provided in this document will ensure that BAS complies with the requirements of the Protocol and other national and international legislation listed below.

Annex III: Waste Disposal and Waste Management

Annex III of the Environmental Protocol sets out regulations both for waste management planning and disposal of wastes (see Appendix 1). The Annex obliges all operators to reduce the quantity of waste produced and or disposed of in Antarctica in order to minimise any impact on the environment. Emphasis is placed on the storage, disposal and removal of waste from the Antarctic Treaty area, as well as recycling and source reduction.

BAS complies with the requirements of the Annex by means of conditions attached to the Operating Permit granted by the Foreign, Commonwealth and Development Office.

Annex IV: Prevention of Marine Pollution

Within the Antarctic Treaty Area (south of 60o latitude) the discharge of all toxic and noxious chemicals, oil and oily wastes, plastics and other forms of non-biodegradable rubbish into the sea is prohibited. Annex IV largely parallels the international regulations controlling ship-generated pollution under MARPOL 73/78.

MARPOL 73/78

Since 1992, the Antarctic Treaty Area has been designated by the International Maritime Organisation (IMO) as a Special Area under Annex I (Oil) and Annex V (Garbage) of MARPOL 73/78 (Revised 2013). This means that the discharge of any oil or oily mixture, bulk chemicals or garbage from a ship is prohibited in Antarctica. Most waste, other than food and sewage, is discharged at port reception facilities outside the Special Area.

BAS avoids the intentional discharge of processed bilge water from machinery spaces containing oily mixtures whilst in Special Areas. However, when there is a requirement to do so, and if the requirements of MARPOL are met, this is allowed in consultation with the Designated Person Ashore and the Head of the Environment Office.

BAS vessel the RRS James Clark Ross, maintains a garbage disposal record book, as required under MARPOL. A copy of the *Marine Standing Instruction MSI/Gen/21 Bilge and Garbage Disposal* is held on the ship and should be referred whilst on board.

UK Environmental Legislation

The Waste (England and Wales) (Amendment) Regulations, 2014

The Waste Framework Directive, which is the primary European legislation for the management of waste, is implemented through the Waste (England and Wales) (Amendment) Regulations 2014. It places great emphasis on the waste hierarchy to ensure that organisations deal with waste in the priority order of:

The waste hierarchy is partly implemented through the amended Duty of Care regulations.

The Duty of Care Regulations, 1991

Under the Environmental Protection (Duty of Care) Regulations, 1991, BAM is required to take all reasonable steps to keep its waste safe and secure so that it does not cause pollution or injury.

In particular, BAM must:

- Fulfil the legal requirement to apply the waste hierarchy.
- Ensure safe and correct packing and containment. This is of particular importance while the waste is in transit.
- Check that waste contractors are appropriately registered with the Environment Agency.
- Describe the waste on a Duty of Care transfer note so that the waste carrier can avoid committing an offence under the Regulations.

Failure to comply with the Duty of Care Regulations is a criminal offence, and could result in a fine of an unlimited amount. The Environment Manager is responsible for compliance with the Environmental Protection (Duty of Care) Regulations, 1991 with regard to wastes returned by BAM from Antarctica for disposal in the UK.

The Hazardous Waste Regulations, 2005

Hazardous wastes are amongst the most harmful and difficult wastes to deal with. The Hazardous Waste Regulations 2005 control the licensing, transfer and disposal of such waste in the UK. The main element of these regulations which BAM must comply with is preparation of consignment notes for every movement of hazardous waste in the UK. And ensure legal disposal

The Head of the Environment Office is responsible for compliance with the Hazardous Waste Regulations, for hazardous waste being returned by BAS from Antarctica which is disposed of in the UK. BAM will be responsible for the removal of our Hazardous construction waste.

Materials resource efficiency

The following waste reduction and reuse measures have been included in the design and/or specification for this project and will be further developed as the design progresses:

Design specifications	Earthwork fill specification to be amended from British standards to suit materials available on site
Choice of materials	Use of site won materials for 99.8% of earthworks (only 50 tonnes of sand import compared to 25000 tonnes of site won fill) Spare sheet piles from the existing Wharf will be used for the foundations of the Waste Handling Facility Steel from the jig used to construct the new Wharf frames will be reused for widening the services bridge at Admirals The scaffold tower from the same jig will be used for access to the New Operations Building during installation. Processed 30mm down fill, a by-product from the Wharf screening, to be used for the crane matts, and permanent landscaping and instead of importing sand for under the New Operations Building Redundant electrical cables to be used for site power distribution. Aim for high percentage of recycled aggregates and cement replacements in concrete mixes. Aim for high percentage of recycled material in steel.
Methods of construction	
Pre-fabrication off site	All concrete elements will be pre-cast outside of the Antarctic region and shipped to Rothera.

	Control Tower and staircase to be fabricated in the UK Plant rooms to be fabricated in the UK Main service corridors to be fabricated in the UK MEP Plant room components to be fabricated and tested in the UK before being broken down for transportation to Rothera Insulated wall panels are to be pre-fabricated outside of the Antarctic region and shipped to Rothera Use of flat pack systems for internal components including the sauna

Forecast of the types and quantities of waste

It is estimated that this site will produce the following types and quantities of waste: These figures will be updated as the design is developed. All waste that cannot be re-used at Rothera will be returned to the UK for recycling/disposal at a licenced waste management facility.

Excavation Waste

Type of Waste	EWC Code	Estimated Quantity Tonnes/(m^3)					Waste Management Action in Detail
		Total	Re-Use	Recycle	Recover	Dispose	
Inert Soil and Stone	17 05 04	72,150 (6,900)	72,150 (6,900)				Material to be re-distributed on site at Rothera

Construction Waste

Type of Waste	EWC Code	Estimated Quantity kg/(m^3)					Waste Management Action in Detail
		Total	Re-Use	Recycle	Recover	Dispose	
Steel	17 04 05	4,000 (0.51)		4,000 (0.51)			
Concrete / Grout	17 01 01	1,150 (0.5)	1,150 (0.5)				Waste grout to be crushed and used as aggregate
Cementitious Wash Water		10,000 (10)				10,000 (10)	Solids removed, remaining liquid neutralised using CO2 or citric acid and discharged to ground.
Alkaline Batteries	20 01 33	14 (0.005)				14 (0.005)	
Clothing / Textiles	20 01 10	50 (2.0)				50 (2.0)	
Cardboard	20 01 01	2,600 (20)		2,600 (20)			

Paper	20 01 01	150 (2.0)		150 (2.0)			
Timber	17 02 01	2,500 (5.0)	1,000 (2.0)	1,500 (3.0)			
Plastic	20 01 39	6,000 (6)		3,600 (3.6)	1,500 (1.5)	900 (0.9)	
Oil	13 02 07	5000 (5)				5000 (5)	
Oil Filters	16 01 07	50 (0.1)				50 (0.1)	
Oil Contaminated Rags	15 02 02	50 (0.2)				50 (0.2)	
Aerosols	16 05 04 16 05 05	64 (0.3)		32 (0.15)		32 (0.15)	
Glass	17 02 02	100 (0.02)					Stored in 205 litre steel drum

Demolition Waste

The table below detail the main waste expected to be generated from the demolition of the listed buildings. Additional waste will be contained in the seven ISO containers that serve as Technical Services Office and stores for a variety of materials. Quantities of demolition waste have been calculated from the original construction drawing where available. Discussions with the BAS Antarctic Estates team have provided information on the waste M&E equipment, fixtures and fittings as well as any modifications that have been made to the structure. Investigations of the buildings to be deconstructed will be undertaken this season which may provide additional information. Individual SWMPs will be produced for each building to be deconstructed once full information is available.

Where concrete foundations of building are below ground, the option of leaving concrete buried underground will be considered. Waste concrete will be crushed on site for re-use as aggregate. Wood and steel will be returned to the UK for recycling. All other demolition materials will be returned to the UK and recycled where possible. BAMs target is to send less than 10% of all waste to landfill.

Demolition Waste from Buildings

	Concrete	Wood	Steel	Insulation	Plaster Board	Calcium Silicate Board	Cement Particle Board	Aqua Elite Board	Acoustic Insulation
	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)
Fuchs House	44.08	70.47	0.10	173.81					
Old Bransfield House	95.11	347.83	3.60	656.78		5.62		22.66	2.27
Ops Tower	20.00	18.11	2.57	25.83	9.12	0.10			
Generator Shed	75.38	22.06	2.00	47.43			7.538		
Tractor Garage	107.28	22.84	5.60	28.02	3.79				
Miracle Span	84.86		0.80						
Chippy Shed / Binghams	2.29	20.28		39.55					
Totals	**429**	**501.59**	**14.67**	**971.42**	**19.18**	**6.44**	**8.76**	**22.66**	**2.27**

Demolition Waste from Services

	Metals				Plastics							Wood
	Copper	Steel	Al.	Galv. Steel	PVC	HDPE	ABS	PP	PE	Armaflex	Insudite	Ply
	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)
Electrical	1.29	0.67			3.79							
Fuel		1.09										
Heating					0.18							
Potable Water						0.6						
Sea Water					1.29		0.51	0.28	22.29			
Waste Water					1.36		0.36			9.23		
Fire Systems	0.03		0.01								0.14	
Data	0.001								0.008			
Ducting						2.59						
Wooden Box Trunking												38.95
Cable trays				0.34								
Totals	**1.32**	**1.76**	**0.01**	**0.34**	**6.62**	**3.19**	**0.87**	**0.28**	**22.30**	**9.23**	**0.14**	**38.95**

Management of waste

The production of waste material on this site during the construction phase is avoided wherever possible by following the '*reduce, reuse, recycle, recover*' measures outlined below. Only where these options have been exhausted is waste sent for disposal.

The waste will be stored interim before shipping to the UK. For the first season (2019-2020) the waste will collected for the Wharf & Modernisation project together. All waste will be segregated and stored in 20 or 40ft containers. These containers are stored between Admirals and the runway. When possible the containers will be relocated to the wharf area. From season 2 the waste containers are stored between Gerritsz building and the new wharf.

Reduction and reuse measures

The following measures will be employed to reduce and reuse waste on this site:

General	
Reduction measures	**Reuse measures**
• All buildings to be constructed using a modular design with panels pre-fabricated in Europe.	• All excavated material (except any hazardous material) to be re-distributed at Rothera.
• Accurate measurement, and minimal wastage will be allowed when ordering materials	• All construction waste materials to be offered to the Research Station Manager for re-use within the station
• Materials are to be stored and transported correctly so as to avoid damage	•
• Materials are to be kept off the ground by the use of pallets or timber bites	•
• All operatives are to receive training on the agreed reduction measures	•
• *(any other measures)*	•
Concrete and hardcore	
Reduction measures	**Reuse measures**
• Foundations to be constructed from pre-cast concrete, cast outside the Antarctic region	•

Excavated material (soil & stones)	
Reduction measures	**Reuse measures**
•	• Excavated soil and stone to be re-distributed on site
Timber	
Reduction measures	**Reuse measures**
• All buildings to be constructed using a modular design with panels pre-fabricated in Europe.	• All construction waste materials to be offered to the Research Station Manager for re-use within the station
• The use of reusable plastic pallets to be used	•
•	•
Metals	
Reduction measures	**Reuse measures**
• All buildings to be constructed using a modular design with panels pre-fabricated in Europe.	• All construction waste materials to be offered to the Research Station Manager for re-use within the station

Recycle and recovery measures

The following waste streams are to be segregated for recycling/ recovery off site:

Waste stream	EWC code	Storage option	Management option
• Mixed Plastics	21 01 39	Stored in FIBC within ISO container	Return to UK for segregation into different plastic waste streams and recycled where possible
• Wood	17 02 01	Stored in FIBC within ISO container or directly within	Return to UK for re-use where possible. Remainder to be sent to waste to energy plant.
• Mixed Metals	17 04 07	Stored in FIBC within ISO container or directly in ISO container if too large for FIBC	Return to UK for segregation into different metal waste streams and recycled.
• Cables	17 04 11	Stored in FIBC within ISO container or directly in ISO container if too large for FIBC	Return to UK for segregation into different waste streams and recycled where possible
• Alkaline Batteries	20 01 33	Stored in plastic lined re-used wooden crates	Tape up terminals. Stored in plastic lined re-used wooden crates labelled “ASSORTED WASTE BATTERIES, NON REGULATED”.
• Clothing / Textiles	20 01 10	Stored in FIBC within ISO container	Return to UK. Disposal to follow waste hierarchy
• Cardboard	20 01 01	Stored in FIBC or bales within ISO container	Broken down and baled or packed into FIBC. Returned to the UK for recycling
• Glass	17 02 02	Stored in re-used 205 litre drum.	Containers to be marked “WASTE GLASS” and returned to the UK for recycling

• Paper	20 01 01	FIBC marked “PAPER” and with the recycling triangle.	Re-use on site for packaging where suitable. Store in FIBC marked “PAPER” and with the recycling triangle. Return to the UK for recycling
• Oil	13 02 07	Stored in re-used 25 ltr plastic containers marked “WASTE LUBRICANTS”	Returned to the UK for recycling
• Oil Filters	16 01 07	Stored in 205 ltr drum marked “OIL FILTERS” and “UN 3077 Class 9 Environmentally Hazardous Substance, solid, n.o.s.” Place inside hazardous waste ISO container	Empty oil filter before storing. Return to the UK for disposal.
• Oil Contaminated Rags	15 02 02	Stored in FIBC within hazardous waste ISO container and labelled “WASTE OILY RAGS”	Allocate hazard class 4.2, UN no. 1856. Return to the UK for disposal
• Aerosols	16 05 04 16 05 05	Store in plastic lined re-used wooden crate, marked “WASTE AEROSOLS”	Seal tops of aerosols with packing tape Affix appropriate hazard labels and label the case UN no. 1950. If a case contains a mixture of aerosols with different hazard classes, then label with all relevant hazard classes. Return to the UK for disposal
• Detergents and Disinfectants	20 01 30	Store In original bottles in plastic lined re-used wooden crate, marked “WASTE DETERGENTS AND DISINFECTANTS”	Offer to Rothera Station Leader before disposal. Return to the UK for disposal
• Paint and thinners	20 01 27 20 01 28	Store in plastic lined re-used wooden crate, marked “WASTE PAINT” or “WASTE PAINT RELATED PRODUCTS”	Paint is to be offered to the Rothera Station Leader for re-use. Return to the UK for disposal.

Hazardous Wastes Classification

Hazardous wastes must be carried in accordance with the *International Marine Dangerous Goods (IMDG) Code*. This covers the carriage of dangerous goods at sea. It is the Chief Officer's responsibility to ensure that the regulations are followed onboard ship. Hazardous materials must be separated into nine different general classes based on the United Nations (UN) hazard classification.
The general classes and subclasses are as follows:

Hazard Class	Class Description
Class 1	Explosive
Class 2.1	Flammable gas
Class 2.2	Compressed gas (non-flammable, non-toxic)
Class 2.3	Toxic gas
Class 3	Flammable liquid *
Class 4.1	Flammable solid
Class 4.2	Spontaneously combustible
Class 4.3	Dangerous when wet
Class 5.1	Oxidising agent
Class 5.2	Organic peroxide
Class 6.1	Toxic
Class 6.2	Infectious substance
Class 7	Radioactive material
Class 8	Corrosive
Class 9	Miscellaneous substance
*** Packing Groups for flammable liquids:**	
I	Flammable liquids - flash point below -18°C
II	Flammable liquids - flash point -18°C up to +22°C
III	Flammable liquids - flash point +23°C up to +61°C

If chemicals of the same class are mixed a list should be attached to the container identifying the approximate volumes of each different chemical it contains.
NEVER mix substances with different UN hazard classes. This is highly dangerous.
Special attention must be given to ensure that oxidising agents (Hazard Class 5.1) are kept separate from other chemicals
Acids and alkalis (hazard class 8) are not to be packed in the same container. They must be clearly labelled in separate containers.

Shipping Documentation

All waste sent out from BAS research stations and ships must be accompanied by an accurate Bill of Lading (BOL). BOLs are the principal documentation for waste removed from Antarctica. They are primarily used to ensure goods are loaded and transported appropriately and discharged in the correct location.
In addition the BOL's for waste are used to agree waste disposal contracts, verifying disposal invoices, auditing the waste management system and monitoring the quantity of waste that is produced in Antarctica. **Waste data has to be reported to BAM Nuttall, UKRI and the BAS Board.** It is therefore essential that the information provided on the BOL is complete, accurate and dated.

BOL's must be prepared by the person who is responsible for the waste, in conjunction with the Station Leader.

BOLs for major construction activity need to specify which project the waste originated from so that these records can be attributed to the correct project.

Each base has been provided with a pallet truck which has built in scales. Standard weights and volumes for use on BOL's are shown below. These should be used **only** in the absence of weighing or measuring facilities. **It is important that the weights and volumes are as accurate as possible.**

Waste	Volume (m^3)	Weight (kg)
205 litre drum – Empty	0.3	20
205 litre drum - Filled e.g. fuel, seawater (do not fill to the top - part fill only)	0.3	185
205 litre drum - Crushed	0.065	20
25 litre drum – Filled e.g. chemicals (do not fill to the top - part fill only)	0.04	30
ISO-container empty	25.0	As per tare plate on container
ISO-container full (crushed drums)	25.0	14,500
Skips	6	Dependent on contents
Small FIBC	0.5(max)	Dependent on contents
Large FIBC	0.75(max)	Dependent on contents

Completing a BOL
Examples of completed BOLs for both non-hazardous waste and hazardous wastes are shown at the end of this section.
The following information is required on all waste BOLs:
• Date
• Consignor
• Consignee
• Station/vessel generating waste
• Vessel used for transportation of waste
• Special stowage instructions (if applicable)
• BOL number
• Quantity and type of package
• Full description of contents
• Case/drum number (new number for each individual item; not required for wastes off-loaded in FI)
• Case dimensions (cm)

- Weight (kg)
- Volume (m3) per item
- Estimated value (if applicable)

Actual Waste Volumes

To be filled out on completion of the contract

Excavation Waste

Type of Waste	EWC Code		Estimated Quantity Tonnes/(m^3)			
		Total	Re-Use	Recycle	Recover	Dispose
Inert Soil and Stone	17 05 04					

Construction Waste

Type of Waste	EWC Code		Estimated Quantity kg/(m^3)			
		Total	Re-Use	Recycle	Recover	Dispose
Steel	17 04 05					
Concrete / Grout	17 01 01					
Cementitious Wash Water						
Alkaline Batteries	20 01 33					
Clothing / Textiles	20 01 10					
Cardboard	20 01 01					
Paper	20 01 01					

Timber	17 02 01					
Plastic	20 01 39					
Oil	13 02 07					
Oil Filters	16 01 07					
Oil Contaminated Rags	15 02 02					
Aerosols	16 05 04 16 05 05					
Glass	17 02 02					

Demolition Waste from Buildings (season 2022-23)

	Concrete	Wood	Steel	Insulation	Plaster Board	Calcium Silicate Board	Cement Particle Board	Aqua Elite Board	Acoustic Insulation
	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)
Fuchs House									
Old Bransfield House									
Ops Tower									
Generator Shed									
Tractor Garage									
Miracle Span									
Chippy Shed / Binghams									
Totals									

Demolition Waste from Services

	Metals				Plastics							Wood
	Copper	Steel	Al.	Galv. Steel	PVC	HDPE	ABS	PP	PE	Armaflex	Insudite	Ply
	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)
Electrical												
Fuel												
Heating												
Potable Water												
Sea Water												
Waste Water												
Fire Systems												
Data												
Ducting												
Wooden Box Trunking												
Cable trays												
Totals												

Schedule C5 Site Waste Management Plan

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Project reference	BAS.2066
Project title	Rothera Runway Resurfacing and Lighting
Client	UKRI / British Antarctic Survey
Principal contractor	BAM
Site waste coordinator / Environment engineer	NG
Contract value	
Address/location	Rothera Research Station, Rothera Point, Adelaide Island, Antarctica **Position Lat. 67°35'8"S, Long. 68°7'59"W**
Project description	This project will: • Replace the runway lighting with efficient LED lights including the associated cabling and ducting. • Extend the usable length of the runway and provide a turning circle for aircraft at southern end of runway • Improve the runway surface drainage • Restore the runway running surface • Improve runway/roadway safety with the provision of road barriers
Document prepared by	NG

Declaration:

We the client and principal contractor confirm that all reasonable steps will be taken to ensure that:

a) all waste from the site is dealt with in accordance with the duty of care in section 34 of the Environmental Protection Act

b) materials will be handled efficiently and waste managed appropriately

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Materials identified within this SWMP are not necessarily statutory waste as they do not fall within the legal definition of waste i.e. 'any substance or object which the holder discards intends to discard or is required to discard.' There is no intention to discard materials such as:

- site won excavated materials
- aggregates crushed in accordance with the WRAP Quality Protocol (on or off site)
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(See Appendix 1 for roles and responsibilities.)

Legislation

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BAS vessel the RRS James Clark Ross, maintains a garbage disposal record book, as required under MARPOL. A copy of the *Marine Standing Instruction MSI/Gen/21 Bilge and Garbage Disposal* is held on the ship and should be referred whilst on board.

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal

The Basel Convention regulates the transboundary movements of hazardous wastes and other wastes. It obliges its Parties to ensure that such wastes are managed and disposed of in an environmentally sound manner.

UK Environmental Legislation

International Waste Shipments Regulations 2019

These regulations state the requirements for the import and export of waste from the UK. Types of waste are classified as either red, amber or green, with red waste being prohibited and green waste being the least hazardous. The regulations confirm the UK commitment to the Basel convention.

Although waste from Antarctica is exempt from these regulations, it has been agreed with the Environment Agency that BAS and BAM will notify them of any waste returned to Antarctica. We are also obliged to inform all countries that the waste travels through of the quantities and nature of the waste. If a ship moors at a port, any waste aboard is deemed to have travelled through that country.

The Waste (England and Wales) (Amendment) Regulations, 2014

The Waste Framework Directive, which is the primary European legislation for the management of waste, is implemented through the Waste (England and Wales) (Amendment) Regulations 2014. It places great emphasis on the waste hierarchy to ensure that organisations deal with waste in the priority order of:

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The Duty of Care Regulations, 1991

Under the Environmental Protection (Duty of Care) Regulations, 1991, BAM is required to take all reasonable steps to keep its waste safe and secure so that it does not cause pollution or injury.

In particular, BAM must:

- Fulfil the legal requirement to apply the waste hierarchy.
- Ensure safe and correct packing and containment. This is of particular importance while the waste is in transit.
- Check that waste contractors are appropriately registered with the Environment Agency.
- Describe the waste on a Duty of Care transfer note so that the waste carrier can avoid committing an offence under the Regulations.

Failure to comply with the Duty of Care Regulations is a criminal offence and could result in a fine of an unlimited amount. The Environment Manager is responsible for compliance with the Environmental Protection (Duty of Care) Regulations, 1991 with regard to wastes returned by BAM from Antarctica for disposal in the UK.

The Hazardous Waste Regulations, 2005

Hazardous wastes are amongst the most harmful and difficult wastes to deal with. The Hazardous Waste Regulations 2005 control the licensing, transfer and disposal of such waste in the UK. The main element of these regulations which BAM must comply with is preparation of consignment notes for every movement of hazardous waste in the UK. And ensure legal disposal

The Head of the Environment Office is responsible for compliance with the Hazardous Waste Regulations, for hazardous waste being returned by BAS from Antarctica which is disposed of in the UK. BAM will be responsible for the removal of our Hazardous construction waste.

Materials resource efficiency

The following waste reduction and reuse measures have been included in the design and/or specification for this project and will be further developed as the design progresses:

Design specifications	Aggregate specification to be amended from British standards to suit materials available on site
Choice of materials	Use of site won materials for pipe bedding. Concrete ducting replaced by plastic ducting, reducing the weight of waste
Choice of Materials	Replacing concrete ducts with plastic ducting proposed by BAM and accepted.
Pre-fabrication off site	All concrete elements will be pre-cast outside of the Antarctic region and shipped to Rothera.

Forecast of the types and quantities of waste

It is estimated that this site will produce the following types and quantities of waste: These figures will be updated as the design is developed. All waste that cannot be re-used at Rothera will be returned to the UK for recycling/disposal at a licenced waste management facility.

Excavation Waste

Type of Waste	EWC Code	Estimated Quantity t (m^3)					Waste Management Action in Detail
		Total	Re-Use	Recycle	Recover	Dispose	
Inert Soil and Stone	17 05 04	630 (300)	630 (300)				Stockpile for re-use on site

Construction Waste

Type of Waste	EWC Code	Estimated Quantity kg/(m³)					Waste Management Action in Detail
		Total	Re-Use	Recycle	Recover	Dispose	
Concrete	17 01 01	2800 (2.8)					Whole lengths of pipe retained as spares. Remainder crushed and stockpiled for re-use.
Plastic	20 01 39	3800 (15.2)	1900 (7.6)	1900 (7.6)			Ducting and accessories retained as spares. Offcuts and damaged parts returned to UK for recycling.
Timber	17 02 01	2,500 (5.0)	1,000 (2.0)	1,500 (3.0)			Re-use offered to BAS for fuel for incinerator, remainder returned to UK for recycling.
Cable Off-Cuts	17 04 11	30 (0.5)			30 (0.5)		
Oil	13 02 07	750 (0.75)			750 (0.75)		Return to UK for use as fuel
Oil Filters	16 01 07	20 (0.2)		20 (0.2)			Return to UK for recycling
Oil Contaminated Rags	15 02 02	10 (0.5)				10 (0.5)	Return to UK for disposal
Alkaline Batteries	20 01 33	5 (0.05)		5 (0.05)			Return to UK for recycling
Clothing / Textiles	20 01 10	10 (0.5)		10 (0.5)			Return to UK for recycling
Cardboard	20 01 01	50 (0.8)		50 (0.8)			Return to UK for recycling
Paper	20 01 01	10 (0.2)		10 (0.2)			Return to UK for recycling

Management of waste

The production of waste material on this site during the construction phase is avoided wherever possible by following the '*reduce, reuse, recycle, recover*' measures outlined below. Only where these options have been exhausted is waste sent for disposal.

Waste will be stored in the same containers as waste from the Discovery Building project. In order to monitor waste produced by the Runway Resurfacing and Lighting project, waste quantities are to be estimated before waste is transferred to the containers.

Reduction and reuse measures

The following measures will be employed to reduce and reuse waste on this site:

General	
Reduction measures	**Reuse measures**
• Packaging to be discussed with suppliers and reduced a much as possible.	• All excavated material (except any hazardous material) to be re-distributed at Rothera.
• Accurate measurement, and minimal wastage will be allowed when ordering materials	• All construction waste materials to be offered to the Research Station Manager for re-use within the station
• Materials are to be stored and transported correctly to avoid damage	•
• Materials are to be kept off the ground by the use of pallets or timber bites	•
• All operatives are to receive training on the agreed reduction measures	•
• *(any other measures)*	•
Concrete and hardcore	
Reduction measures	**Reuse measures**
• Concrete ducting to be packed and transported with care to avoid damage	• Waste concrete to be crushed and re-used as aggregate.
Excavated material (soil & stones)	
Reduction measures	**Reuse measures**
•	• Excavated soil and stone to be re-distributed on site
Timber	
Reduction measures	**Reuse measures**
•	• All construction waste materials to be offered to the Research Station Manager for re-use within the station

Recycle and recovery measures

The following waste streams are to be segregated for recycling/ recovery off site:

Waste stream	EWC code	Storage option	Management option
• Concrete	21 01 39	Unused ducting stored carefully. Broken concrete stockpiled	Unused ducting kept as spares. Remainder crushed on site and re-used as aggregates
• Wood	17 02 01	Stored in ISO container	Offered to BAS for re-use or to fuel incinerator. Remainder returned to UK for re-use where possible or sent to waste to energy plant.
• Mixed Plastics	21 01 39	Stored in FIBC within ISO container	Return to UK for segregation into different plastic waste streams and recycled where possible
• Cable Off-Cuts	17 04 11	Stored in FIBC within ISO container	Return to UK for re-cycling
• Cardboard	20 01 01	Stored in FIBC or bales within ISO container	Broken down and baled or packed into FIBC. Returned to the UK for recycling
• Paper	20 01 01	FIBC marked “PAPER” and with the recycling triangle in ISO container	Return to the UK for recycling
• Alkaline Batteries	20 01 33	Tape up terminals. Stored in plastic lined re-used wooden crates labelled “ASSORTED WASTE BATTERIES, NON REGULATED”	Return to the UK for recycling
• Clothing / Textiles	20 01 10	Stored in FIBC within ISO container	Return to UK. Disposal to follow waste hierarchy

• Empty Aerosols	16 05 04 16 05 05	Store in plastic lined re-used wooden crate, marked “WASTE AEROSOLS”	Return to the UK for disposal
• Oil Filters	16 01 07	Empty oil filter before storing. Stored in 205 ltr drum marked “OIL FILTERS” and “UN 3077 Class 9 Environmentally Hazardous Substance, solid, n.o.s.” Place inside hazardous waste ISO container	Empty oil filter before storing. Return to the UK for disposal.
• Oil Contaminated Rags	15 02 02	Stored in FIBC within hazardous waste ISO container and labelled “WASTE OILY RAGS”. Allocate hazard class 4.2, UN no. 1856	Return to the UK for disposal
• Oil	13 02 07	Stored in re-used 25 ltr plastic containers marked “WASTE LUBRICANTS”	Returned to the UK for recycling

Hazardous Wastes Classification

Hazardous wastes must be carried in accordance with the *International Marine Dangerous Goods (IMDG) Code*. This covers the carriage of dangerous goods at sea. It is the Chief Officer's responsibility to ensure that the regulations are followed onboard ship. Hazardous materials are divided into nine different general classes based on the United Nations (UN) hazard classification.
The general classes and subclasses are as follows:

Hazard Class	**Class Description**
Class 1	Explosive
Class 2.1	Flammable gas
Class 2.2	Compressed gas (non-flammable, non-toxic)
Class 2.3	Toxic gas
Class 3	Flammable liquid *
Class 4.1	Flammable solid
Class 4.2	Spontaneously combustible
Class 4.3	Dangerous when wet
Class 5.1	Oxidising agent
Class 5.2	Organic peroxide
Class 6.1	Toxic
Class 6.2	Infectious substance
Class 7	Radioactive material
Class 8	Corrosive
Class 9	Miscellaneous substance
*** Packing Groups for flammable liquids:**	
I	Flammable liquids - flash point below -18°C
II	Flammable liquids - flash point -18°C up to +22°C
III	Flammable liquids - flash point +23°C up to +61°C

If chemicals of the same class are mixed a list should be attached to the container identifying the approximate volumes of each different chemical it contains.
NEVER mix substances with different UN hazard classes. This is highly dangerous.
Special attention must be given to ensure that oxidising agents (Hazard Class 5.1) are kept separate from other chemicals
Acids and alkalis (hazard class 8) are not to be packed in the same container. They must be clearly labelled in separate containers.

Shipping Documentation

All waste sent out from BAS research stations and ships must be accompanied by an accurate Bill of Lading (BOL). BOLs are the principal documentation for waste removed from Antarctica. They are primarily used to ensure goods are loaded and transported appropriately and discharged in the correct location.
In addition the BOL's for waste are used to agree waste disposal contracts, verifying disposal invoices, auditing the waste management system and monitoring the quantity of waste that is produced in Antarctica. **Waste data has to be reported to BAM Nuttall, UKRI and the BAS Board.** It is therefore essential that the information provided on the BOL is complete, accurate and dated.

BOL's must be prepared by the person who is responsible for the waste, in conjunction with the Station Leader.

BOLs for major construction activity need to specify which project the waste originated from so that these records can be attributed to the correct project.

Standard weights and volumes for use on BOL's are shown below. These should be used **only** in the absence of weighing or measuring facilities. **It is important that the weights and volumes are as accurate as possible.**

Waste	**Volume (m^3)**	**Weight (kg)**
205 litre drum – Empty	0.3	20
205 litre drum - Filled e.g. fuel, seawater (do not fill to the top - part fill only)	0.3	185
205 litre drum - Crushed	0.065	20
25 litre drum – Filled e.g. chemicals (do not fill to the top - part fill only)	0.04	30
ISO-container empty	25.0	As per tare plate on container
ISO-container full (crushed drums)	25.0	14,500
Skips	6	Dependent on contents
Small FIBC	0.5(max)	Dependent on contents
Large FIBC	0.75(max)	Dependent on contents

Completing a BOL

The following information is required on all waste BOLs:

Date	Full description of contents
Consignor	Case / drum number
Project	Case dimensions (cm)
Vessel used for transportation	Weight (kg)
Special stowage instructions (if applicable)	Volume (m3)
BOL number	Estimated value
Quantity and type of package	

Actual Waste Volumes

To be filled out on completion of the contract

Excavation Waste

Type of Waste	EWC Code	Estimated Quantity Tonnes/(m^3)					22/23 Season Quantity kg/(m^3)					23/24 Season Quantity kg/(m^3)				
		Total	Re-Use	Recycle	Recover	Dispose	Total	Re-Use	Recycle	Recover	Dispose	Total	Re-Use	Recycle	Recover	Dispose
Inert Soil and Stone	17 05 04	630 (300)	630 (300)													

Construction Waste

Type of Waste	EWC Code	Estimated Quantity kg/(m³)					22/23 Season Quantity kg/(m³)					23/24 Season Quantity kg/(m³)				
		Total	Re-Use	Recycle	Recover	Dispose	Total	Re-Use	Recycle	Recover	Dispose	Total	Re-Use	Recycle	Recover	Dispose
Concrete	17 01 01	2800 (2.8)														
Steel	17 04 07						190 (Oil Drums)		190 (Oil Drums)							
Plastic	20 01 39	3800 (15.2)		1900 (7.6)	1900 (7.6)											
Timber	17 02 01	2,500 (5.0)		1,000 (2.0)	1,500 (3.0)		1123 (2.25)		561 (1.12)	561 (1.12)						
Cable Off-Cuts	17 04 11	30 (0.5)				30 (0.5)										
Oil	13 02 07	750 (0.75)				750 (0.75)	589 (0.59)			589 (0.59)						
Oil Filters	16 01 07	20 (0.2)			20 (0.2)		11.4			11.4 (0.11)						
Oil Contaminated Rags	15 02 02	10 (0.5)														
Alkaline Batteries	20 01 33	5 (0.05)			5 (0.05)											
Clothing / Textiles	20 01 10	10 (0.5)			10 (0.5)											
Cardboard	20 01 01	50 (0.8)			50 (0.8)		191		191 (3.1)							
Paper	20 01 01	10 (0.2)			10 (0.2)											

Appendix 1 Roles and responsibilities

The Clients' Representative will:

- Appoint a Principal Contractor
- Provide the Principal Contractor with details of all decisions taken before the site waste management plan was drafted on the nature of the project, its design, construction method or materials employed in order to minimise the quantity of waste produced on site
- Ensure a construction phase SWMP is produced

The agent for the Principal Contractor will:

- Ensure the SWMP for the construction phase is produced, and distributed to all staff and subcontractors
- Ensure that within three months of project completion:
  - that the plan has been monitored on a regular basis
  - that estimated quantities are compared with actual
  - that any deviation from the plan are explained
  - that estimates of cost savings achieved have been made
- Keep a copy of the SWMP for a minimum of two years after project completion

The site waste co-ordinator / environmental engineer for the Principal Contractor will:

- Produce the construction phase SWMP prior to works starting on site
- Obtain from the client details of all decisions taken before the site waste management plan was drafted on the nature of the project, its design, construction method or materials employed in order to minimise the quantity of waste produced on site, for inclusion in the construction phase SWMP
- Keep a copy of the SWMP on site and display in suitable locations for information
- Review the plan monthly and update where necessary to accurately reflect progress
- Ensure the following waste data is recorded within BAM Site when any waste is removed from site:
  - a description of the waste, including the 6 figure EWC code
  - the name of the company collecting the waste (waste carrier)
  - the site where the waste is being taken to (waste destination)
  - the quantity of the waste and whether it was;
  - reused on site
  - taken for reuse at an exempt or standard permit site
  - taken to a transfer station for segregation and onward recycling
  - taken to a dedicated recycling facility
  - sent to landfill (only if all other options have been discounted)
- Ensure details of recycling figures for the transfer stations used within the region are obtained and entered onto BAM Site on a quarterly basis
- Ensure details of all waste carrier registration numbers, environmental permit numbers and exemption references for the carriers and disposal sites used within the region are checked and sent to the area environment advisor for input onto BAM Site

Appendix 2

ROTHERA OIL SPILL CONTINGENCY PLAN (OSCP)

Oil Spill Contingency Plan

Rothera Research Station

Document Title		Rothera Research Station Oil Spill Contingency Plan	
Author(s)		BAS Environment Office	
Version No.	**Date**	**Amendment Details**	**Approved By**
Draft V1	31/10/2023	Removal of duplication of oil storage locations from the fast facts that is already in section 2.5. Addition of Oil Spill Kit inventory as an appendix. Update to reflect increase in MGO/AVCAT mix.	Senior Environmental Manager
FINAL 9th Edition	27/10/2023		Head of Environment Office

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British Antarctic Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

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Contents

DOCUMENT DISTRIBUTION, CONTROL & AMENDMENT

Responsibility

The Head of Environment is responsible for the content and distribution of this Oil Spill Contingency Plan (OSCP).

Review Strategy

This plan is subject to a 5-yearly review by the BAS Environment Office. Additionally, review and re-issue will be undertaken as and when required. This could for instance be triggered by a significant change in layout of the station, the introduction of new technologies or technical elements to the station, changes in fuel storage on station, technical advances in the field of oil spill response or following a Tier 2 or 3 incident.

Amendment Procedures

Amendments to the Rothera Research Station Oil Spill Contingency Plan will be issued as necessary by the BAS Environmental Office. The OSCP will be updated on Iceflow, and a notification sent to those on the distribution list informing them of the update. Existing copies of the OSCP must be destroyed and replaced with the updated version. Confirmation must be provided to the Environmental Office that this has been completed.

Liability limitations

This document is produced for internal management purposes by the British Antarctic Survey (BAS). Its publication and/or sale do not constitute endorsement of any of the companies or products mentioned herein. BAS do not accept any responsibility or legal liability for any actions undertaken, on the basis of the advice in this document, by individuals not employed by BAS, or by organisations or companies not contracted to BAS in the field of oil spill response. Any liability of BAS to its own employees or to companies contracted to it will be limited to that under UK Health and Safety legislation or contractual agreement.

Distribution and Issue Status

The latest digital version of this document is held on the internal website under the Oil Spill Response Section: https://nercacuk.sharepoint.com/sites/BASDigitalw/people-teams/OperationsPolar/Pages/EnvironmentOil.aspx

Circulation List
Director of Operations
Head of Polar Operations, BAS Cambridge
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Lead Operations Planner, BAS Cambridge

Station Leader's Office, Rothera
Station Operations Manager, BAS Cambridge
Head of Environment Office, BAS Cambridge
Head of Estates, BAS Cambridge
Station Facilities Engineer, BAS Cambridge
BAS Incident Response Group (Microsoft Teams), BAS Cambridge
Head, Polar Regions Unit, Foreign, Commonwealth and Development Office (FCDO)

FAST FACTS ROTHERA STATION

Table 1: Fast facts Rothera Station

<table>
<tr><th colspan="2">ROTHERA RESEARCH STATION</th></tr>
<tr><td>Station Response Team</td><td>Core Station Response Teams:
<table>
<tr><th>Summer Station Response Team</th><th>Winter Station Response Team</th></tr>
<tr><td>Summer Station Leader</td><td>Winter Station Leader</td></tr>
<tr><td>Station Logistics Manager (summer only)</td><td>All winterers</td></tr>
<tr><td>Station General Assistants (summer only)</td><td></td></tr>
<tr><td>Air Unit Coordinator (summer only)</td><td></td></tr>
<tr><td>Station Facilities Engineers</td><td></td></tr>
<tr><td>Other summer staff with station management responsibilities or vehicle (including boats/aircraft) or fuel handling responsibilities</td><td></td></tr>
<tr><td>Winter Station Leader</td><td></td></tr>
<tr><td>All winterers</td><td></td></tr>
</table></td></tr>
<tr><td>Location</td><td>67°34'S, 68°08'W</td></tr>
<tr><td>Station area</td><td>Refer to Figure 4 for an overview map.</td></tr>
<tr><td>Buildings</td><td>Buildings located either side of the 920m long gravel runway (also refer to Figure 4 and Figure 5):
On the west side are the hangar, the bulk fuel storage tanks, and one fuel hut (with another fuel polishing hut and a steel platform for drummed petrol and paraffin expected to be constructed in 2023/24).
On the east side are the accommodation, storage and workshop facilities, as well as a science laboratory, a boatshed, generator shed and operations tower.
Situated at the southern end of Rothera Point is a deep-water wharf at which vessels can tie up alongside and discharge cargo and fuel.</td></tr>
<tr><td>Vehicles/ boats</td><td>Aircraft
Small boats
Vehicles and other small equipment</td></tr>
<tr><td>Number of personnel</td><td>Designed to accommodate 124 people (a station and field complement of between 60 to 124 between October and March each year, usually 22 throughout the winter)</td></tr>
<tr><td>Area covered by the OSCP</td><td>The immediate area around the station and runway. Refer to Figure 4 on page 10.</td></tr>
<tr><td>Season:</td><td>All year round</td></tr>
</table>

Resupply	Resupply between 2 -4 times each season depending on a BAS research vessel's (or vessel operated on behalf of BAS) movement. Fuel transfer is approximately 650,000 litres of marine gas oil and 350,000 litres of aviation fuel (AVCAT).
Sensitivities	Also refer to Figure 12 and Figure 13. 1. Salt water intake, wet well and reverse osmosis plant (refer to Section 4.9.1) 2. Salt water intake, wet well and aquarium in Bonner Laboratory (refer to Section 4.9.2) 3. Scientific monitoring sites (refer to Section 4.9.3) 4. ASPA No. 129 (refer to Section 4.9.4) 5. Terrestrial flora (refer to Section 4.9.5) 6. Marine ecosystems around Rothera Point (refer to Section 4.9.6) 7. Nesting birds (refer to Section 4.9.7) 8. Seals and whales (refer to Section 4.9.8)
Hazards or hazardous activities	1. Resupply of fuel by ship 2. Storage of fuel at Rothera Research Station 3. Refuelling of station day tanks 4. Refuelling of equipment, bowsers, vehicles, boats and aircraft 5. Transferring/ decanting fuel at station drum depots
Regular checks	1. Weekly visual check of the main fuel tank and pipeline 2. Annual inspection of the oil storage facilities
Oil storage facilities (refer to section 2.5)	
Oil spill response kit and PPE (refer to Appendix J)	

Section 1

INTRODUCTION

1. INTRODUCTION

1.1 AIM OF THE OIL SPILL CONTINGENCY PLAN

The aim of this Oil Spill Contingency Plan (OSCP) is to describe the procedures that will be used by the British Antarctic Survey (BAS) to enable a timely, effective, and coordinated response effort in the event of an oil spill at Rothera Research Station, Adelaide Island, Antarctica.

1.2 LEGAL REQUIREMENTS IN ANTARCTICA

The Protocol on Environmental Protection to the Antarctic Treaty (1991) contains stringent and comprehensive regulations to prevent and combat pollution. Article 15 of the Protocol requires Treaty Parties to provide for prompt and effective response action to incidents with potential adverse effects on the Antarctic environment, and to establish contingency plans for emergencies. The UK has enacted domestic legislation to enforce the provisions of the Protocol through The Antarctic Act (1994), The Antarctic Act (2013), and The Antarctic Regulations (1995/490 as amended).

The Council of Managers of National Antarctic Programmes (COMNAP) has carried out a comprehensive review of oil spill response in Antarctica. COMNAP has adopted a set of recommended guidelines for oil spill contingency planning to help national operators comply with the requirements of the Environmental Protocol. These guidelines have been used to develop the Rothera OSCP.

1.3 BAS POLICY ON OIL POLLUTION

In accordance with Article 3 (1) of Annex IV (Prevention of Marine Pollution) to the Protocol, BAS prohibits any deliberate discharge into the sea or land of oil or oily mixtures from either its research vessels or stations.

BAS makes every effort to prevent accidental oil spills through careful attention to fuel management and transfer operations, and by maintaining storage facilities and pipelines to a high standard. Nevertheless, BAS recognises that even with the best precautions, accidents can still happen, and oil spill contingency procedures are required.

BAS views an oil spill which might occur from its stations and vessels as extremely serious. **BAS' priorities are firstly, the safety of all personnel and secondly, minimising environmental impact as far as possible.** Given the severe operational and climatic restraints of operating in Antarctica, any spill response by BAS will seek to complement and make use of natural processes whenever possible.

1.4 THE SCOPE OF THE OIL SPILL CONTINGENCY PLAN

This plan describes the response procedures to be used at Rothera Research Station in the event of an oil spill resulting from:

- the grounding of a BAS vessel near to the station or loss of hydrocarbons into the marine environment from a vessel operating on behalf of BAS near to the station;
- failure of a bulk fuel tank;
- refuelling operations during ship to shore transfer;
- failure of pipes, valves, joints, small fuel tanks, vehicle fuel and oil tanks, aircraft fuel and oil tanks and fuel drums;
- refuelling of day tanks, vehicles, boats and aircraft;
- transferring/decanting fuel from 205l, 25l, and 1 litre containers

The potential impacts of releasing hazardous materials into the environment include long-term impact on aquatic organisms and the aquatic environment, wildlife injuries and fatalities, damage to BAS/ Natural Environment Research Council (NERC)/ UK Research and Innovation (UKRI)/ Foreign, Commonwealth and Development Office (FCDO) reputation and conflict with other COMNAP states.

In the event of an oil spill occurring from a BAS vessel whilst in the immediate vicinity of Rothera Research Station, the Ship's Captain is responsible for leading the vessel response in line with the relevant Shipboard Oil Pollution Emergency Plan (SOPEP) and for liaising with the Station Leader to coordinate and agree the necessary response from the station. The Station Leader will implement the shoreside response in line with the station OSCP and in liaison with the Ship's Captain.

BAS stations do not have the capability to provide oil spill response to non-BAS vessels. In the case of a spill from a non-BAS vessel, the external vessel is responsible for conducting its own response. BAS stations will only respond locally in order to protect its own resources and environmental sensitivities.

1.5 HOW TO USE THE CONTINGENCY PLAN

The plan gives an introduction to Rothera and its infrastructure and sensitivities, outlines BAS' general spill response strategies, and supports any response efforts by clarifying responsibilities and actions. It comprises six further parts:

Section 2 Local Information: This section contains a description and map of Rothera highlighting, the research station, its infrastructure, and its oil storage facilities. It gives an overview of the area covered by the contingency plan and the probability, size, type, movement and fate of oil spills at Rothera.

Section 3 BAS Oil Spill Response Strategy: Outlines BAS' classification of oil spills and the general response strategy as well as internal training requirements.

Section 4 Responsibilities and Actions on Station: This section describes the emergency procedures to be followed at Rothera when a spill occurs. It sets out the expected chronological order of events. Roles and responsibilities of personnel are defined, and action plans detailed. Advice is given on the initial rapid assessment, managing a spill site, available response techniques and equipment deployment. The sensitivities and resources, i.e., infrastructure and environmental sensitivities at risk, near station are examined and the priorities for a response including protection are established. Finally, instructions are given for reporting, waste disposal, environmental monitoring, and the termination of an oil spill response.

Section 5 Health and Safety: This section outlines risks to responders and station staff associated with spill response and applicable health and safety requirements.

Section 6 Responsibilities and Actions at BAS Cambridge: Describes the spill response structure at BAS Cambridge and outlines corresponding responsibilities and actions.

Section 7 Communications: Section 7 outlines internal and external communication requirements, including contacts as appropriate.

Appendices: These include the oil spill response form, rapid initial assessment form, risk assessment, information on how to use spill response equipment and site fuel layouts.

Section 2

LOCAL INFORMATION

2. LOCAL SITE INFORMATION

2.1 ROTHERA POINT OVERVIEW

Rothera Research Station (67°34'S, 68°08'W) is located on Rothera Point, Adelaide Island, Antarctica, as shown in Figure 1 below:

Figure 1: The Antarctic Peninsula and Rothera Research Station

Rothera Point is a low rocky promontory, situated in the southeast corner of Adelaide Island, covering an area of approximately 3.5km^2 and rising to a maximum height above sea level of 39m. A raised beach forms an isthmus between the Wormald Ice Piedmont and Rothera Point, and connects the point, via an ice ramp, to the rest of the island. Antarctic Specially Protected Area (ASPA) No. 129, is situated on the north-eastern corner of the Point (refer to Figure 3 on page 45 and Section 4.9.4) and is clearly marked by signposts placed along its boundary.

An overview of the southeast corner of Adelaide Island showing Rothera Research Station can be found in Figure 2 below.

Figure 2: Overview map of southeast Adelaide Island

The climate is relatively cold and dry. The mean wind speed is 13.4 kts. Gale force winds are expected on over 60 days per year and an extreme gust of 80 kts has been recorded. The prevailing wind direction is from the north-east with the strongest winds generally coming from this direction or from the north-north-west. The mean air temperatures in summer are

in the region of -2°C to +1°C, whilst in winter they range from -5°C to -20°C. The extreme minimum temperature has been recorded at -39.5°C.

Seawater temperatures at Rothera vary little, ranging between -1.8°C in winter to 0.5°C in summer. Sea ice conditions vary greatly through the year and from year to year. The waters around Rothera Point can remain totally locked with fast ice from July to February one year but be completely free of fast ice in another. Pack ice often drifts north from Marguerite Bay when the wind is in the south or calm and can fill South Bay in a few hours.

Rothera has no direct sunlight for a few weeks at austral mid-winter (June) and has 24 hours of sunlight possible for a similar period at austral mid-summer (December).

2.2 THE ROLE OF ROTHERA RESEARCH STATION

Rothera Research Station is the main air facility for BAS and its centre for airborne and deep-field science programmes in the Antarctic. Since 1996/97, it has also been the centre for BAS terrestrial biology and inshore marine biology. Field parties operate within a large area around Rothera. The vast majority of the scientific work is carried out between October and March each year, with a station and field complement of between 60 to 124 people. The station is staffed by 22 people (on average) over the intervening winter seasons during which ongoing scientific research is carried out and essential maintenance and preparations are made for the forthcoming summer.

2.3 PHYSICAL LAYOUT OF THE STATION

Rothera Research Station is operated all year round and can accommodate a maximum of 124 personnel. The station was built on the relatively flat raised beach area of Rothera Point between the rock outcrops on the east side and the ice ramp to the west. The station complex is divided by the 920m long gravel runway. On the west side of the runway are the hangar and the bulk fuel storage tanks, and on the east side are the accommodation, storage and workshop facilities, as well as a science laboratory, a boat house, power plant and operations tower. Situated at the southern end of the Point is a deep water wharf at which vessels can tie up alongside and discharge cargo and fuel.

A local overview map of Rothera Point is shown in Figure 3 overleaf.

Environmental and station sensitivities (such as wildlife and freshwater source) at Rothera Research Station are discussed in more detail in Section 4.9.

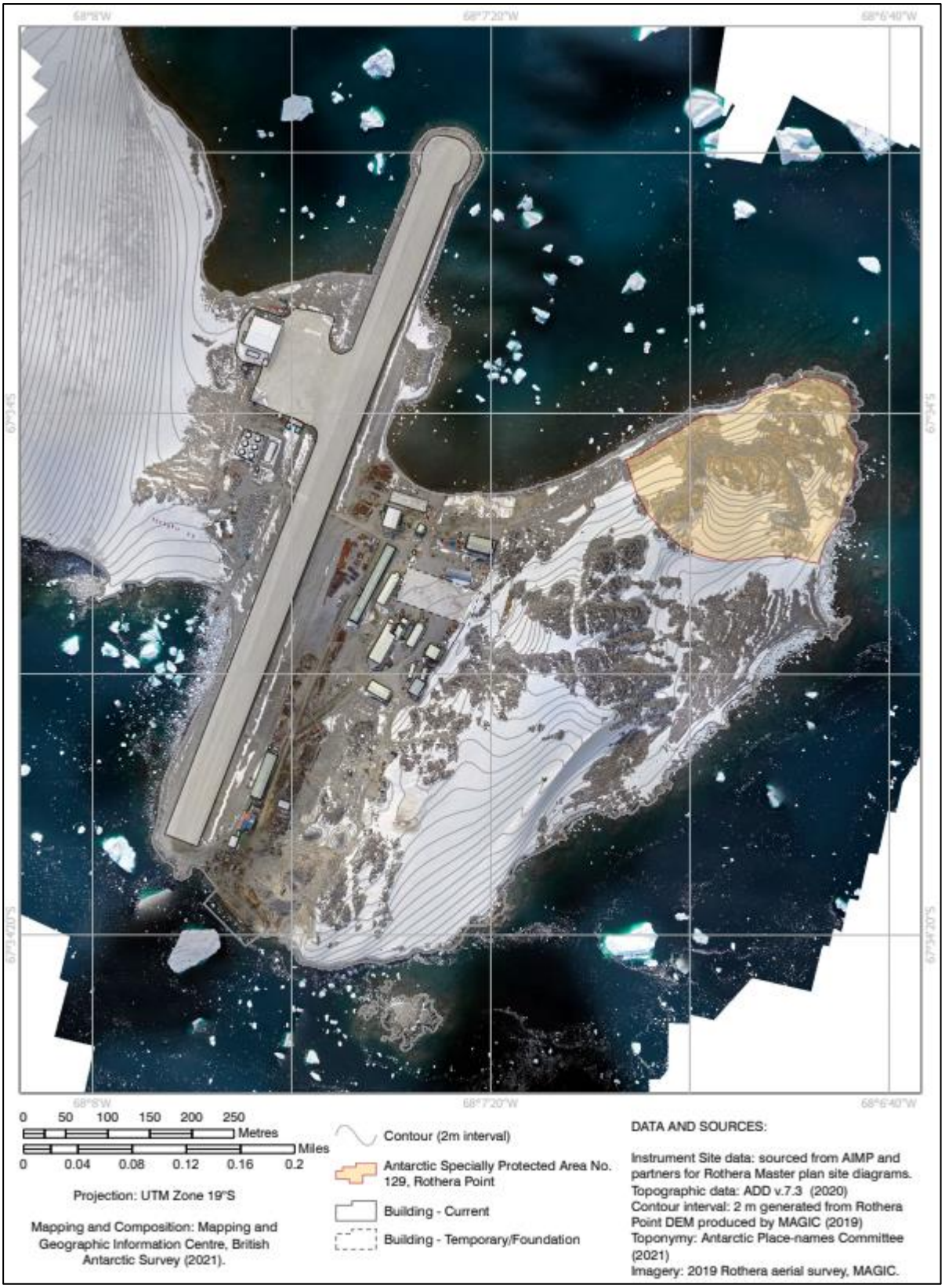


Figure 3: Overview of Rothera Point

2.4 THE AREA COVERED BY THE OIL SPILL CONTINGENCY PLAN

The OSCP covers the immediate area surrounding the station and the runway as shown in the aerial overview of the station complex in Figure 4 below.

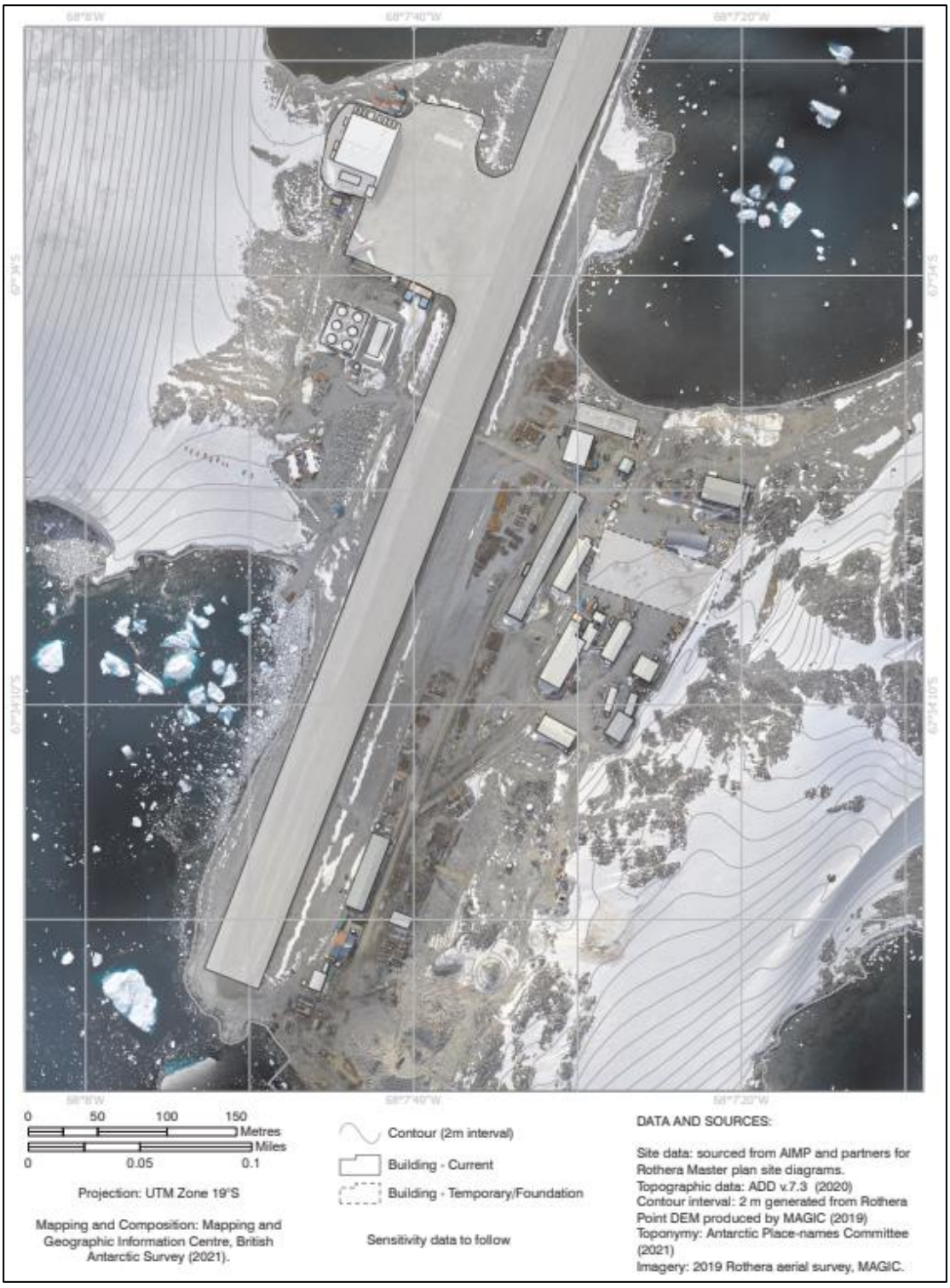


Figure 4: Aerial overview of Rothera Station Complex

2.5 OIL STORAGE FACILITIES

The following oil storage facilities are located at Rothera Station six main bulk fuel tanks, fuel drum depots, two day holding tanks, a boiler fuel tank and several other small bulk fuel tanks. In addition, there is temporary fuel storage for the Antarctic Infrastructure Modernisation Programme (AIMP) construction work. All oil storage facilities are described under Section 2.5, and maximum fuel quantities are shown in Table 2 below. The fuel network layout can be found in Figure 6 on page 15. Due to the ongoing construction work at Rothera Station, the location and type of fuel lines/ connections are expected to change. However, there are currently no updated services plans available apart from the services connections to the Bonner Lab (Figure 7 on page 16).

Estates conduct annual fuel tank inspection surveys. Bulk storage and associated pipework are checked before each fuel delivery.

Table 2: Oil storage facilities on Rothera Island

Location	Type of fuel	Type of storage	Secondary containment	Maximum quantity (litres)
Rothera Station – Bulk fuel MGO and aviation fuel storage tanks (refer to Section 0)				
Main fuel tank 1 Rothera station – west of runway	MGO or AVCAT/AVTUR	Bulk tank	Contained within a bund	240,000 litres each
Main fuel tank 2 Rothera station – west of runway	MGO or AVCAT/AVTUR	Bulk tank	Contained within a bund	240,000 litres each
Main fuel tank 3 Rothera station – west of runway	MGO or AVCAT/AVTUR	Bulk tank	Contained within a bund	240,000 litres each
Main fuel tank 4 Rothera station – west of runway	AVCAT or AVTUR	Bulk tank	Contained within a bund	240,000 litres each
Main fuel tank 5 Rothera station – west of runway	AVCAT or AVTUR	Bulk tank	Contained within a bund	240,000 litres each
Main fuel tank 6 Rothera station – west of runway	AVCAT or AVTUR	Bulk tank	Contained within a bund	240,000 litres each
Rothera Station – Day holding tanks (refer to Section 2.5.2)				
Day holding tank 1 Rothera Station – Generator shed	MGO/AVCAT/AVTUR	Bulk tank	Single skinned and bunded	5,500 litres each
Day holding tank 2 Rothera Station – Generator shed	MGO/AVTUR/AVCAT	Bulk tank	Single skinned and bunded	5,500 litres each
Rothera Station – Boiler fuel tank (refer to Section 2.5.3)				
Boiler fuel tank – Old Bransfield House	MGO/AVCAT/AVTUR	Bulk tank	Double skinned tank	3,400 litres
Rothera Station – Other small fuel storage tanks (refer to 2.5.4)				
New Bransfield House	MGO	Bulk tank	Double skinned tank	12,500
Admirals	MGO	Bulk tank	Bunded	6,800
Giants	MGO	Bulk tank	Bunded	3,800
Bonner Lab	MGO	Bulk tank	Bunded	5,300
Vikings	MGO	Bulk tank	Bunded	2,600

Location	Type of fuel	Type of storage	Secondary containment	Maximum quantity (litres)
Incinerator tank - outside behind the incinerator	AVCAT or MGO	Bulk tank	Unknown	500
Mobile bowser 1	Petrol	Bulk tank	Bunded	1,005
Mobile bowser 2	Petrol	Bulk tank	Bunded	1,005
Mobile bowser 3	MGO/AVCAT/AVTUR (minimal cut)	Bulk tank	Bunded	8,000
Rothera Station – Garage and Hangar tanks (refer to 2.5.5)				
Garage fuel tank	MGO / AVTUR/AVCAT	Bulk tank	Double skinned tank	2,100
Garage waste oil tank	Lube oils	Bulk tank	Unknown	1,800
Hangar generator emergency tank	MGO/ AVTUR/AVCAT	Bulk tank	Unknown	12,480
Rothera Station – Station drum depots (refer to Section 2.5.6)				
Rothera station – at wharf in ISO containers (generally a temporary location after ship relief before being moved to the apron)	AVTUR	320 x 205 litre drums	ISO container	65,600
Rothera station - ISO containers adjacent to the apron	AVTUR	1000 x 205 litre drums	ISO container	205,000
Rothera station - flattened area to the south of the bulk fuel tanks (installation of an elevated drum platform is planned for 2023/24)	Petrol	100 x 205 litre drums	No containment	20,500
	Paraffin	15 x 205 litre drums	No containment	3,075
Rothera station – Yellow metal cupboard inside the hangar	In-use Lubricating Oil / 2 Stroke Oil / Antifreeze / Degreaser	400 x 205 / 100 / 25 litre	Unknown	11,750
Rothera station - storage container outside the hangar, 25m to the north	Spare Lubricating Oil / Two-stroke Oil / Antifreeze / Degreaser		Sumped (bunded base) storage container	
Rothera station – Vehicle lube store, west side of the vehicle workshop	Lubricating Oil / Two-stroke Oil / Antifreeze / Degreaser		Sumped (bunded base) storage container	
Rothera Station – Temporary fuel tanks for AIMP Rothera Modernisation Project (refer to Section 2.5.7)				
Construction works fuel bowser	MGO/AVCAT/AVTUR	Bowser	Bunded steel bowser	5,000
Rothera Station - adjacent to Generator Shed	MGO	Steel bulk tank	Bunded (110%)	50,000
Construction works generator tank	MGO	Bulk tank	Bunded	2,250

Location	Type of fuel	Type of storage	Secondary containment	Maximum quantity (litres)
Western Global transcube tank no. 1 (located at the vehicle workshop)	HVO	Bulk tank	Bunded steel tank	2000
Western Global transcube tank no. 2 (located at the fuel farm)	HVO	Bulk tank	Bunded steel tank	2000
Western Global transcube bowser located south of the Bonner Lab	HVO	Bowser	Bunded steel tank	950

2.5.1 Station bulk fuel tanks

The bulk fuel storage facility contains aviation fuel (AVCAT or AVTUR), and Marine Gas Oil (MGO). Fuel is stored in six 240,000 litre tanks, which are contained within a bund, thus ensuring containment should a spill or leak occur.

The AVCAT and AVTUR dispenser is located at the south end of the aircraft apron and the MGO pump is located at the south-east corner of the tank containment area. An overview of the fuel network layout from 2007 can be found in figure 6.

A visual check of the tanks and pipeline is carried out each week by the station facilities engineer.

Rothera fuel farm infrastructure is being upgraded (works due to be completed in 2023/24) with the installation of a new fuel farm hut that will house fixed fuel polishing units capable of filtering the fuel in all three MGO bulk storage tanks independently of the main fuel circulation. This is expected to reduce waxing and reduce fuel wastage.

The new fuel farm hut (similarly to the existing fuel hut and sitewide flow and return pipes) will sit outside of the bulk tank bund (see Figure 5). However, the new hut and associated plant will be fitted with individual bunds on each polishing unit with bund alarms, increasing our capacity to catch leaks in the system. The station ring main pumps will be surrounded by a small concrete coffer dam which will contain any small leaks or spillages.

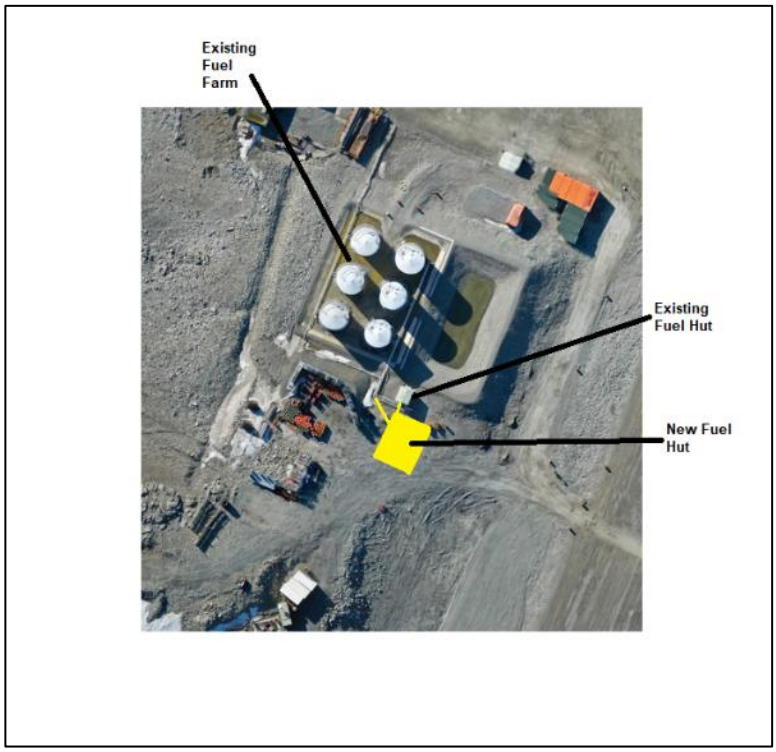


Figure 5: Proposed layout of new structures

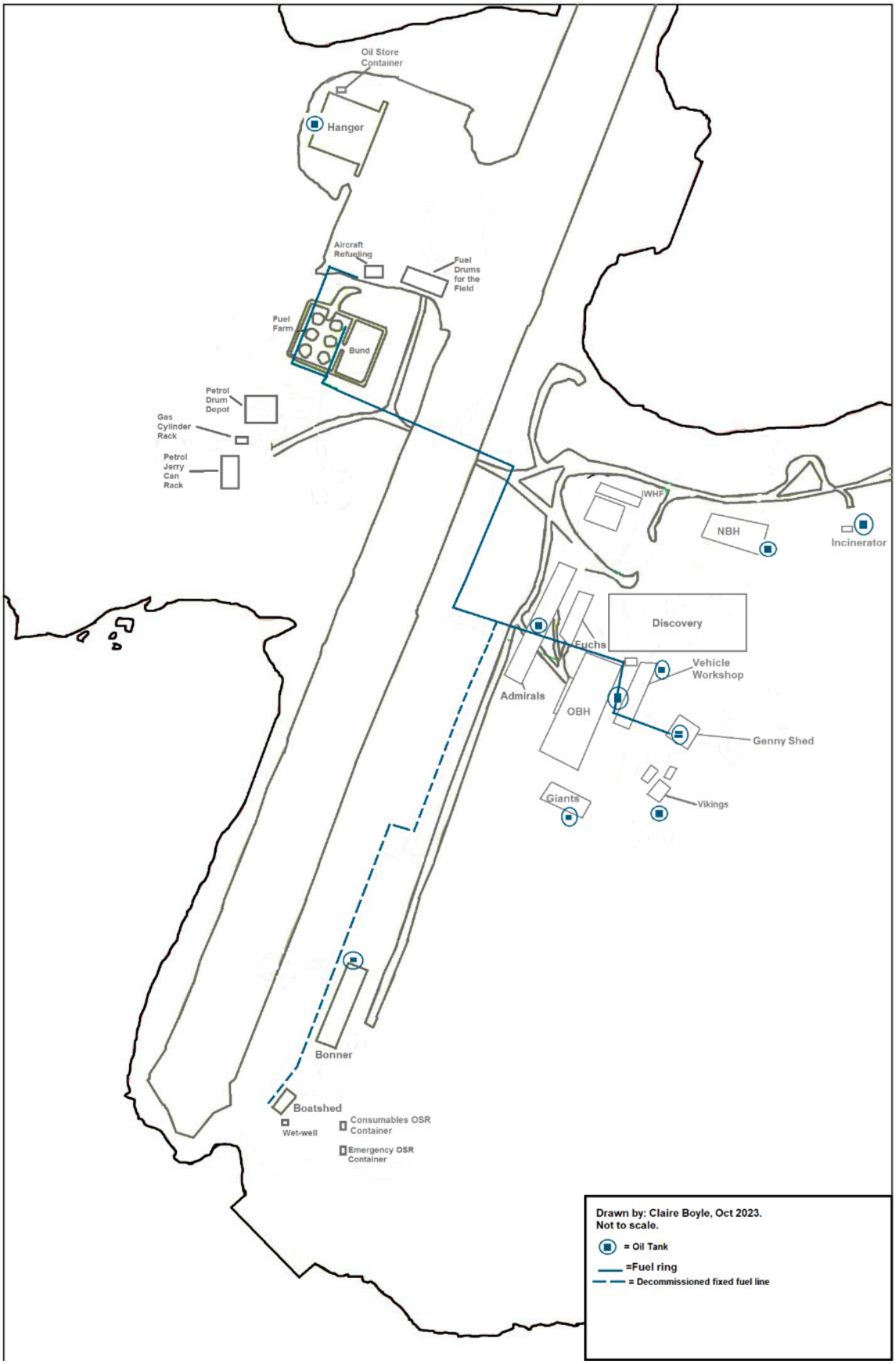


Figure 6: Overview of fuel network layout- not shown are temporary tanks and bowsers

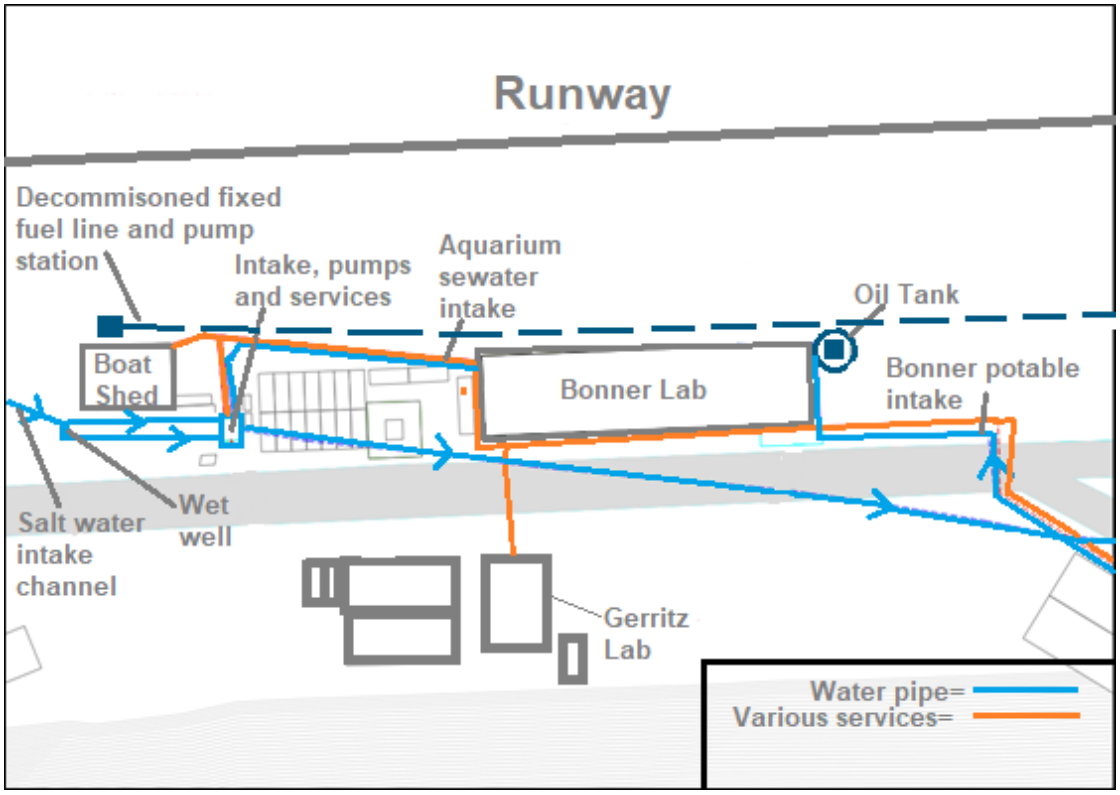


Figure 7: Bonner Lab updated services plan (2023)

2.5.2 Day holding tanks

The day holding tanks (2 x 5,500 litres) located in the generator shed are fed from the station bulk tanks on a daily basis. Bulk fuel is delivered to the generator shed through two plastic coated steel pipes (100 mm) buried underground. The fuel is circulated, and heat traced to prevent it from waxing. Each tank is fitted with control valves and a re-circulating pump is situated in an enclosed housing to the southeast of the fuel farm.

2.5.3 Boiler fuel tank

The double-skinned boiler fuel tank in Old Bransfield House (3,400 litres) is fed from the station bulk tanks on a daily basis. Bulk fuel is delivered to Old Bransfield House through two plastic coated steel pipes (100 mm) buried underground. The fuel is circulated, and heat traced to prevent it from waxing. Each tank is fitted with control valves and a re-circulating pump is situated in an enclosed housing to the southeast of the fuel farm.

2.5.4 Other Small fuel storage tanks

There are several small fuel storage tanks at Rothera station as detailed in Table 2 on page 11. All tanks are fitted with ‘dead-mans’ shut-off handles and fuel quantity gauges (except for the in the Bonner Laboratory and Vikings).

The incinerator fuel tank is of 500 litre capacity (MGO or AVCAT) and is located outside behind the incinerator.

The petrol bowsers are sited outside the Geritz Lab and on the ramp. The MGO/AVTUR/AVCAT bowser is located outside New Bransfield House.

Estates are currently preparing an updated map showing where bowsers and other mobile plant can be safely stored away from the station's sensitivities. Refuelling of the petrol bowsers is completed by the Vehicle Mechanics. Refuelling of the MGO/AVCAT/AVTUR bowser is completed by the Estates team.

A drawing of the services that connect the wet well to station water source and the Bonner Laboratory and other buildings to fuel lines can be found in Figure 7 on page 16.

2.5.5 Garage and Hangar tanks

The double-skinned garage tank (2,100 litres) is filled on a daily basis. Bulk fuel is delivered to the garage through two plastic coated steel pipes (100 mm) buried underground. The fuel is circulated, and heat traced to prevent it from waxing. The garage waste oil bulk tank holds 1,800 litres. The type of secondary containment is unknown but is being investigated to confirm. Both tanks are fitted with 'dead man's handles and control valves. A re-circulating pump is situated in an enclosed housing to the southeast of the fuel farm.

The Hangar generator emergency tank situated outside the hangar holds 12,480 litres of AVTUR. The type of secondary containment is unknown but is being investigated to confirm.

2.5.6 Station drum depots

Drummed AVTUR is delivered to station in 205 litre drums, in 20ft shipping containers. These are offloaded onto the wharf, where they are stored temporarily until they are moved to the main depot on the hanger either, in their containers by vehicle, or they are unpacked from the container and towed on a sled, when there is sufficient snow cover. The Vehicles department's SOPs apply. AVTUR drums can be stored at the hangar apron for up to 18 months before either being flown into the field or transferred to the aircraft fuel tanks. The risk of a spill occurring is low as drums are visually inspected when they arrive at Rothera.

The main petrol and paraffin drum depot is located on a flattened area to the south of the station bulk fuel tanks. Drums are stored here for up to 2 years without secondary containment. A large steel platform will be constructed in 2023/24 as shown in Figure 8 below in order to house the drummed petrol and paraffin. .

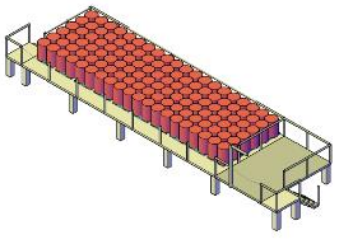


Figure 8: Concept drawing of drum platform

Drums and bottles (205, 100, 25 litres) of lubricating oils, antifreeze, degreaser and two-stroke oil are stored at Rothera station at the following locations:

- Inside a sumped storage container, which is located on the west side of the vehicle workshop. The vehicle workshop and lube store have absorbents to deal with small spills. The generator shed contains dustbins full of oil spill absorbents.
- Inside the aircraft hangar, a stock of in-use Paints, Oils and Lubes (POLs) is stored in a yellow metal cupboard.
- Spare POLs are stored inside a sumped storage container outside the hangar, 25m to the north. The quantities held here are small and absorbents stored in the hanger are available to deal with spills.

2.5.7 Temporary fuel tank for AIMP construction at Rothera

During the construction work under the AIMP, various projects will require additional temporary fuel storage as agreed and detailed in the Environmental Impact Assessments (EIA) for the Rothera Modernisation project and Rothera Runway Resurfacing project. Including:

- A 5,000 litre bunded steel bowser for refuelling vehicles, temporary tanks, and mobile generators.
- A temporary 50,000 litre bunded steel bulk tank was installed on the north side of the generator shed in the 2021/22 season. The additional fuel powers generators that support MEP systems in the Discovery Building and serves heated containers. The tank will be removed at the end of the project in the 2024-25 season.
- A temporary 2,250 litre bunded tank was installed in 2019-2020 adjacent to the AIMP generators. This tank will provide fuel for the mechanical plant and the generator tank used during construction and will be refuelled using the towable bowser.
- In 2022/23, 4,950 litres of Green D+ fuel, an enhanced type of Hydrogenated Vegetable Oil (HVO) was imported to Rothera as part of an AIMP trial managed by BAM. The HVO was stored in two Western Global 2,000 litre transcube bunded bulk tanks at either the fuel farm or the generator shed. In addition, a 950 litre smaller refuelling and transport bowser tank was delivered and located south of the Bonner Lab in order to feed HVO to the BAM 65 kVA generator as part of the trial. No additional HVO is being delivered in the 23/24 season but the trial is expected to continue with the remainder of the fuel. In 2022/23, BAM used 1000 litres of the HVO and the vehicles team used 595 litres, leaving a total of 3355 litres remaining at the start of the 2023/24 season.

During construction works at station the Station Leader will continue to have overall responsibility for oil spill response, but BAM will lead on response to Tier 1 spills as detailed in the EIA. Please also refer to section 4.2.1.1 BAM (Construction Partner) Individual Staff Member Action Plan.

In the event of a HVO fuel spill, the existing Oil Spill Response Measures for MGO can be followed. A 1,100-litre spill kit will be supplied by BAM in a wheeled bin adjacent to the 2 x 2000 litre HVOs tanks.

Additionally, all mechanical plant will carry oil spill kits. Refuelling of plant and equipment will be carried out by nominated refuellers and comply with the BAM refuelling procedures. The Standard Operation Procedure (SOP) for refuelling at Rothera applies.

2.6 FUEL STORAGE AND HANDLING PROCEDURES

For Rothera, the Standard Operation Procedure (SOP) for Re-fuelling at Rothera applies. This procedure is reviewed annually. The refuelling of vehicles falls under the Vehicles Departments' SOPs.

2.6.1 Refuelling of the station bulk fuel tanks

Refuelling of the station bulk fuel tanks is undertaken in accordance with the SOP for Re-fuelling at Rothera. This sets out how to re-supply Rothera bulk tanks using the lay flat hose and equipment (during the Rothera Wharf construction works the original 4" fixed fuel pipes from the wharf to Admirals house were removed and they are planned to be re-instated upon completion of Rothera AIMP works) direct from the ship to the fuel farm and the bulk tank containers positioned on the wharf.

There are separate resupply hoses and pipelines for the MGO (refer to Appendix D and Appendix E Marine Gas Oil System) and AVCAT/AVTUR (refer to Appendix F). During refuelling, continual inspections are made of the fuel hoses, the fuel tanks and level gauges, and on-board ship. Drip trays are placed under the hose joints as a precaution during refuelling. Contact between personnel is maintained using VHF radio.

2.6.2 Refuelling of the day tanks

The MGO pump shown in Appendix D is capable of continuous operation and delivers fuel via a sub-surface pipeline to the generator shed where it can be used to top up the day tank.

2.6.3 Refuelling of the vehicles, equipment, boats and aircraft

Refuelling of the station vehicles, equipment, boats and aircraft is carried out around Rothera under station refuelling procedures. SOPs for refuelling vehicles are owned by the Vehicles team.

The AVCAT/AVTUR dispenser shown in Appendix F is fed via a surface pipeline from the bulk AVCAT/AVTUR tanks. Aircraft may then be refuelled directly from the dispenser.

2.6.4 Refuelling of mechanical plant and generators during construction

Mechanical plant and the generator tank used during AIMP construction are refuelled using a towable 5,000 litre bunded steel bowser. This is towed by a tractor or similar item of plant. Refuelling is manged by the construction partner BAM and oil spill equipment is located adjacent to the fuel tank and accompanies the bowser at all times. All mechanical plant carries spill kits.

2.6.5 Refuelling of station drum depot

Drums are moved around station by vehicle from the wharf to the apron either containerised by machine or towed by a bulldozer on a sled. Locally they are moved by drum trolly. Vehicles SOPs apply.

2.7 SPILL SCENARIOS AND RISKS

A range of spill scenarios have been generated for Rothera Research Station. Generally, these range from the very low probability of a large oil spill if a vessel were to run aground, to the high probability of small spills during refuelling operations and the handling of fuel drums.

2.7.1 The expected probability, size and type of oil spills

Table 3 summarises the expected probability, maximum spill size and fuel type for certain scenarios.

Table 3: Expected probability, maximum spill size and fuel type for a range of possible scenarios at Rothera Research Station.

Spill scenario	Probability	Maximum spill size (l)	Fuel type
BAS Ship collision with iceberg or grounding	Very low	690,000 2,200	Diesel fuel (MGO) / AVTUR/ AVCAT Other petroleum products
Catastrophic failure of a station bulk fuel tank	Low	240,000	Diesel fuel (MGO)
Leak during refuelling ship to shore	Medium	1,000	Diesel fuel (MGO)
Break in MGO circulation line	Medium	24,000	Diesel fuel (MGO)
Rupture / overflow of New Bransfield House day tank	Low	12,500	Diesel fuel (MGO)
Rupture or overflow of day tank in generator shed	Medium	5,500	Diesel fuel (MGO)
Rupture or overflow of boiler tank	Low	3,400	Diesel fuel (MGO)
Rupture / overflow of Admiral House tank	Medium	6,800	Diesel fuel (MGO)
Rupture / overflow of Old Bransfield House tank	Medium	3,400	Diesel fuel (MGO)
Rupture / overflow of Emergency Generator tank	Medium	12,480	Diesel fuel (MGO)/ AVCAT
Spill scenario	**Probability**	**Maximum spill size (l)**	**Fuel type**
Rupture / overflow of Generator Shed tank	Medium	2,600	Waste oil / lubricants
Rupture / overflow of Giants House tank	Medium	3,800	Diesel fuel (MGO)
Rupture / overflow of Bonner Laboratory tank	Medium	5,300	Diesel fuel (MGO)
Rupture / overflow of garage tank	Medium	2,100	Diesel fuel (MGO)
Rupture / overflow of garage tank	Medium	1,800	Waste oil / lubricants
Rupture of mobile petrol fuel bowser	Medium	1,005	Petrol
*Rupture of temporary fuel tanks	Medium	5,500	Diesel fuel (MGO)
*Rupture of construction works generator fuel tanks	Medium	2,250	Diesel fuel (MGO)

*Rupture of construction works mobile fuel bowser	Medium	5,000	Diesel fuel (MGO)
*Rupture of HVO bulk fuel tank	Medium	2000	Hydrogenated vegetable oil (HVO)
*Rupture of smaller HVO bulk fuel bowser	Medium	950	Hydrogenated vegetable oil (HVO)
Damaged drum at a fuel depot	High	205	Diesel fuel (MGO) Petrol Paraffin
Overflow of vehicle / aircraft tank while refuelling	High	Traces	AVTUR / Avtur-oil mix / Petrol / Petrol-oil mix / AVCAT
Failure of pipes, valves or joints	Medium	1,000	Diesel fuel (MGO)

* Temporary fuel storage facilities for AIMP construction work

2.7.2 The likely movement of oil spills at Rothera

Spills on Rothera are most likely to occur either from the station itself or during refuelling from ship to shore and will be of AVCAT, AVTUR, petrol or MGO.

A spill of diesel fuel during refuelling from ship to shore will enter the sea in South Cove and spread very quickly unless it occurs on sea-ice or within an ice lead. A fuel spill which enters South Bay will spread out quickly into Ryder Bay and then potentially beyond.

If a spill enters the sea in North Bay, onshore north-easterly winds would help to contain the spill to the local shoreline. However, in such wind conditions the bay regularly fills up with pack ice and bergy bits which would hamper any clean-up. Fuel that enters the sea will initially float but will then evaporate at a speed determined by the prevailing temperature, and, particularly in rough weather, will be naturally dispersed by wave action.

At the station, a spill not contained within bunds will follow the topography of Rothera Point, generally running down slope towards North or South Bay. It will pool in hollows, in particular under buildings. It will seep through the rocky subsurface until it reaches the layer of permafrost. Any significant vertical migration will probably be stopped by permafrost which is thought to be found near the surface even at sites such as Rothera with altitudes close to sea level.

Oil will also be absorbed by snowdrifts. Snow absorbs oil through capillary action and reduces how far it spreads. It is easier to recover oil whilst on the ice before thawing occurs. On ice, oil will pool in cavities and will behave as it would on impermeable ground, following the path of least resistance. Due to the type of oil and additives used by BAS, oil is not expected to solidify on ice.

2.7.3 The likely fate of spilt oils

BAS use diesel fuel (MGO), aviation fuel, petrol, paraffin, and lubricating oil on and around Rothera Research Station. Oil can potentially be spilled on ice-free ground, man-made ground, snow, ice or in the water (sea).

The majority of potential spills at Rothera will be of MGO or aviation fuel. On land, MGO and aviation fuel generally evaporate readily, even in cold temperatures and calm conditions where the evaporation rate is expected to be lower than in a temperate environment. In the sea, MGO and aviation fuel normally evaporate and disperse into the water column readily at ambient temperatures although at extreme low temperatures these processes are likely to be slower.

In cold climates, small spills of refined products, such as petrol and paraffin, on land will typically evaporate over two days. If the products enter the water, they will typically evaporate and disperse naturally to a large degree in turbulent waters. When spilled, paraffin will spread rapidly into a thin sheen and as with petrol, it will rapidly evaporate and naturally disperse. Refer to Section 3.2 for further details on BAS'BAS response strategy to petrol spills.

Lubricating oil used at BAS stations is expected to remain fluid in cold temperatures and to not evaporate, which should allow for containment and recovery (Section 4.10.2).

Section 3

BAS OIL SPILL RESPONSE STRATEGY

3. BAS OIL SPILL RESPONSE STRATEGY

When considering general oil spill response strategies, there are three primary options:

- **containment and recovery;**
- in situ-burning;
- use of dispersants.

A decision as to what particular response strategy will be utilised depends on the available response capabilities, the spill condition at the time, the risks to responders and the impact on the environment. As described in Section 3.1 BAS response strategy to spilt oils (not petrol) below, **the general BAS response strategy is 'containment and recovery',** and the use of dispersants and in-situ burning are not practised on BAS stations.

3.1 BAS RESPONSE STRATEGY TO SPILT OILS (NOT PETROL)

The general strategy of BAS is to contain and recover oil spills (except petrol) with emphasis on recovering as much oil as possible in the first few days after a spill with as little impact on the environment as possible. The response techniques used by BAS to contain and recover oil are described in more detail in Section 4.10.

Before employing any response technique, the risk of damage to the environment caused by each technique must also be considered and be minimised in as much is as possible.

Each spill is different, and the general strategy of containment and recovery of spilt oil may not always be appropriate. Under certain conditions, BAS would allow natural recovery to take place or may seek expert external advice on alternative response strategies should the need arise for a Tier 2 or 3 incident (please refer Section 3.6 BAS classification of oil spills).

The use of dispersants and in-situ burning are not practised on BAS stations as described in Section 3.5.

3.2 BAS RESPONSE STRATEGY TO PETROL SPILLS

Petrol is a lighter oil and is generally volatile in nature and will usually evaporate readily and naturally disperse. In cold climates, it will typically take two days to evaporate.

If spilled offshore, petrol rarely requires an active response beyond monitoring[1] as the right amount of wave action effectively aids natural dispersion, and oil will break down in the water column naturally.

If spilled on land, particularly in confined areas, petrol has the potential to ignite causing fires and/or explosions. Even in ventilated areas the evaporated fuel fumes from the spilt petrol can affect breathing and cause nausea.

Therefore, BAS generally do not actively respond to petrol spills but allow them to evaporate naturally. Should large amounts of petrol be spilled or should the spill occur in an area of site sensitivity (Section 4.9), it should be re-evaluated whether this approach is appropriate or

[1] ITOPF Handbook - ITOPF: Page 30

whether an active response may be required by contacting BAS Cambridge for advice (Section 4.10.1).

3.3 ENVIRONMENTAL MONITORING

The initial response to any oil spill is undertaking surveillance to detect, monitor and track any spills. In the Antarctic, this option is limited due to the lack of airborne and boat surveillance available. Where possible, BAS personnel will undertake inland, shore or ice-based surveys as the first step of the monitoring programme. Monitoring may not always be necessary, especially if a spill is small and resources are not at risk.

The initial monitoring by BAS personnel is undertaken through a 'Rapid Initial Assessment' (see Section 4.3) and aims to obtain information regarding:

- Confirmation and location of the oil spill
- Origin of oil and status of the source
- Quantification of the volume of oil (if on water) using the Bonn Agreement Oil Appearance Code (BAOAC)[2]
- Weather conditions, such as prevailing winds and currents, to calculate trajectory of an oil slick on water[3].

Post-incident monitoring is covered in Section 4.18.

3.4 SAMPLING OF OIL

BAS does not have suitable laboratory equipment on station that could be used to analyse spilt oil and characterise its type or degree of weathering. However, in some instances, BAS Environment Office will advise on the need to collect samples, provide information on the sampling method and equipment to be used, and arrange for its subsequent analysis.

3.5 RESPONSE STRATEGIES NOT USED BY BAS

3.5.1 In-situ burning (ISB)

ISB is a response technique that removes spilled oil from land, snow, ice, or water surfaces through controlled burning of the surface oil. The application of ISB removes relatively large amounts of oil from the surface but generates large amounts of black smoke and contributes to atmospheric pollution. A small percentage of unburned oil may remain from the spill and residual by-products (such as dioxin, a persistent chemical) may be released into the environment after ISB. The potential effects of these residues, combustion by-products and the smoke plume on humans, wildlife and the environment need to be carefully considered particularly on sensitive Antarctic terrestrial and water communities[4].

This is also supported by the Protocol on Environmental Protection to the Antarctic Treaty (1991) which contains stringent and comprehensive regulations to prevent and combat

[2] Bonn Agreement Oil Appearance Code (BAOAC) entered into effect on 1 January 2004.
[3] As a rule, oil will move on water with 3% of the wind's energy and 100% of the current.
[4] (FACTSHEET I No.3 I ISB Human Health And Environmental Effects): Response Library - Oil Spill Prevention and Response - API

pollution. Article 3 of the Protocol requires Treaty Parties to protect the Antarctic environment and avoid activities that have significant adverse effects on air and water quality.

In addition to the environmental impacts of ISB, the safety concerns and weather conditions also need to be considered. The risk of managing a controlled fire in a remote location and in proximity to BAS stations is considered too high and too difficult to safely mitigate. The weather conditions in the Antarctic are generally not suitable to support the safe application of ISB.

Overall, the overriding factor in the Antarctic Treaty area is considered to be the avoidance of adverse effects on air and water quality as well as the protection of human life and wildlife. Therefore, BAS does not practice ISB.

3.5.2 Dispersants

Chemical dispersants aim to enhance natural microbial degradation, a naturally occurring process where microorganisms remove oil from the environment. Dispersants break up the surface oil slick from the sea surface into tiny oil droplets and thereby remove oil from the water surface by transferring it into the water column where it is broken down by natural microbial degradation.

Dispersants can be applied by aircraft or watercraft. The use of dispersants should always be based on a net environmental benefit analysis. The toxicity of the oil, the dispersed oil, and the dispersant itself must be considered as mixing these into the water column could potentially expose an array of resources and habitats that normally would not be exposed if the oil were left on the surface.

Due to the remoteness and the lack of suitable aircrafts and watercrafts in Antarctica, the application of dispersants is not a realistic option for BAS. Dispersants are also generally used on spills in open water whereas spills at BAS stations are likely to occur near the coastline. Dispersants also have a limited shelf life and will add to the station storage requirements, if unused they will create additional hazardous waste to be shipped back to the UK.

Overall, the use of dispersants is not considered viable by BAS.

3.6 BAS CLASSIFICATION OF OIL SPILLS

Oil spill incidents within BAS are classed in Tiers 1, 2, 3. The classification is based on the *International Association of Oil & Gas Producers (IOGP) Tiered preparedness and response framework*[5]. This classification into tiers identifies the oil spill response capabilities required to mitigate any potential oil spill scenario. There are three categories of response capabilities: Response personnel, response equipment and additional support. The tiers should only be used to define the required response capabilities to respond to the incident, not the scale of the incident itself. A number of factors influence the response capabilities: location, oil type, season and volume spilled.

[5] Tiered preparedness and response | IPIECA

Within BAS, three tiers have been defined as outlined in Section 3.6.1 to Section 3.6.3 below and shown in Table 4 below:

Table 4: BAS Classification of incidents

Tier 1	Incident can be dealt with by one or two station personnel or a small subset of the station response team using local response equipment.
Tier 2	Incident requires the full response capability of the station and assistance from BAS Cambridge.
Tier 3	Incidents which exceed the response capability of the station and BAS Cambridge. Outside assistance is required.

3.6.1 Tier 1

Response capabilities utilised include one to two adequately trained station staff (refer to Section 3.7 Training) and local response equipment. The incident can be managed by the station alone and does not affect local infrastructure or environmental sensitivities. No additional support is required.

This could for instance include spills from a leaking fuel drum with immediate containment (by using putty and/ or decanting into intact, leak-proof drum) as well as immediate recovery and clean-up of the contaminated area such as bagging of waste snow and fuel and disposal in accordance with the BAS Waste Management Handbook. Tier 1 can be described as a reactive initial response, where activities are driven by resources available and immediate priorities.

Due to the limited quantity of fuel and type of containers present and their remoteness, incidents occurring in or near the field huts are generally expected to be classed as Tier 1.

3.6.2 Tier 2

Response capabilities employed include, the station's full response team coordinated by the Station Leader, and local equipment. The incident affects local infrastructure, resources and/or environmental sensitivities. Additional support i.e., technical advice is provided by BAS Cambridge.

This would include spills requiring more complex containment as well as protection of vulnerable areas (refer to Section 4.9). Tier 2 can be described as proactive 'project' phase, where spill response activities are driven by objectives and strategies and resources identified depending on demand. A more detailed assessment is required to ascertain the most appropriate response technique and it may take longer to employ relevant equipment.

3.6.3 Tier 3

Response capabilities utilised encompass the station's full response team coordinated by the Station Leader, local equipment, and BAS Cambridge support. These capabilities are limited practically, and further support would be required. However, due to the remoteness and often limited accessibility of Antarctica, it is not realistic to expect further, possibly international capabilities, to be available to be called upon. For the same reason, there is no further contractual assistance that could be called on.

Section 4.10 provides details on the response capabilities held at Rothera Research Station i.e., response techniques and equipment available.

It is important to remember that resources held in the three tiers complement and enhance the overall capability, e.g., the elements of a Tier 1 response are supplemented by higher Tier capability and not superseded or replaced by it. This approach enables a seamless escalation according to the requirements of the incident.

3.7 TRAINING

BAS recognise the importance of training in oil spill response and are committed to providing and facilitating appropriate training opportunities.

3.7.1 Cambridge Staff Training

BAS Environment Office and other key operational staff e.g., Station Operations Managers, Station Leaders, and Station Facilities Engineers, where appropriate, maintain accreditation to internationally recognised International Maritime Organisation (IMO) oil pollution preparedness and response training at IMO Level 2 or IMO Level 3 with refresher training offered every three years.

In the event of an oil pollution incident on station, BAS Environment Office staff will participate in the BAS Incident Response as the Environmental & Pollution Incident Representative and offer advice on:

- Mitigating risks of pollution and/or environmental impact
- Clean-up measures
- Waste Management
- Environmental Monitoring

3.7.2 Station Leader Pre-deployment Training

All Station Leaders (SLs) receive Station Management Oil Spill Response Training in Cambridge and by Oil Spill Response Ltd in Southampton prior to deployment South. The training detail is summarised in Appendix I.

3.7.3 Station Response Team Pre-Deployment Training

A representative group of station staff will receive the Station Oil Spill Response Team Training in Cambridge prior to deployment South and will form the core station response team. At Rothera Research Station, the core station response team will be made up of station management and staff as below:

- Summer Station Leader
- Winter Station Leader
- Station Facilities Engineer
- Station Deputy Facilities Engineer
- Majority of the wintering team
- Key summer personnel including, Station Logistics Manager, Station General Assistants and the Air Unit Ground Coordinator.

The training is a half day classroom and practical session coordinated by the BAS Environment Office and delivered by BAS and Oil Spill Response Ltd. The training is intended to give an overview of station oil management, OSCPs, environmental and H&S impacts of a spill and highlight BAS' spill response strategies. The training detail is summarised in Appendix I.

BAS Environment Office holds all records of UK oil spill response training delivered within the BAS Environmental Management System (EMS).

3.7.4 On-Site Station Response Team Training

The Station Leader, assisted by the Station Facilities Engineer where available, are responsible for providing on-site spill response training to a subset of station staff that will form the spill response team on site.

The training should be delivered in the summer to the incoming station personnel consisting of the 'core' spill response team as detailed above (trained in the UK) and to all remaining winterers that didn't receive training in the UK and key summer staff with station management responsibilities or vehicle (including boats/aircraft) or fuel handling responsibilities. Wherever possible, training should be delivered prior to ship to station bulk refuelling and prior to the spill response exercise. The Station Leader must keep local records of all training delivered in Maximo under the Safety, Health, Environment and Quality (SHEQ) Reporting Module. The training detail is summarised in Appendix I.

3.7.5 On-Site Station Spill Response Exercises

The Station Leader is responsible for undertaking spill response exercises with the station response team. A spill response exercise should be planned and executed twice annually for wintering stations or once annually for summer only stations. Staff must be trained (as detailed above) prior to undertaking an exercise.

At wintering stations, two exercises are required per year: the first exercise is to take place at the start of the season once the majority of all summer staff and incoming winterers have arrived and then once more at the end of the season with all wintering staff. The exercises should be specific to the station and should test scenarios that have the potential of occurring and that the station may therefore need to respond to. A selection of scenarios should be developed that cover a variety of potential real-life incidents where an oil spill may occur specific to each station. Both exercises must involve full set up, deployment, operation, and recovery of all spill response equipment. This should include deployment at sea of booms and staking on the shoreline, setting up of Fastanks and operation and testing of skimmers. Equipment should be deployed in locations relevant to the spill scenario. The purpose of the exercise is to:

- maintain the spill response team's training and competency
- test the OSCP procedures
- test the suitability and performance of PPE and spill response equipment; and
- identify weaknesses and learning points.

The Environment Office can support and provide advice and guidance prior to an exercise – please get in touch if further guidance is required.

Following each exercise, the Station Leader will complete an exercise report and submit this to BAS Cambridge via the Maximo SHEQ Reporting Module.

Section 4

RESPONSIBILITIES AND ACTIONS AT STATION

4. RESPONSIBILITIES AND ACTIONS AT STATION

4.1 INTRODUCTION

The general BAS Oil Spill Response strategy is 'containment and recovery' for all oil spills **except petrol** and is defined in greater detail in section 3**.** The emphasis is on recovering as much oil as possible in the first few days after a spill with as little impact on the environment as possible. Further detail on the types of response techniques that can be applied to respond to an oil spill at Rothera Research Station are discussed in section 4.10. of this chapter.

BAS Response Strategy to Petrol Spills
BAS does not actively respond to petrol spills. Petrol is a light and volatile oil with potential to ignite causing fire/explosion. Petrol spills are generally allowed to evaporate naturally. Always report petrol spills as soon as possible so that appropriate and case specific advice can be provided. See section 3.2. for further advice on BAS' response strategy to petrol spills.

Within BAS, oil spills are classified into three tiers. The tiers are used to define the response capabilities (e.g., response staff, spill response equipment, additional Cambridge support) required to respond to an oil spill and do not define the scale of the spill itself. The Tier classification is summarised in the table below and further detail is provided in section 3.6.

BAS Oil Spill Tier Classification	
Tier 1	Incident can be dealt with by one or two station personnel or a small subset of the station response team using local response equipment.
Tier 2	Incident requires the full response capability of the station and assistance from BAS Cambridge.
Tier 3	Incidents which exceed the response capability of the station and BAS Cambridge. Outside assistance is required.

Section 2.5 of this OSCP provides a summary of the oil storage facilities on station. It also summarises the scenarios on station that could lead to an oil spill and provides guidance on the likely movement of oil spills at Rothera Research Station based on the local geography, land structure and features of the station.

The following headings in this Section set out the steps and actions to be followed at Rothera Research Station when a spill occurs, in the expected chronological order of events. Roles and responsibilities of station staff are defined, and action plans are provided. Advice is given on several actions including:

- Initial rapid assessment of the spill
- emergency shut down measures
- managing the site and spill responders safely
- how and when to notify Cambridge
- Station sensitivities (including wildlife) and priority for protection
- Spill response techniques to be applied

4.2 STATION OIL SPILL RESPONSE STRUCTURE

The oil spill response structure for Rothera Research Station comprises the Station Leader and Station Response Team or individual staff depending on classification of the spill, as well as the BAS Cambridge (Operations on Call) as required (Figure 9).

The core Station Response Team of 40 staff will be led by the Summer Station Leader in summer and the response team of 20 staff will be led by the Winter Station Leader (refer to Section 4.6).

Summer Station Response Team	**Winter Station Response Team**
Summer Station Leader	Winter Station Leader
Station Facilities Engineer	All winterers
Station Deputy Facilities Engineer	
Station Logistics Manager (summer only)	
Station General Assistants (summer only)	
Air Unit Coordinator (summer only)	
Other summer staff with station management responsibilities or vehicle (including boats/aircraft) or fuel handling responsibilities	
Winter Station Leader	
Winterers	

Their respective training requirements are detailed in Section 3.7. Contact between station staff will be established by VHF.

On station, the Station Leader will co-ordinate the spill response and report into Cambridge as required (refer to 4.2.2 and Figure 9 overleaf).

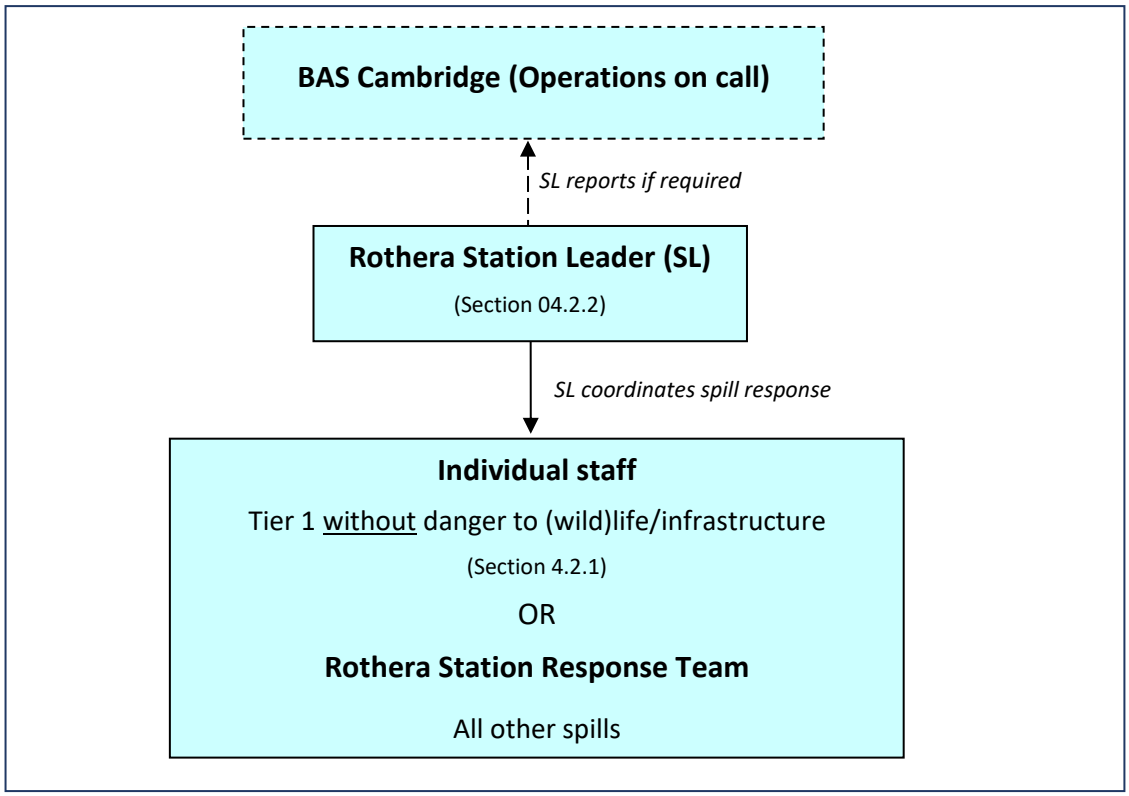


Figure 9: Oil spill response structure Rothera Research Station and reporting requirements to BAS Cambridge

4.2.1 Individual Staff Member Action Plan

Responding to an oil spill incident is the responsibility of everyone, i.e. all individual staff members on station regardless of their assigned role. In accordance with Figure 10 on page 36 the individuals must either:

- Respond to the spill if within their capabilities (e.g. Tier 1) and report to the Station Leader. Appropriate containment and recovery actions using absorbents, putty or decanting into good condition oil containers (see Section 4.10.2.1);
- Immediately report to the Station Leader if beyond their capability (e.g. Tier 2 or 3). Once a spill is reported to the Station Leader it becomes their responsibility to coordinate the response.

Incidents occurring in or near any field hut are generally expected to be classed as Tier 1 due to the limited quantities of fuel and type of containers presents. Individual staff members stationed in the huts are expected to respond to minor spills as described above.

4.2.1.1 *BAM (Construction Partner) Individual Staff Member Action Plan*

During the AIMP construction works at station undertaken by BAM, the Station Leader will continue to have overall responsibility for all Tier 2 or 3 incidents on station, irrespective of how they happened or who caused the spill. BAM staff are responsible for dealing with any

Tier 1 spill they have but have to report them to the SL as soon as possible for inclusion on Maximo.

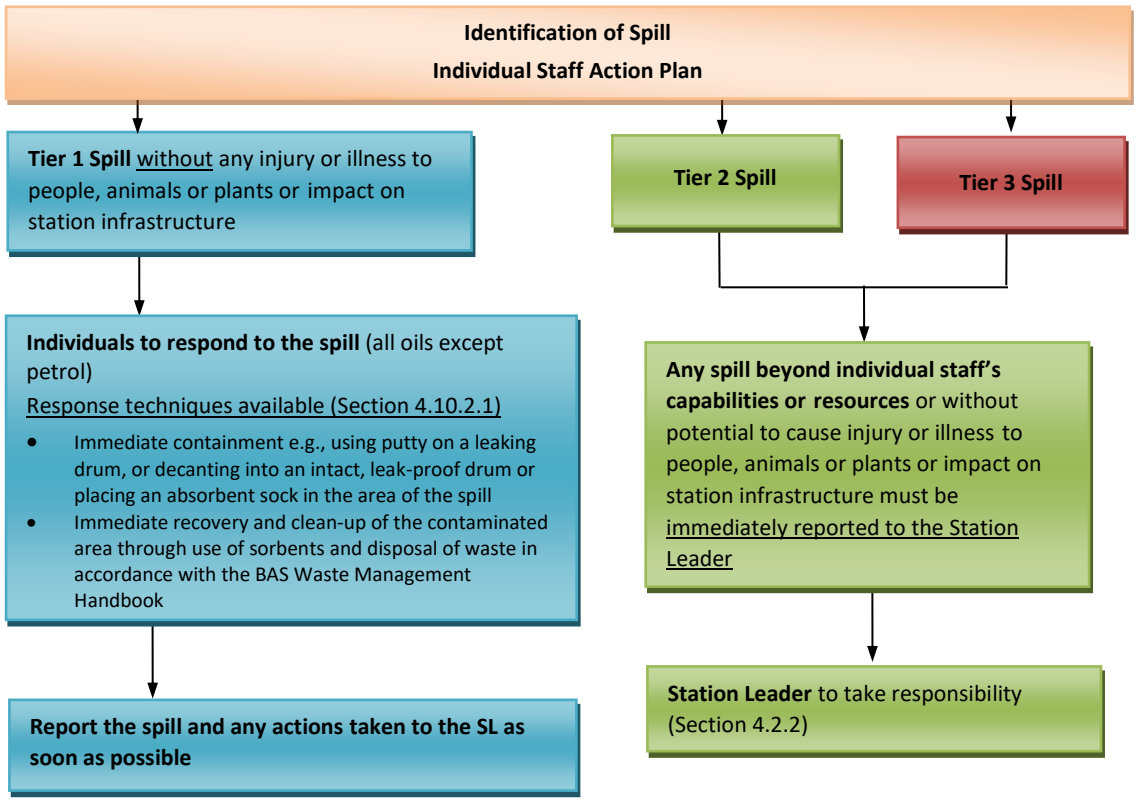


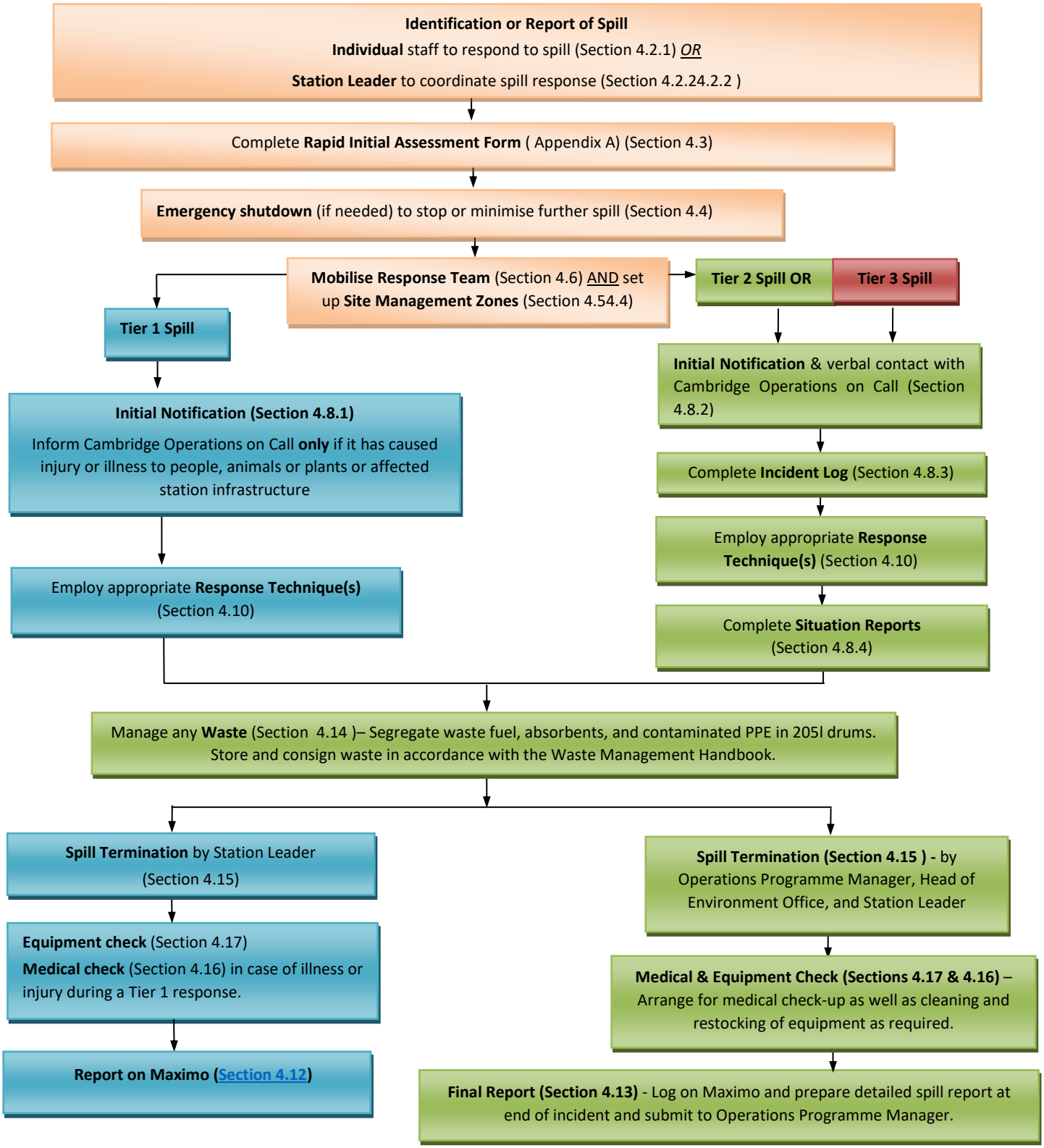
Figure 10: Action Plan Individual staff member

4.2.2 Station Leader (SL) Action Plan

Once a spill has been discovered and reported to the Station Leader, spill response becomes the Station Leader's responsibility. Their responsibilities during an incident, including the requirement to notify BAS Cambridge, are outlined in the Station Leader's Action Plan in Figure 11 overleaf. All tasks and actions are explained in more detail in Sections 4.3 to 4.18.

During the AIMP construction works at station undertaken by BAM, the Station Leader will continue to have overall responsibility for spill response for all spills at Tier 2 or 3 level on station, irrespective of how they happened or who caused the spill. BAM staff are responsible for dealing with any Tier 1 spill they have but have to report them to the SL as soon as possible for inclusion on Maximo (refer to Section 4.2.1.1).

Figure 11: Action Plan – Rothera Station Leader



4.3 RAPID INITIAL ASSESSMENT (RIA)

The health and safety of station personnel is paramount during an oil spill. The Station Leader must carry out a rapid initial assessment of the situation. This will provide them with on overview of the spill scenario and determine if the spill area can be declared safe and the spill response can proceed.

As outlined below, the Station Leader shall undertake the following tasks and record actions required in the RIA Form (see Appendix A):

- Confirm the time and location of the spill;
- Confirm the type of oil and assess probable quantity of oil spilled and probable source and cause;
- Assess the risk of fire or harm to human health (Section 5);
- Assess site sensitivities at risk and priority for protection;
- Assess weather conditions;
- Assess capabilities to respond (spill response team and spill response equipment).

In a potentially hazardous or explosive spill the Station Leader may need to: muster the team and undertake a head count to ensure everyone present on station (or in/ near the field hut) is accounted for: follow the station muster procedure as necessary and review agreed mustering location based on the location of the spill incident.

Emergency spill response actions should not be undertaken in periods of extreme weather conditions or darkness unless the situation has been fully assessed by the Station Leader and deemed safe.

When extremely volatile fuels, such as petrol, are spilled in a confined area, there may be a risk of fire or explosion. In unventilated areas petrol fuel fumes can also affect breathing and cause nausea. In such circumstances, explosion and fire prevention are the top priority. No clean-up is to be attempted of spilt petrol and the spill area should not be accessed by staff until it is declared safe by the Station Leader.

If there is any risk of fire or explosion, the mobile fire unit should be brought immediately to the scene if safe to do so. The Air Unit are responsible for its deployment on scene and use if necessary.

4.4 EMERGENCY SHUTDOWN

Once the Station Leader has deemed the situation to be safe, they must order any emergency shutdown measures needed to stop or minimize further spillage (in consultation with the Station Facilities Engineer) or shutdown measures needed to protect station sensitivities (see section 4.9).

A Tier 1 incident as defined in Section 3.6.1 is unlikely to require an emergency shutdown. However, the incident may develop into a Tier 2 incident during the monitoring phase (refer to Section 3.3), where an emergency shutdown may be required.

4.4.1 Shut down of Oil Spill Source

Possible shutdown measures at Rothera Research Station include the following:

- Any emergency shutdown measures of fuel systems/refuelling activities;
- Any emergency shutdown of station generators that may be affected by a spill.

4.4.2 Shutdown of Reverse Osmosis Plant

If a spill threatens to contaminate the water supply in the wet well (refer to Section 4.9.1), the saltwater pumps must be shut down immediately. This is undertaken by the Facilities Engineer/ Fixed Plant Mechanic (Section 4.6.1). This will stop any water/fuel mix from reaching the reverse osmosis plant or being pumped right through the system (including the aquarium) and into North Bay via the waste pipes. Water for use on station will be supplied in accordance with the most recent version of the Rothera Incident Response Plan).

4.4.3 Shutdown of Aquarium/ Bonner circulation pump

Seawater from the wet well also feeds the Aquarium in the Bonner Lab (refer to Figure 7 on page 16 and Section 4.9.12). The water intake from the wet well into the Bonner system is located less than 1 m below the surface, which is significantly shallower than the intake for the rest of station. Depending on the location of a spill this may cause higher levels of contamination in the aquarium system than elsewhere.

Should the wet well be at risk of being impacted by an oil spill, the aquarium recirculation system should be activated and saltwater pumps to the aquarium from the wet well should be shut down. These actions must be taken in consultation with the Facilities Engineer/Fixed Plant Mechanic and Rothera Bonner Lab Manager. However, this can only be used as a preventative measure rather than a reactive one.

4.5 SITE MANAGEMENT

Managing the spill site appropriately will help minimise the extent of pollution and keep staff safe during the response. Demarcating a cold, warm and hot zone will help to contain oil in one area and avoid spreading contaminants around the station. Hazardous tape can be used to help mark off different zones where appropriate.

4.5.1 Hot Zone

This is the contaminated area around the spill where people wearing PPE will be working and deploying equipment. This may be a controlled access area.

It may be necessary to keep wildlife away from the spill area to allow clean-up work to proceed safely. Please also refer to Section 5.5 Working near wildlife.

4.5.2 Warm Zone

This is a transition area, clear of the spill itself and above the tide line which is designated to ensure that secondary contamination (from people, equipment, vehicles) does not spread further. A decontamination area can be created where staff can take off contaminated clothing. A boot washer should be located at the exit of the hot zone into the warm zone to avoid cross-contamination.

Waste packaging should be located here ready to receive segregated waste oil, contaminated clothing and used absorbents. The Fastank (Section 4.10.2.5) can also be set up here to store contaminated water.

4.5.3 Cold zone

The cold zone should be a clean area away from the spill. No one in this area should be wearing contaminated PPE. This is the area from which the spill response should be planned and co-ordinated, and where responders can rest, eat and receive medical assistance.

4.6 MOBILISATION OF STATION RESPONSE TEAM

Once it has been established that it is safe to proceed with the oil spill response and site management zones have been established (Section 4.5), the Station Leader must mobilise the Station Response Team.

All spill response staff will have received training during pre-deployment training and/or during station on-site training (see Section 3.6).

Station Response Team:

Summer Station Response Team	**Winter Station Response Team**
Summer Station Leader	Winter Station Leader
Station Facilities Engineers	All winterers
Station Logistics Manager (summer only)	
Station General Assistants (summer only)	
Air Unit Coordinator (summer only)	
Other summer staff with station management responsibilities or vehicle (including boats/aircraft) or fuel handling responsibilities	
Winter Station Leader	
All winterers	

The station response team will operate under the direct supervision of the Station Leader. The specific duties of the Facilities Engineer are detailed in Section 4.6.1 below. Other staff will be delegated roles and tasks by the Station Leader as required. It is the duty of the response team to protect:

- Health and safety (Section 5);

- Station facilities (Section 2.5);
- Threatened resources and sensitivities (Figure 13 on page 47 and Section 4.9).

4.6.1 Facilities Engineer/ Deputy Facilities Engineer

The Facilities Engineer / Deputy Facilities Engineer is a vital member of the Station Response Team and responsible for the following actions:

- Undertaking any emergency shutdown measures of fuel systems/refuelling activities;
- Shutting off the saltwater pumps and reverse osmosis plant if necessary;
- Checking generators to ensure that the spill will not cause disruption of fuel supply to the engines online (e.g. spill from day tank in generator shed);
- If the spill directly affects engines online, they must be shut off and an emergency supply organised immediately;
- If the spill does not affect engines online then the Engineer/ Mechanic will proceed to the spill site and assist with pumping operations. These may include:
  - pumping of fuel from a damaged tank to secondary tank;
  - pumping from a containment bund into oil recovery drums;
  - pumping from the sea into fast tank containment.
- Post incident – review the condition and service as necessary all spill response equipment.

Once the Facilities Engineer has completed their assessment, they report back to the Station Leader.

4.6.2 Mobile Plant Technician

The Mobile Plant Technician is responsible for the following actions:

- Bring to readiness the appropriate vehicles and trailers and move the oil spill response equipment to the spill site under the Station Leader's direction;
- Responsible for running the peristaltic pump at site of spill.

4.6.3 General Assistants (GAs)

The GAs are responsible for the following actions:

- Distribute the spill response clothing, which is held in the Oil Spill Response Container, to the team;
- Responsible for cordoning off spill area if practical;
- Responsible for erecting Fastank on level ground as close as possible to the spill;
- Set up the inflatable boom, if weather and ice conditions permit.

4.6.4 Air unit

The Air unit are responsible for the following actions:

- Responsible for deploying mobile fire unit if necessary.

4.6.5 Bonner Lab Manager and Ocean Scientist

The Bonner Lab Manager or Ocean Scientist is responsible for the following actions:

- Responsible for any sampling which may be required as part of an environmental monitoring programme under the supervision of the Head of Environment.
- Responsible for the protection of the Aquarium and decision making on shutting off saltwater intake and activating the recirculation system in consultation with the Facilities Engineer/Fixed Plant Mechanic.

4.6.6 Chef

The Chef is responsible for the following actions:

- Responsible for field messing, if necessary;
- Provision of beverages to response team to prevent de-hydration.

4.7 PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE should be issued before any of the response team is involved in the clean-up of a spill. At Rothera Research Station, PPE is stored in a designated spill response container at the wharf and is inventoried by station staff annually and restocked each summer season during station resupply. If replenishment of PPE is required during the season (as a result of a spill) then the Station Leader should contact the BAS Environment Office so options can be investigated. See Appendix J for detail of oil spill response PPE stored on station.

4.8 NOTIFICATION AND COMMUNICATION WITH CAMBRIDGE

4.8.1 Tier 1 Initial notification

All Tier 1 spills should be reported on Maximo (Incidents (HSE) (BAS)).

Tier 1 spills do NOT generally need to be notified to Cambridge via the Operations on Call unless the spill has, or could have:

- caused injury or illness to staff or visitors;
- affected station facilities (e.g. water or electrical supply);
- impacted the local environment (e.g. killed or injured animals or plants);
- or the spill has provided lessons that can be learned, which can be shared with other stations or BAS Cambridge.

4.8.2 Tier 2 & Tier 3 Initial Notification

In case of a Tier 2 or Tier 3 spill, the Station Leader is required to notify the 'Operations on call' at BAS Cambridge **as soon as possible**. This includes the completion of the oil spill report form (Appendix B) and emailing this to the Operations on Call email. Notification **must not** be delayed, even if some of the information required is not available.

Once notification by email has been sent, verbal communication by telephone **must** be made between the Station Leader and the Operations on Call staff member. If the Operations on Call are not available, the Station Leader should contact the Head of Environment Office. In

Cambridge, any Operations staff who receive an initial notification of a spill on station must ensure that verbal communications with the Station Leader is made as soon as possible.

4.8.3 Incident Log

Once the initial notification to BAS Cambridge has been made and the Station Response Team has been mobilised, the Station Leader should keep a record of all actions undertaken on station and all communications with Cambridge. This needs to be kept up to date throughout the incident until the response is terminated. The incident log, initial notification and situation reports will be used as the basis of the final incident report (see section 4.13).

4.8.4 Situation reports – Tier 2 and Tier 3 only

After the initial notification of the spill, situation reports should then be submitted at 3, 6, 12, and 24 hrs after the initial notification, using the oil spill response form (see Appendix A). After 24 hrs, situation reports are to be sent every 24 hrs until otherwise agreed by BAS Cambridge and the Station Leader. All communications are to be recorded in the incident log maintained on station (Section 4.8.3).

Digital photos of the spill and its subsequent clean-up are to be kept if available and should be submitted by the Station Leader to the Operations on Call at BAS Cambridge at the first opportunity. The record should be as comprehensive as possible. Photos can also be included in the final report if appropriate and logged on Maximo.

4.9 SENSITIVITIES AT RISK AND PRIORITY FOR PROTECTION

As outlined in Section 1.3, the overall aim of a spill response is to **minimise the damage to the environment and ensure the health and safety of station personnel**. There is the risk that the spill response operation is more damaging to the environment than the oil itself. It is therefore important that any infrastructure and biological resources at risk are identified, noted as sensitivities and prioritised for protection.

The sensitivities most at risk from a major oil spill on Rothera are shown in Figure 13 on page 47 and described in Section 4.9.1 to 4.9.8. These include:

- Saltwater intake, wet well and reverse osmosis plant
- Aquarium in Bonner Laboratory
- Scientific monitoring sites
- Antarctic Specially Protected Area (ASPA) No. 129
- Terrestrial flora
- Marine ecosystems around Rothera Point
- Nesting birds
- Seals and whales

4.9.1 Saltwater intake, wet well and reverse osmosis plant

A seabed trench from South Bay feeds saltwater into a wet well which is positioned about 50m north of the wharf. The salt water is drawn from the well, through pipes to the pump house and is pumped along a 200m pipeline to the station boiler house. Here the salt water is converted to fresh water by a reverse osmosis plant. Although the wet well is fed by bottom

water, via the trench, it is possible that fuel could find its way into the well by following pipes, ducts, or spillages directly above the wet well. Figure 7 on page 16 shows the saltwater intake and section 4.4.2 details the shutdown of the reverse osmosis plant.

The health and safety of station personnel is paramount during an oil spill. The fresh water supply to the station is considered life-supporting and has therefore been assigned the **highest priority** for protection.

4.9.2 Saltwater intake, wet well and aquarium in Bonner Laboratory

As above, salt water from South Bay via the saltwater intake and wet well also feeds the salt-water aquarium in the Bonner Laboratory. Figure 7 on page 16 shows the saltwater intake and section 4.4.2 details the shutdown of the aquarium/ Bonner circulation pump.

The saltwater supply to the aquarium is considered vital to preserve the life of organisms in the aquarium and has therefore been assigned **highest priority** for protection.

4.9.3 Scientific monitoring sites

There are a number of terrestrial scientific monitoring sites on Rothera Point which need protection from oil pollution. These include two research sites used periodically to monitor moss vegetation which are marked as Area A and B in figure 12. In addition, there are various monitoring sites within the ASPA. In the marine environment there are various inshore monitoring sites located around Rothera Point. In particular in South Cove there is a long-term monitoring site focussed on the impact of iceberg scouring on marine benthos (Area C in figure 12). In addition, North Cove and Hangar Cove are regular diving sites where long-term monitoring of benthic communities is undertaken. All monitoring sites should be protected where possible in the event of a spill.

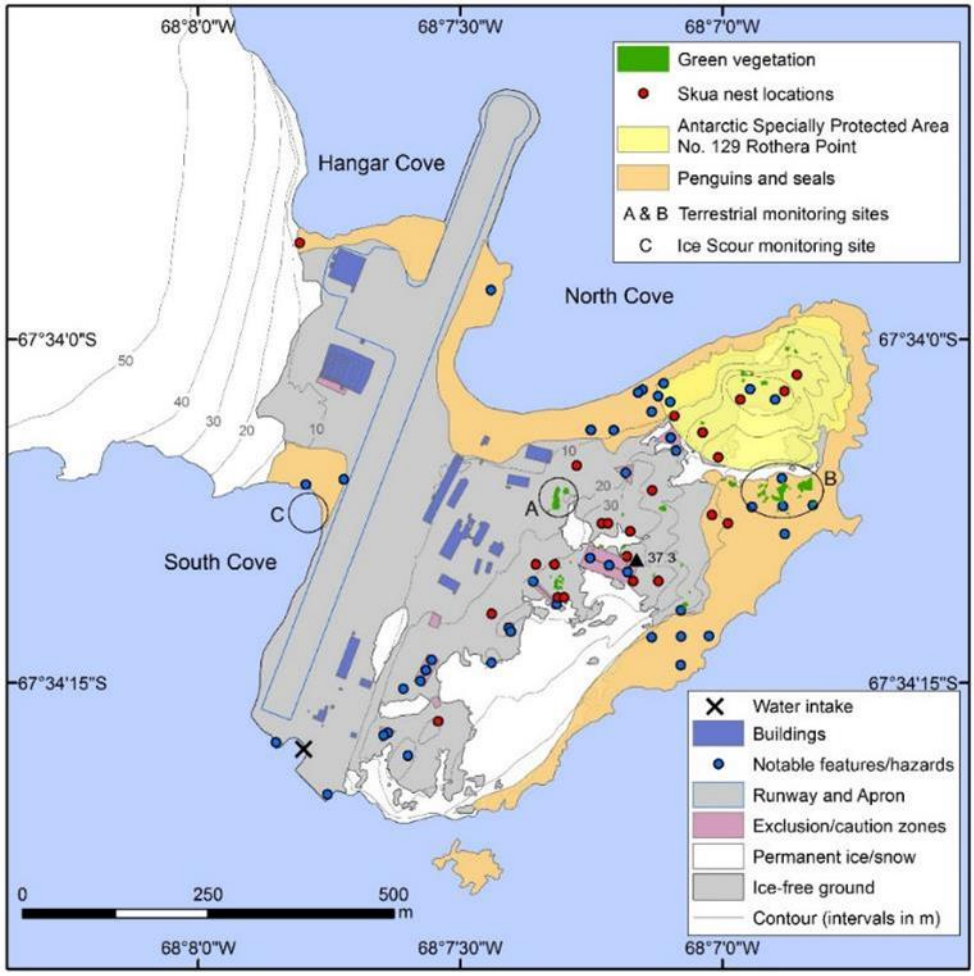


Figure 12: Rothera Point Coastal Sensitivity Map

4.9.4 Antarctic Specially Protected Area (ASPA) No. 129

ASPA No. 129 Rothera Point, Adelaide Island serves to monitor the impact of humans on an Antarctic fellfield ecosystem and covers an area of approximately 0.05 km^2 of Rothera Point (refer to figure 12).

Vehicles and helicopters are prohibited from entering the ASPA. Pedestrians are allowed to walk around the outside of the area, keeping to the shoreline. Scientific research or other activities within the ASPA are only allowed if a permit has been issued under the *Antarctic Act*.

4.9.5 Terrestrial flora

Rothera Point contains no large areas of vegetation, with substantial continuous moss and liverwort patches limited to a single area of c. 100 m^2 adjacent to a transient melt stream in a gully marked as Area A in figure 12.

4.9.6 Marine ecosystems around Rothera Point

The intertidal zone is subject to ice scour but unusually has a comparatively rich fauna. As well as rocks supporting seasonal macroalgal growth, which is exploited by mobile animals such

as the Antarctic limpet, representatives of seven major animal groups are present. Limpets are the most obvious of these, particularly at the low tide mark, but other gastropod, copepods, amphipods and nemaerteans and sea urchins can occur in the tide pools, at the southern end of the Point.

4.9.7 Nesting birds

Between eight and fifteen breeding pairs of birds nest on the rocky high zone of Rothera Point. The birds are predominantly south polar skuas but also usually include one or two pairs of Dominican gulls. Please refer to figure 12 for approximate locations of nests (red circles) as recorded between 2005 and 2016. Note, the red circles mark the general areas in which nests are located, as the precise location may vary by a few metres year on year. On nearby Killingbeck Island there are colonies of nesting blue-eyed shags and Antarctic terns.

4.9.8 Seals and whales

Since the construction of the runway the beaches around North and South Bays have become inaccessible to seals in all but a few short stretches. Small numbers of Weddell seals haul out mainly on East beach. Many crabeater seals are also found in the area but restrict themselves to ice floes or swimming in the bays. Large numbers of fur seals and elephant seals and occasional leopard seals, come ashore at Rothera and very occasionally a Ross seal has been recorded.

Minke whales and humpback whales are seen in Ryder Bay each austral summer. During some years minke whales can be observed frequently and may be year-round residents, including within the ice pack if present. Observational data suggest that local waters around Rothera Point are summertime foraging habitat for humpback whales. Killer whales inhabit the larger Marguerite Bay area and are usually seen from the station several times each austral summer.

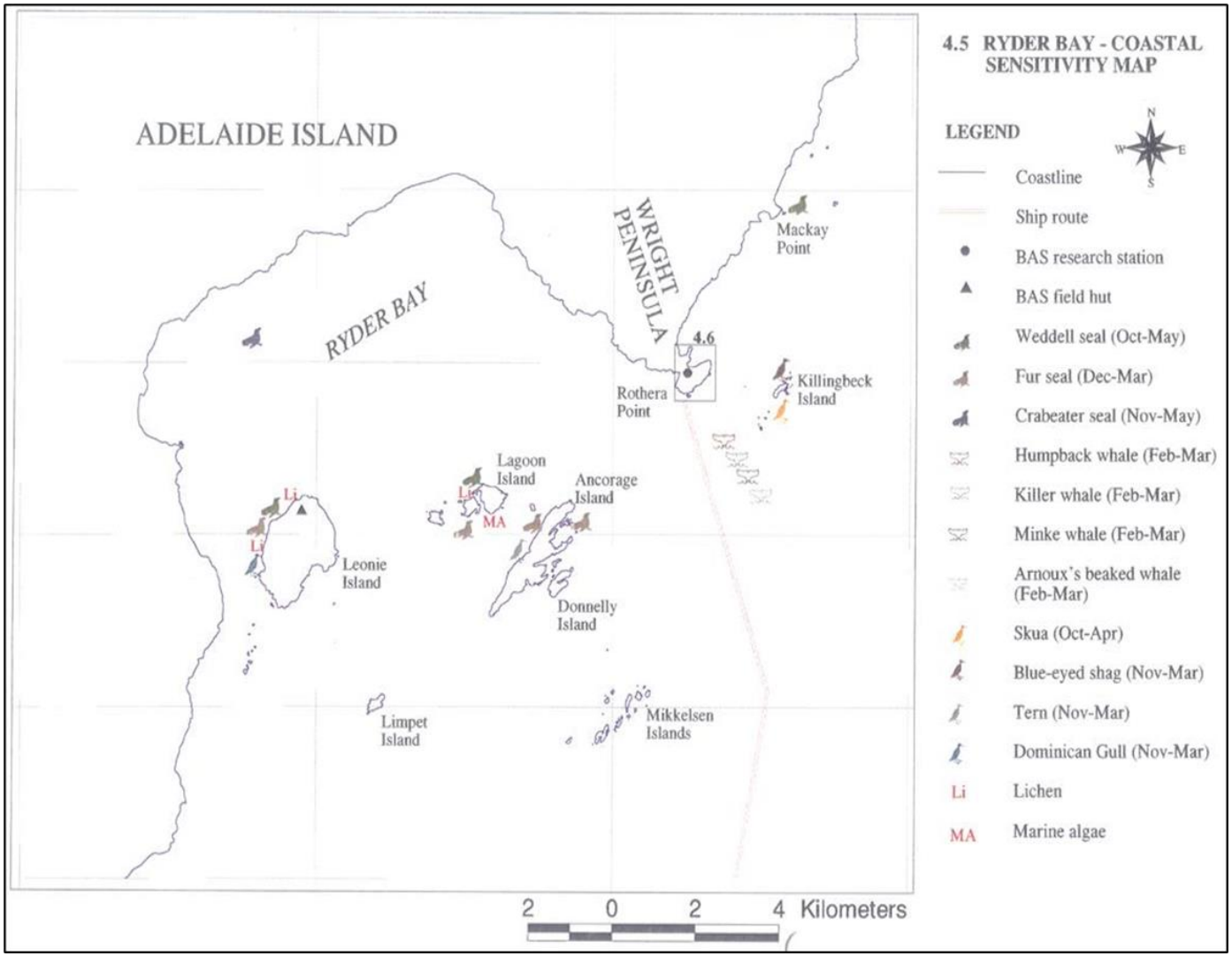


Figure 13: Sensitivities at risk

4.10 RESPONSE TECHNIQUES

The selection and employment of appropriate spill response techniques is driven by the protection of sensitivities (Section 4.9). An appropriate response technique will not cause more harm to the environment than good and will ideally return the sensitivity to its baseline condition without suffering further impact or affecting sensitivities not initially impacted by the spill. Select the response technique most suitable to the environment and oiling conditions, always ensuring that impacts of oil spills on people and the environment are minimised in accordance with the Net Environmental Benefit Analysis (NEBA)[6].

The response techniques available on Rothera are outlined in Sections 4.10.1 to 4.10.6 and include:

- Natural Recovery of oil through 'passive response'
- Containment and Recovery options
- Wildlife safekeeping
- Recovering dead wildlife

Each spill response operation will be influenced by many factors including the quantity of fuel spilt, location, resources available and weather conditions. **Techniques can be used separately or in conjunction with each other to minimise the environmental impact and maximise recovery.**

4.10.1 Natural Recovery

In certain situations, it may be appropriate to leave an oil spill to disperse and be broken down by natural processes. In such cases, a 'passive' response in the form of natural recovery, i.e. evaporation, may be adequate. When choosing this approach, seek advice from BAS Cambridge and notify the BAS Environment Office to ensure that this passive response is appropriate before disregarding any other type of response, regardless of the level of incident. The presence of sensitivities close by (Section 4.9) or the amount of oil spilt may warrant the need for an active response to the spill.

Natural Recovery for Petrol Spills
Section 3.2 outlines BAS' approach to petrol spills, which do not require an active response effort. Prioritise the health and safety of staff (Section 5) before stopping the source of the spill but do not attempt to recover spilled petrol. When choosing this approach seek advice from the BAS Environment Office to ensure this passive response is appropriate.

4.10.2 Containment and recovery

As per Section 3, the general response strategy of BAS is to contain and recover oil spills where possible. However, there are exceptions to this as discussed in Section 4.10.1. The general principle that any damage to the environment caused by the response to the spill rather than the spill itself must be considered carefully (4.10).

[6] NEBA-Net-Environmental-Benefit-Analysis-July-2013.pdf (api.org)

In the first few days after a spill as much oil as possible shall be removed. After which any remaining oil will be left to degrade and disperse in the environment. The progress of this natural attenuation will be monitored (Section 4.18).

Containment and recovery equipment available on Rothera are described in Sections 4.10.2.1 to 4.10.2.5 below and additional detail is also summarised in a table in the appendices (see Appendix F) and can be printed and laminated and kept with the oil spill response equipment. A full list of station oil spill response kit available is documented in Appendix J.

All equipment is stored in the Emergency Oil Spill Response ISO container at the wharf and the Consumables Oil Spill Response ISO container outside New Bransfield House.. During winter, the pumps are to be stored inside the generator shed, but they should be returned to the container immediately before the first vessel call of the season. All equipment is to be used in accordance with the manufacturer or supplier's instructions and prioritising health and safety requirements. Personnel deploying the equipment must have completed the practical pre-deployment OSRL training.

4.10.2.1 *Sorbents, putty and other containment*

Sorbents are used for manual recovery of oil and are any material that recovers oil through absorption, where the oil penetrates the pores of the material, or adsorption where the oil is attracted to the material surface and adheres to it. Sorbents are supplied as sheets, mats, pillows, socks or absorbent booms. These are particularly useful for small spills of light oil (e.g. MGO) but in a large spill they are not used as the primary method of clean-up as this would create an unnecessarily large amount of waste. Sorbents are most suitable in the final clean up.

Some sorbents are treated with oleophilic or hydrophobic agents to increase their recovery capacity. Oleophilic agents attract oil, whereas hydrophobic agents repel water. Both types will increase the amount of oil a sorbent will absorb rather than water. Without treatment, many sorbents can become waterlogged and sink if deployed in water. Therefore, it is important to use the appropriate sorbent for the spill location i.e. oleophilic and hydrophobic in wet conditions. Synthetic sorbents (which are stocked at all stations) have the highest recovery efficiency but must be removed from the spill site after use because they are non-biodegradable.

Putty is a temporary repair solution used to patch up leaking drums and pipes in an emergency situation. It can be kneaded together and applied on the crack or hole, to contain oil whilst the drum or pipe is being decanted/drained.

Containing the oil in damaged oil containers can also be achieved by turning an oil container over or on its side to prevent fuel from leaking, by placing in an overpack drum or by transferring the oil from the damaged container to an intact, leak-proof oil container.

See appendix J for a full list of oil spill response equipment available on station.

Information on how to use the different types of sorbents and repair putty is detailed in the appendices (see 7.5 Appendix H).

4.10.2.2 *Inflatable Booms*

Booms are temporary floating barriers used on the water to deflect or contain an oil spill. They can be used to deflect oil from the shoreline to protect sensitivities or assist in shoreline clean-up by containing the oil in an area where it can be recovered. At Rothera Research Station there are 3 x 20m Crest Flowline inflatable booms and 2 x 20m Crest Flowline intertidal booms as listed in Appendix J.

The Crest Flowline intertidal boom has two lower water ballast chambers and one upper air chamber and is used to protect the shoreline from an encroaching spill. It can be used on beaches and in intertidal zones (all water and land interfaces) and can be deployed from a boat or from the shore.

The Crest Flowline inflatable boom is a free-floating boom (with one chamber filled with air using the air inflator) used to contain oil on water, it can be deployed from the wharf. Staff deploying booms should have attended the BAS oil spill training course. Inflatable booms are used for oil collection, deflection, containment and/or protection. The free-floating inflatable booms can be deployed from the wharf or shore with one of the ships tenders or RIBs.

To ensure that oil is not lost over or under the boom, buoyancy should be as high as possible, and the curve of the boom must be as smooth as possible. The deployment of booms is not a simple operation and must be managed in a logical well-ordered manner to ensure the equipment does not get damaged and is effective. Weather conditions and sea state must be considered before use and booms should be continuously monitored whilst in position to avoid damage and maximise oil recovery.

Inflatable booms are reusable and should be cleaned thoroughly after use.

This information (along with other spill response equipment) is summarised in a table in the appendices (see Appendix H and J).

4.10.2.3 *Fence boom*

The GlobeBoom LWU (Lightweight Urethane) fence boom is a fast response boom comprised of special high-density polyethylene (HDPE) round floats of hemi-spherical design. This means that it does not require any inflation and can be deployed quickly and efficiently. Each globe segment has a cast handle that allows for easy handling. The handles are attached to both sides of the boom, creating stability in choppy waters. It is equally suitable for sheltered waters, and can be deployed without power packs, reels or inflators.

This information (along with other spill response equipment) is summarised in a table in the appendices (see Appendix H).

4.10.2.4 *Rope Mop Skimmer*

The rope mop is ideal for shallow water as the rope requires minimal water to float. It also works well in icy conditions as the rope can move easily through the ice and any ice which becomes attached to the rope falls off when it comes up to the wringer unit.

The rope mop is a 100+m loop of oleophilic material which attracts and picks up oil when moved across the surface of water. The skimmer unit rotates the mop and squeezes out the oil between two rollers into a small tank. The pulley which is positioned on the other end of the mop (attached to a boat or a fixed point) enables the rope to be directed across the water surface.

The oil that is collected in the small tank on the skimmer unit can be pumped directly into a drum for disposal. Whilst the rope mop is oleophilic it will still collect some water although in small quantities.

Staff deploying the rope mop should have attended the BAS oil spill training course. The deployment of the rope mop skimmer is not a simple operation and must be managed in a logical and well-ordered manner to ensure the equipment does not get damaged and is effective. Before commencing rope mop skimming, the skimmer should be set on firm, level ground and safely tethered to prevent movement. Please refer to user manuals for details on the operation and report any issues to the station facilities team.

4.10.2.5 *Fastanks*

Fastanks are portable and collapsible containment tanks that are quick and simple to erect in the location of the spill clean-up site. They are used to store oil contaminated water, which has been collected from a spill site. The Fastanks come with a lid and can be used to store oil contaminated water for a period of a time to allow the water and oil to separate. The water can then be re-skimmed using the skimmer and decanted into empty 205l drums before being transported off site for disposal. Additional information is summarised in a table in the appendices (see Appendix F Appendix H).

Recovery equipment available at Rothera Research Station is detailed in Appendix J. Please refer to the BAS Waste Management Handbook for correct disposal of oily mixtures.

4.10.3 The use of trenches in the recovery of oil

When responding to spills on the ground or snow/ice covered ground (permeable surfaces), it is important to minimise the amount of oil that can penetrate below the surface in order to prevent penetration of oil and further contamination sub-surface.

As a longer-term recovery technique, trenches can potentially be used to intercept and contain fuel. Please note that whilst this option is theoretically possible, in BAS practice it has been of limited benefit. Given the resources needed and disturbance created, advice must be sought from BAS Cambridge and permission given by BAS Cambridge (specifically Environment Office and Estates) before any digging begins.

BAS Environment Office will review and agree the potential effectiveness of this technique and advise on mineral resources specialist activity permitting requirements.

Underground services must be avoided when digging trenches. A permit to dig is required from BAS Estates on station prior to undertaking any groundworks.

If the consultations with BAS Cambridge confirm trenching is viable, then the following approach can be taken. Further detail will be provided by Cambridge throughout the spill response.

In summer, if the water table is high and the oil will not permeate the soil, shallow trenches may be dug to collect oil for removal.

In winter, spilt fuel is likely to be absorbed by surrounding snow or run vertically through snow until it reaches frozen ground. Fuel may then pool in depressions, for example under buildings. During the spring melt, fuel may then be flushed down slope to North or South Beach.

Trenches can be dug across the path of the spill to intercept and contain fuel as shown in Figure 14 below. Fuel can be mopped up with absorbents if on impermeable (frozen ground) or if in very large volumes it can be moved by hand squeegees along the impermeable (frozen) ground and into the trenches or move slowly into the trenches along the water table. The fuel can then be pumped out of the trench into a Fastank and be decanted as required.

Seawater can be sprayed above the spill using the fire pump to flush fuel into the trench, which can then be skimmed off using a pump. If flushing occurs near to the shoreline, booms and where required, additional absorbents should be used as a precautionary measure to avoid wider contamination.

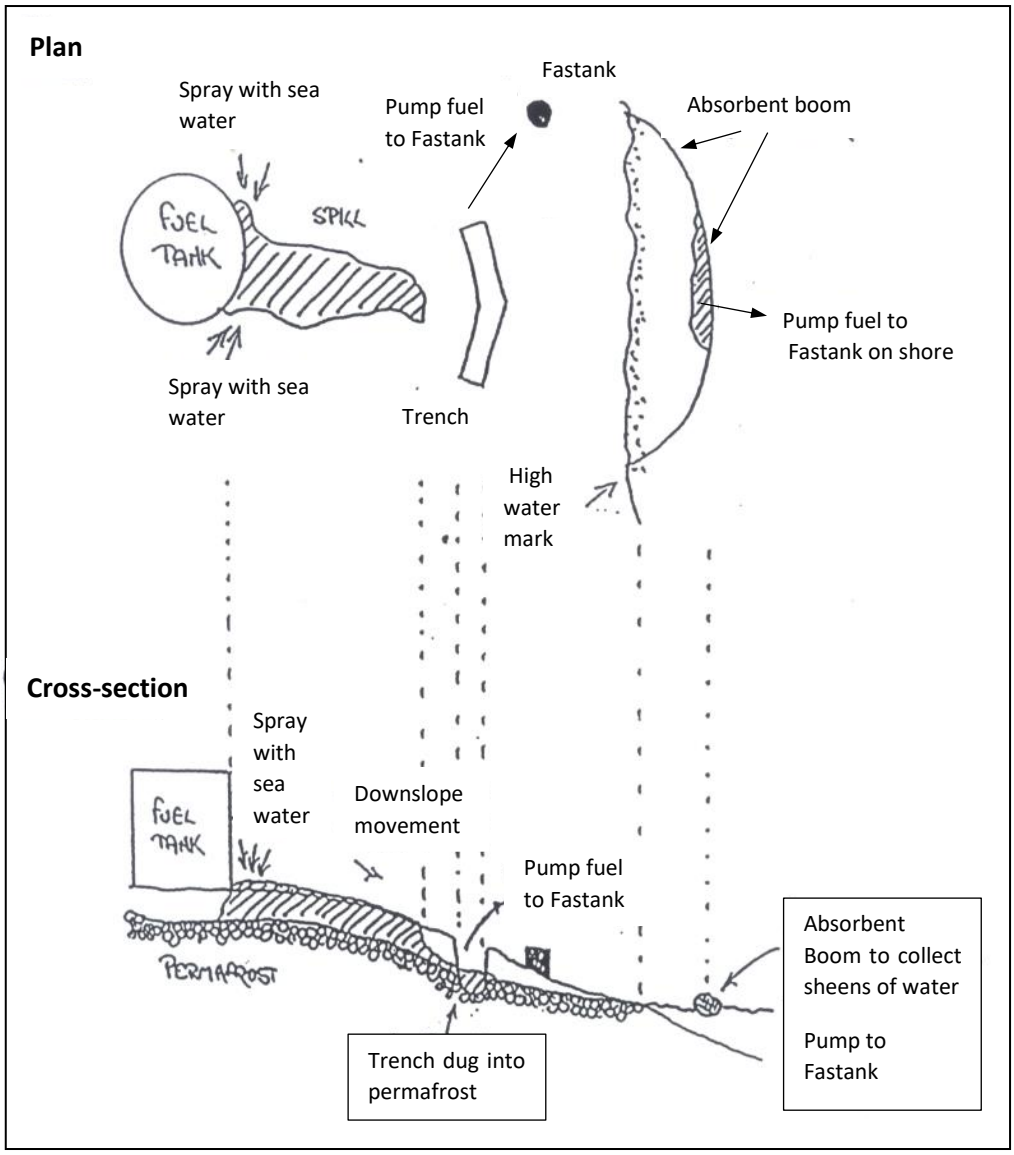


Figure 14: Trenching schematics

4.10.4 Wildlife safekeeping

During an incident, it may be necessary to designate a member of staff to watch wildlife to ensure that wildlife is protected from the spill and the spill response activities. It may also be necessary to ensure that spill responders are kept safe from wildlife.

Wherever possible, avoid contact with wildlife, however in some situations it may be necessary to move wildlife away from the spill site or erect temporary barriers to stop wildlife from becoming contaminated by oil or to stop them from entering working zones where staff may be at risk. Please refer to latest issued version of the BAS Station Wildlife Movement Guidance for general advice and safety considerations.

4.10.5 Recovering dead wildlife

Should the oil spill result in wildlife dying, dead limpets and other dead fauna contaminated with oil must be removed to prevent ingestion by birds. These will need to be segregated from all other waste streams and at Rothera may be disposed of through incineration.

However, please contact the Environment Office for advice prior to proceeding with this disposal method. Please also refer to safety guidance in Section 5.8.

4.10.6 Recovering oiled wildlife

Currently, BAS are not in a position to recover any contaminated live wildlife.

4.11 LONG-TERM CLEAN-UP

A long-term intensive clean-up is unlikely to be carried out by BAS because of the rapid evaporation and dispersion of most refined fuel products used on station. In addition, the severe climatic conditions, and logistical constraints of operating safely will limit the ability of the team to undertake such a clean-up. Should long-term clean-up operations be required, BAS will seek advice from external advisors (Section 7.5).

4.12 INCIDENT REPORTING ON MAXIMO

Any oil spill incidents regardless of quantity spilled (including near misses) are to be reported on Maximo. This ensures that important lessons can be learnt, and a review of BAS' oil spill contingency plans can be undertaken as necessary.

4.13 FINAL REPORT

For Tier 2 and 3 spills the Station Leader is to prepare a final report on the spill at the end of the incident. The 'incident log' (see Section 4.8.3) and 'oil spill report forms' (Appendix B) used to communicate with Cambridge should be used as the basis of the information. The report is to describe the:

- time (GMT) and date of spill;
- estimated quantity of fuel spilled (litres)[7];
- oil sampling results, if undertaken;
- type of fuel;
- source and cause;
- location and extent of spill (map);
- sensitivities and resources affected;
- environmental impact;
- response action taken;
  - stopping or minimising spill
  - technical work carried out to fuel tanks or pipelines;
  - clean-up (number of personnel, techniques in use, amount of oil/water collected (litres));
  - environmental monitoring (photographs, other digital documentation)
- value of response action;
- health of station personnel, if affected by spill incident;
- final classification of spill (Tier 2 or 3);
- post spill evaluation of contingency plan, and suggested amendments if necessary;

[7] Refer to Bonn Agreement Oil Appearance Code and Section 3.3

- further action(s).

The final report and any accompanying photographs are to be submitted on Maximo within one month of the end of the incident.

4.14 WASTE MANAGEMENT

The BAS Waste Management Policy in the Antarctic is:

- to minimise waste in the first instance;
- reuse and recycle at source where possible and
- to remove all wastes other than sewage, grey water or food waste from the Antarctic.

Waste produced as a result of an oil spill in the Antarctic will be managed in line with the BAS Waste Management Handbook. Waste will be segregated on site, packaged in line with the International Maritime Dangerous Goods (IMDG) Code for transport by sea and stored on site until it can be collected by the BAS vessel for return to the UK and disposal by the BAS authorised and licensed hazardous waste contractor.

4.14.1 Storage and disposal of waste

A minimum of 40 empty fuel drums are designated for oil spill response. It is the responsibility of the Station Leader to ensure that this stock of drums is to be rotated each summer and checked for holes and rust. At Rothera Research Station, these drums are stored on North Beach.

All waste from the spill response is to be stored in empty 205 litre drums. The different types of waste (waste oil, oily mixtures, contaminated absorbents, contaminated PPE) are to be segregated and stored separately as described below. In addition, keep different types of wastes segregated by fuel type wherever possible.

Store separately in 205l drums:

- Waste oil
- Oily mixtures (mixture with any oil content, may be contaminated with water/ice/snow/soil)
- Contaminated absorbents (booms, mats, pillows, granules)
- Contaminated PPE

Final packaging, consignment and disposal of waste oil and oil contaminated wastes must follow the instructions given in the BAS Waste Management Handbook. At the first available opportunity, drums containing recovered fuel and other wastes from the clean-up should be sent out on the BAS vessel. These are to be returned to the UK, consigned to the Environmental Manager. This usually only occurs once a season when the BAS vessel makes its last call at BAS stations prior to sailing back to the UK.

4.15 TERMINATION OF OIL SPILL RESPONSE

It is the Station Leader's responsibility to define the end point of the response to a Tier 1 incident (Section 4.2.2).

In case of a Tier 2 or 3 incident, it is the Cambridge Incident Response Team (Operations Programme Manager, Head of Environment Office and the Head of Estates). responsibility to decide the end point in consultation with the Station Leader.

Clean-up endpoints must be determined early so that appropriate methods can be selected to meet the overarching clean-up objectives:

- Minimise risk to human health;
- Reduce the threat of additional or prolonged impacts;
- Facilitate the natural recovery of impacted areas;
- Minimise the amount of waste created e.g. waste oily mixtures, contaminated sorbents

4.16 MEDICAL CHECK-UP

It is the responsibility of the Station Leader to stand down the Station Response Team after a Tier 1 incident. All personnel involved in the response to a Tier 2 or Tier 3 spill must be given a medical check-up by a BAS doctor at the first opportunity. This may also be required in case of injury/ illness caused by a Tier 1 incident. The BAS Medical Unit will provide instructions (Section 6.5).

4.17 POST-INCIDENT EQUIPMENT DECONTAMINATION AND INVENTORY

All reusable equipment (e.g. booms, skimmers, Fastanks etc.) must be washed and cleaned by the response team before being put into storage. The Fastank can be used for temporary storage of contaminated equipment that is waiting to be cleaned. Firstly, remove as much oil as possible from reusable equipment using absorbent mats (dispose of the single use contaminated sorbents as described above) and then, if necessary, wash the equipment with warm soapy water to remove any remaining oily residue.

The water pump must be emptied of water. The water pump and any other mechanical spill response equipment (such as the petrol pump, air inflator etc.) must also be inspected by the Facilities Engineer.

The Station Leader is to reorder any materials consumed after checking the equipment and consumables against the oil spill response equipment inventory. Arrangements for the repair and replacement of damaged equipment are to be made with the Head of Environment Office at BAS Cambridge at the earliest opportunity.

4.18 POST-INCIDENT MONITORING

Any post-incident environmental monitoring is the responsibility of the Head of Environment Office. The monitoring programme will be agreed by the Head of Environment Office in consultation with the Operations Programme Manager, the Station Leader and the Ecosystems Science Programme Coordinator and appropriate Ecosystems Project Leader(s).

Ongoing monitoring in the post-incident phase may be required depending on the risks posed by the spill. In line with PREMIAM guidelines[8], monitoring is required "*when an incident is*

[8] PREMIAM Guidelines

expected to have the potential for a significant environmental impact". When assessing the significance of the impact of a spill, the nature of the oil, the quantity, the location, and sensitivities at risk need to be considered.

As part of a post-spill monitoring programme, the following tasks are to be undertaken:

- Establish baseline of pre-existing levels of contamination prior to the incident;
- Set endpoint for monitoring (e.g. achieve recovery);
- Select environmental parameters and key indicators for biological and chemical sampling;
- Site selection for sampling, where appropriate;
- Consider the need for a specialist activity permit (Antarctic Treaty Area) or regulated activity permit (South Georgia)
- Undertake sampling per monitoring programme

As described in Section 3.3, BAS' capabilities in terms of surveillance of spills by aircraft, watercraft, or autonomous platforms are limited and are therefore not routinely available for deployment during post-incident monitoring. However, visual diving inspections may be viable (refer to section 4.18.1 below).

The Head of Environment Office can offer more detailed advice in terms of post-monitoring requirements.

4.18.1 Visual diving inspections

At Rothera, diving surveys may be used to undertake a visual assessment of an oil spill in the sea. This may help to determine the environmental impact of an oil spill under sea-ice, in the water column and on sub-tidal communities, and must be coordinated in liaison with the Head of Environment Office, Operations Programme Manager, Science Programme Co-ordinator, Station Operations Manager and the Field and Institute Diving Officers. The health and safety of all divers is paramount (Section 5.7).

If deemed appropriate and safe, a visual diving assessment should be made of the area affected by the spill. Monitoring should include dives at the impact site and at control sites, away from any likely effects for comparison. The Ocean Scientist and BAS Senior Marine Scientists should advise the Diving Officer on choice of suitable sites for monitoring impacts on local marine life.

Section 5

HEALTH AND SAFETY

5. HEALTH AND SAFETY

During the incident response, there is the risk of acute toxicity as well as physical hazards associated with noise levels, sun exposure, heat stress, injuries, and ergonomic stressors. The following subsections give an overview of points to be considered to minimise risks to health and safety. For further details on risks to the health and safety of responders and station staff please refer to the risk assessment in Appendix C.

5.1 EXPOSURE TO OIL

The type of oil must be established before any response actions are undertaken. Testing and sampling of the oil may be beneficial if the source is not known however BAS currently lacks the required sampling and analysis capability to undertake this work on site (Section 3.4). This will ensure that the oil's specific hazards, which can be found on its Safety Data Sheet (SDS), are known to the responders.

5.1.1 Safety Data Sheets (SDS)

The Safety Data Sheets for Marine Gas Oil, petrol, kerosene, AVTUR, AVCAT and all lubricating oils used at Rothera Station are held on the shared drive on station and in Cambridge.

5.1.2 Inhalation of fumes

Inhalation of hydrocarbon fumes can cause headaches and nausea. For small spills, ensure adequate ventilation in clean-up work areas and monitor staff health. For large spills, it may take 2-3 days to allow sufficient ventilation to gain safe entry into some areas.

Fumes may also build up inside the station by the response team bringing in fuel-soaked clothing. An emergency drying room should be established, away from the main living area on the station. The Station Leader must establish a cleaning rota to ensure that rooms used by the response team are washed daily. The contamination of the main living area should be mitigated by establishing appropriate warm and cold zones (Section 4.5). Contaminated PPE is not to be brought into the cold zone.

5.1.3 Skin irritation

Fuel and oil can be a skin irritant. Severe reactions can lead to dermatitis. Clean-up personnel must wear one-piece suits, rubber gauntlets and protective eye goggles during response efforts. Showers must be taken at the end of the working day.

5.1.4 Advice on health

During the response, the Station Leader must pay close attention to signs of fatigue or stress amongst the response crew. These may include:

- Being uncommunicative
- Risky behaviour
- Difficulty concentrating
- Making mistakes or responding slowly to situations
- More irritable than usual
- Feeling tired or yawning all the time
- Falling asleep on the job

The Station Leader must establish rotas as required to ensure that responders have sufficient rest periods (in the cold zone). In addition, the Station Leader should ensure that spill responders are familiar with the most likely health effects of an oil spill. These may include:

- Nausea
- Dizziness
- Headaches.

For further advice, the Station Leader should contact the nearest doctor (ship or station). If symptoms attributable to the spill occur, the doctor is to inform the BAS Medical Unit immediately who will provide instructions and advice.

5.2 CONTAMINATION OF DRINKING WATER

Drinking water would need to be highly contaminated by hydrocarbons for harm to occur. This is highly unlikely since very low concentrations of hydrocarbons alter the taste of water and make it completely unpalatable. Should contamination of drinking water occur, the water is to be monitored for hydrocarbon content. No analytical kit is available on station for testing the hydrocarbon content of contaminated water. Water can be sampled on site and tested through simple smell and if necessary, taste tests. If hydrocarbons can be smelled or tasted the water is unsafe to drink. The Station Leader should consult the H&S Advisor prior to undertaking any drinking water sampling.

5.3 SLIPS AND TRIPS

Spilled fuel increases the risks of slips and falls. Correct protective footwear, good 'housekeeping' and limiting the spread of contamination will help to reduce these risks. Due attention must be paid in order to avoid slips, trips, and accidents from manual handling of the equipment.

5.4 MANUAL HANDLING

The risk of manual handling is to be minimised by following the station specific manual handling risk assessments and through appropriate training. During spill response ensure that personnel are rotated on a frequent basis to avoid fatigue.

5.5 WORKING NEAR WILDLIFE

Working near wildlife presents a number of hazards. Please refer to the BAS Station Wildlife Movement Guidance for general advice and safety considerations.

5.6 WORKING NEAR WATER

During spill response, some personnel may be working near water depending on the location of the spill. Slips, trips and falls near water can result in responders falling into the water and suffering hypothermia or, in the worst case, drowning.

Responders should work with a partner or team when working around water and wear suitable life jackets in accordance with relevant station RAs. At least two people need to be in sight of each other at all times. A rescue vessel may also be required (where available). Communication devices are necessary, and they must be waterproof, suitable to the area of

operation and tested before work commences. There must be an emergency plan, including provision for rescue. Throw ropes as well as facilities for warmth and shelter may be required.

5.7 VISUAL DIVING INSPECTIONS

Should diving inspections be undertaken as part of post incident monitoring (Section 4.18), the health and safety of divers is paramount. A comprehensive risk assessment is to be undertaken before deploying divers in and around on oil spill. The Field Diving Officer should coordinate any diving with the Institute Diving Officer and Ocean Scientist. The Diving Officers advising on the any risk to health and safety and appropriate mitigation measures to be implemented.

5.8 HANDLING OF OIL-CONTAMINATED DEAD ANIMALS

When handling oil-contaminated dead animals, appropriate PPE must be worn to avoid direct contact to any oil. Time handling oiled dead animals shall be kept to a minimum to reduce potential exposure to volatile organic compounds of personnel staff.

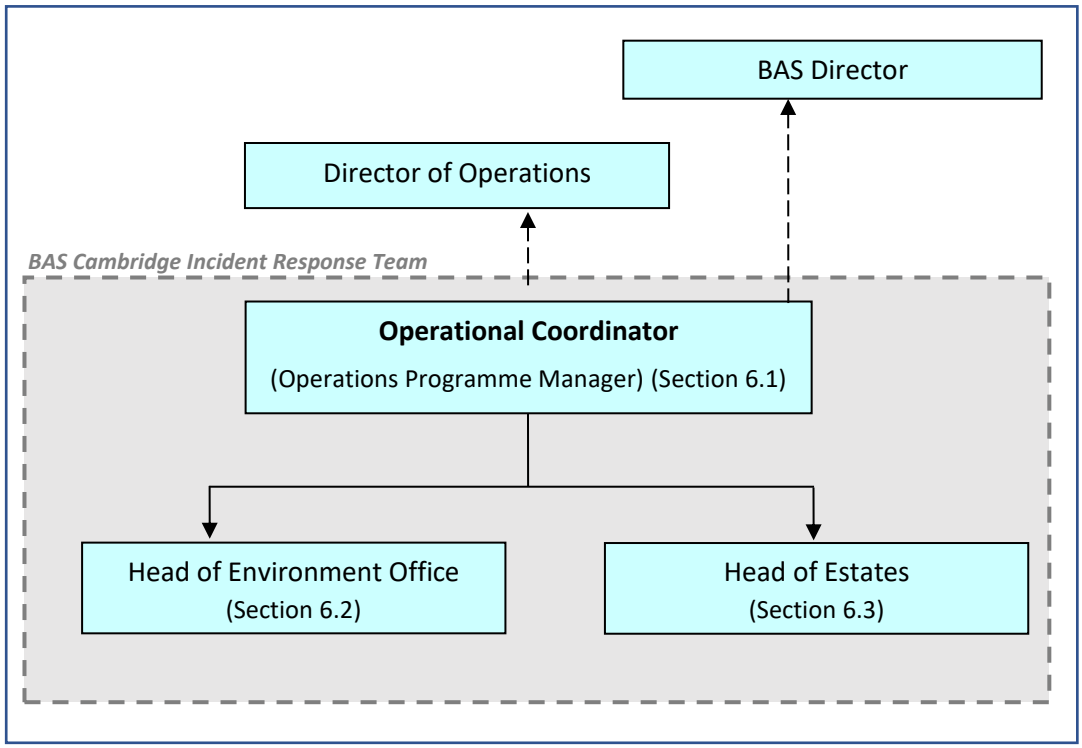
Section 6

RESPONSIBILITIES AND ACTIONS AT BAS CAMBRIDGE

6. RESPONSIBILITIES AND ACTIONS AT BAS CAMBRIDGE

At BAS Cambridge, the Incident Response Team will be notified of a Tier 2 or 3 spill via Operations on Call. The Cambridge Incident Response Team will consist of the Operational Coordinator (usually filled by the Operations Programme Manager), the Head of Environment Office and the Head of Estates, or their nominated deputies (refer to Figure 15). In the event of medical emergencies, the Cambridge Incident Response Team will also open line of communication with BAS Health and Safety and the BAS Medical Unit (BASMU). Information on other internal and external communication is provided in Section 7.

Figure 15: Oil spill response Structure BAS Cambridge



6.1 OPERATIONAL COORDINATOR / OPERATIONS ON CALL

This role is usually filled by the Operations Programme Manager (OPM) and is initially notified through the member of staff on Operations on Call (OpsonCall / 07894 935 223). The Operational Coordinator's responsibilities following on from the initial notification are outlined in the Operational Coordinator Action Plan (Figure 16). The actions required by the Operational Coordinator in a Tier 1, Tier 2 and Tier 3 incident are identified in Sections 6.1.1, 6.1.2 and 6.1.3, respectively overleaf.

6.1.1 Tier 1 Actions Operational Coordinator

Where a Tier 1 spill is reported by the Station Leader, the Operational Coordinator will complete the following actions in line with Figure 16 on page 66:

- Acknowledge initial notification from SL by email or telephone call.
- Inform the Head of Environment, Head of Estates and the Director's office after the initial contact with the SL in due course and where necessary.
- Lastly, the Operational Coordinator will advise the Station Leader to report the incident on Maximo.

6.1.2 Tier 2 Actions Operational Coordinator

In case of a Tier 2 spill the Operational Coordinator takes overall control of the response and undertakes the following actions in line with Figure 16 on page 66:

1. Provides **immediate**[9] notification to the Head of Environment Office and Head of Estates.
2. Confirms the following through discussion with the SL by telephone (and follow up by email):
    - Time (GMT) and date of spill
    - Estimated quantity of fuel spilled (litres)
    - Time (GMT) & date of spill
    - Type of fuel
    - Source and cause
    - Location of spill
    - Harm to human health
    - Risk of fire/explosion
    - Freshwater source at risk
    - Site sensitivities under threat/impact (environment, wildlife, science)
    - Response actions already taken
    - Useable bulk fuel remaining
3. After responding to the Station Leader's initial notification by telephone, the Operational Coordinator will alert the Director of Operations and the BAS Director.
4. Advises the Station Leader on:
    - Technical/Facilities remediation actions
    - Response Techniques
    - Operations (itineraries/pax movements)
    - Weather maps
5. Notifies outside agencies (FCDO, COMNAP) as appropriate.
6. Prepares draft press statements for release by the Director's Office.
7. Decides when to terminate a response.
8. Files and logs communications with Station Leader (oil spill report forms, final report from SL, photographs etc.)

[9] Within 30 minutes of the initial notification unless there is risk to life or personnel safety in which case that would be dealt with first before environmental considerations.

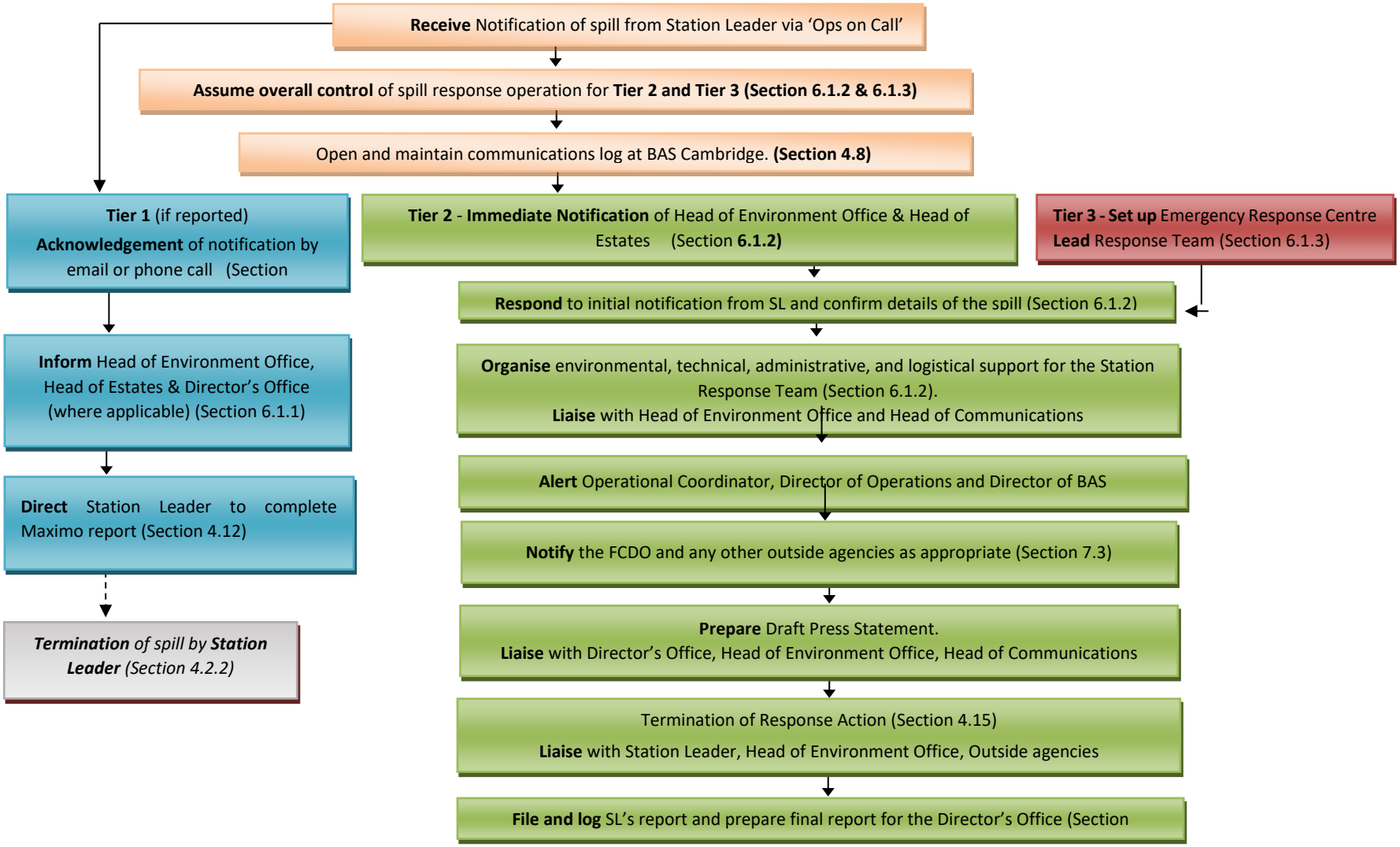
9. Prepares final report on the spill for the Director's Office.

6.1.3 Tier 3 Actions Operational Coordinator

In case of a Tier 3 spill, all Tier 2 actions apply as per Section 6.1.2 with the addition of setting up an Emergency Response Centre at BAS Cambridge in Room 133a and following all incident guidance specified in the 'BAS Incident Response Plan' along with this Oil Spill Contingency Plan. The BAS Incident Response Team comprises of a minimum of the Operational Coordinator (filled by the Operations Programme Manager) and an Operational Controller (filled by the Head of Polar Operations) and in the case of oil spills also includes the Head of Environment Office and Head of Estates.

In the event of remote working, BAS would make a judgement at the time as to whether an incident can be adequately responded to remotely or whether the Incident Response Team needs to convene in person. A third option, a hybrid model where parts of the team convene in BAS Cambridge and others join remotely, may be considered.

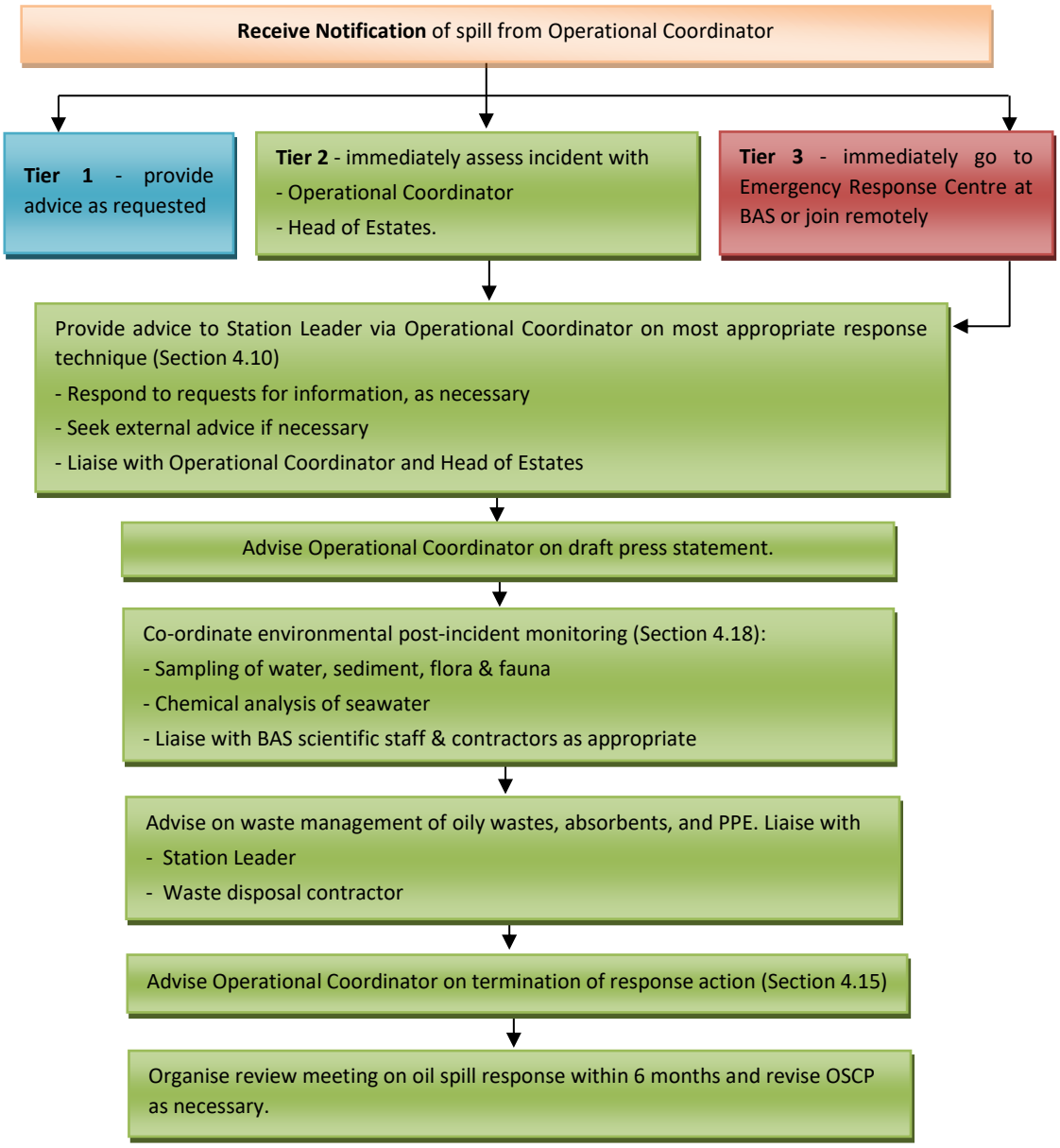
Figure 16: Action Plan – Operational Coordinator at Cambridge



6.2 HEAD OF ENVIRONMENT OFFICE

The responsibilities of the Head of Environment Office following on from the notification by the Operational Coordinator are outlined in the Head of Environment Office Action Plan in Figure 17 below.

Figure 17: Action Plan – Head of Environment Office at Cambridge



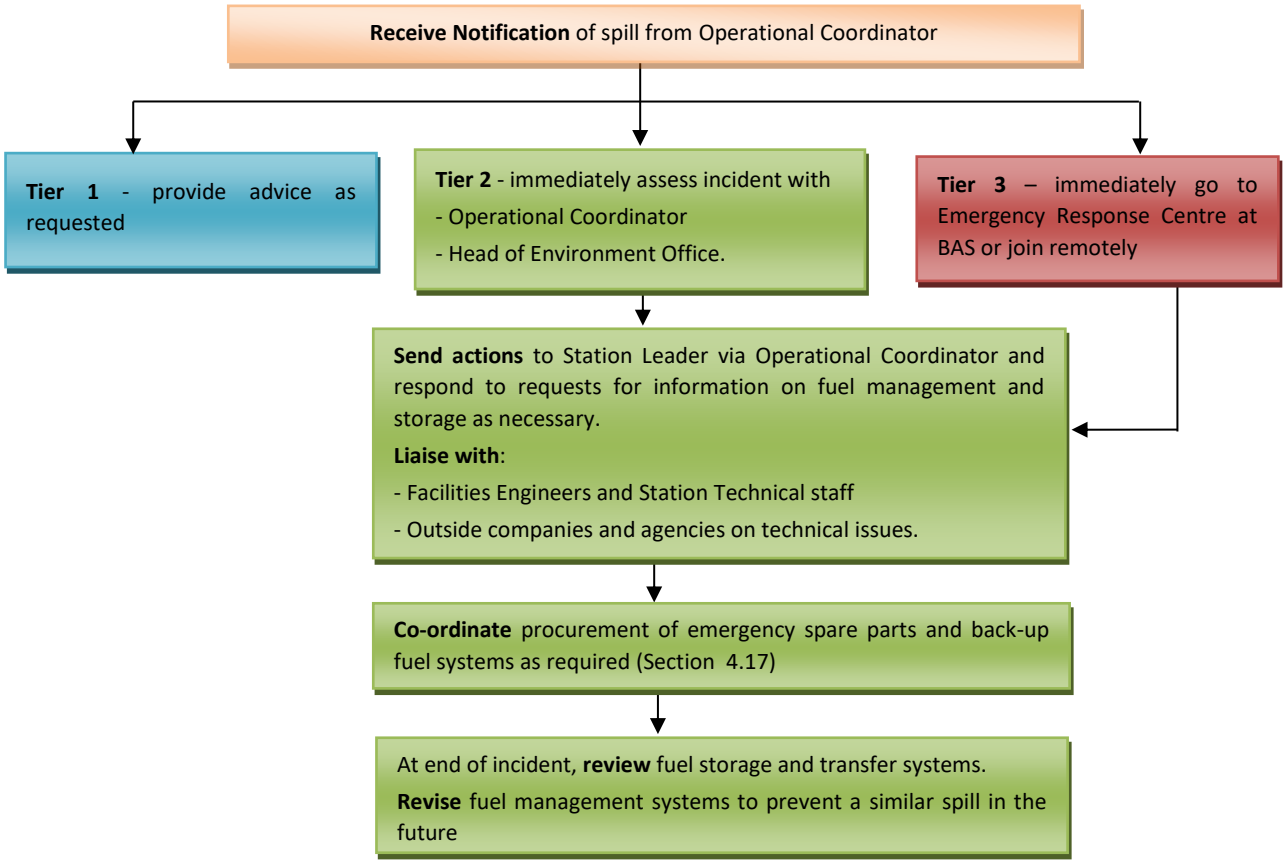
In summary, the responsibilities of the Head of Environment are as follows:

1. Advise on best practicable response techniques including containment and recovery options, the site ecological sensitivities most at risk and likely environmental impact;
2. Contact appropriate outside bodies for information and assistance regarding clean-up (e.g. OSRL);
3. Authorise expenditure on clean-up equipment and disposal of oily wastes;
4. Advise the Operational Coordinator on the environmental content of press statements;
5. Devise and coordinate scientific post-incident monitoring and studies (see 3.3 and 3.4 and 4.18);
6. Organise a review meeting on the spill response within 6 months of a Tier 2 or 3 spill and revise the OSCP as necessary.
7. Organise oil spill response courses for Antarctic staff in the UK;
8. Review and update the OSCP every 5 years or as and when required.

6.3 HEAD OF ESTATES

The responsibilities of the Head of Estates following on from the notification by the Operational Coordinator are outlined in the Head of Estates Action Plan in Figure 18 below.

Figure 18: Action Plan – Head of Estates at Cambridge



In summary, the responsibilities of the Head of Estates are as follows:

1. Advise on emergency fuel management and the integrity of oil storage facilities and pipelines;
2. Advise on the emergency shutdown of reverse osmosis system if not already undertaken by Station Facilities Engineer;
3. Procure emergency spare parts for fuel tanks and pipelines as well as back up fuel systems and review the fuel storage and transfer systems as necessary;
4. Contact BAS Facilities Engineers, outside companies and agencies for information and assistance regarding technical services;
5. Review fuel storage and transfer system after an incident (including any learning points and possible improvements), and review fuel management system to prevent a similar spill in the future;
6. Authorise expenditure on technical services.

6.4 BAS HEALTH & SAFETY

The BAS Cambridge Health and Safety Advisor has the following responsibilities in terms of oil spill response:

- Advises on Health and Safety issues as they arise during exercises or incidents
- Reviews and provides advice upon appropriate PPE for oil spill response
- Reviews and provides advice on the H&S Section of BAS Oil Spill Contingency Plans.

6.5 THE BRITISH ANTARCTIC SURVEY MEDICAL UNIT (BASMU)

The BAS Medical Unit (Medical Adviser) will provide medical advice on health care required as a result of an oil spill. The unit can be contacted by the Operations Programme Manager or Station Leader.

Section 7

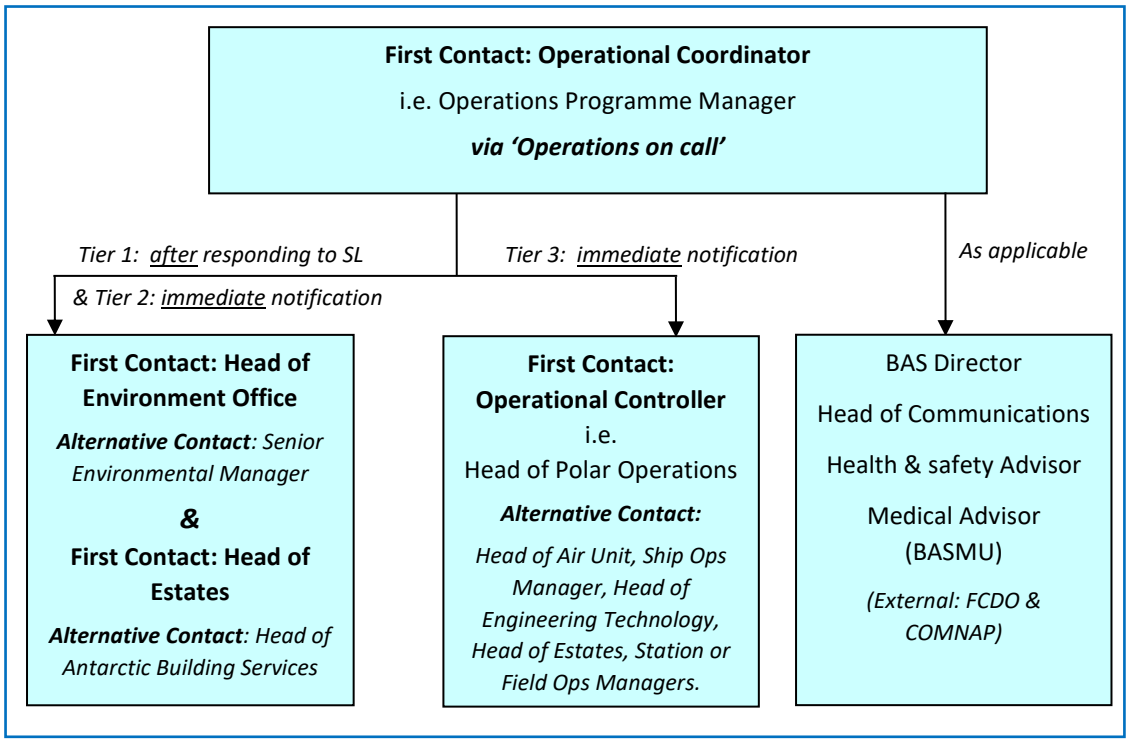
COMMUNICATION

7. COMMUNICATION

7.1 BAS CAMBRIDGE – LINES OF COMMUNICATION

Following the initial notification of an oil spill by the Station Leader to BAS Cambridge via the Operations on Call contact, the Operational Coordinator will lead on communications within and outside Cambridge as described below in the figure below.

Figure 19: Lines of communication within BAS Cambridge



7.2 CONTACT LIST BAS CAMBRIDGE

The most up to date contact details for the positions indicated below can be found in the emergency contact database stored on the ***BAS Incident Response Microsoft Teams site***, maintained by the Operations Programme Manager. The Station Leader has password-protected access to this database.

7.3 INFORMING FCDO AND COMNAP

Under Condition 7 of the Operating Permit issued to BAS by the Foreign, Development and Commonwealth Office (FCDO), any issue or incident which could reasonably be considered a breach of a permit condition must be reported to the permitting authority as soon as possible upon discovery. Contacts are the Head or Deputy Head of the Polar Regions Department of the FCDO, or out-of-hours through the Global Response Centre. The permitting authority may then request further information in relation to the incident before determining whether further action is needed.

BAS is a founder member of Council of Managers of the National Antarctic Programmes (COMNAP). All national operators are required to report significant oil spills to COMNAP. The Operations Programme Manager is to notify the COMNAP Executive Secretary as necessary.

7.4 STAFF INFORMATION AND PUBLIC RELATIONS

A Tier 3 spill will concern staff and is likely to attract public and media attention. The Director of Operations is responsible for ensuring that all staff are aware of a Tier 3 oil spill. A staff notice is to be prepared as soon as practicable after initial notification has been received at BAS Cambridge.

The official spokesperson for BAS in the event of a major oil spill will be the Head of Communications who will be briefed regularly by the BAS Cambridge Incident Response Team. No unauthorised BAS personnel are to contact or talk to the media.

The Operations Programme Manager will assist the Head of Communications in preparing a draft press statement. Advice on environmental issues will be provided by the Head of Environment Office.

7.5 EXTERNAL ADVISORS

In the event of a Tier 2 or Tier 3 spill BAS Cambridge will seek expert advice where necessary and available e.g., from Oil Spill Response Ltd (OSRL), for information and advice on the best practicable response techniques and clean-up techniques. Contact will normally be made by the Head of Environment Office. However, as outlined in Section 3.6.3, it must be noted that there realistically are no further Tier 3 capabilities that could be called upon.

APPENDICES

Appendix A Rapid Initial Assessment (RIA) Form

Rapid Initial Assessment Form for Oil Spill Incident

Assessor's details		**Incident details**				
Name/ Role	Date	Location of spill	Time of spill	Type of fuel	Probable quantity	Probable source and cause

Initial categorisation of incident		
Tier 1 (one or two local staff sufficient)	**Tier 2** (local response team and BAS Cambridge support sufficient)	**Tier 3** (local response team, BAS Cambridge support **not** sufficient)

Task	Assessment	Action(s) required	**Action(s) completed** *(including time and date)*
Harm to human health	Adequate ventilation of work area?		
	Hydrocarbon/ oxygen levels safe?		
	Appropriate PPE available?		
	Drinking water at risk?		
	Food at risk?		
Risk of fire	Obvious sources of ignition present?		
	Volatile fumes present?		
	Excessive heat present?		
Site Sensitivities at risk	Site sensitivities impacted by spill or at risk of potential impact?		
Emergency shutdown	Emergency shutdown actions required and safe to do?		
Muster	Has everyone been accounted for?		

Weather conditions	Are conditions safe for response to proceed?		
Response Capability	Members of response Team present?		
	Replacement members required?		
	Spill Response Equipment available and adequate?		
Site Management	Determine Hot, Warm and Cold Zones		

Overall Assessment:

☐ **Safe** to proceed with spill response ➔ **Mobilise** Response Team	☐ **NOT** safe to proceed with oil response ➔ Do **NOT** proceed and **notify** BAS Cambridge

Appendix B Oil Spill Report Form

BAS OIL SPILL REPORT FORM						
SELECT BAS STATION/SITE OF SPILL						
Rothera ☐	Halley ☐	Rothera ☐	Bird Island ☐	KEP ☐	Traverse ☐	Other ☐
URGENT **To: Operations Programme Manager/Operational Coordinator, BAS** **Email: opsoncall@bas.ac.uk and call 07894 935 223 (Operations on Call)** after immediate notification by email						
Status of Spill: Initial Response ☐ Ongoing response ☐ Terminated response ☐						
Situation report of ongoing response: 3hrs ☐ 6hrs ☐ 12hrs ☐ 24hrs ☐ __hrs ☐ after initial response						
Classification of Spill: Tier 2 ☐ Tier 3 ☐						
Date: **Time** (GMT = local time + 3hrs) :						
Reported by: **Position:**						
Type of fuel and estimated quantity / revised estimate of quantity of fuel spilt (litres):						
Weather conditions: Wind speed: Wind direction: Visibility: Cloud cover: Sea state: Temperature:						
Source and cause:						
Location, area covered, appearance and movement of spill (attach map if possible):						

Known safety risks (H&S, Fire risk, freshwater contamination etc.):
Sensitivities at risk and environmental impact:
Response action (include actions to stop or minimise spill, clean-up techniques, number of personnel involved, quantity of fuel recovered, environmental monitoring / samples taken)
Useable bulk fuel remaining (litres):
Advice requested from BAS Cambridge:
Additional comments (continue on separate sheet if necessary) : Signature:

Appendix C Risk assessment

1. List hazards or hazardous activities? *(List individually below)*	**2. What harm is likely to occur or what could go wrong?** *(with no controls}*	**3. What are your control measures?** *(Please use brief bullet points as description)*	**4. Overall risk with controls in place** *(See risk evaluation guidance)*	**5. Further actions needed and by when?**	**6. Responsible person?**
1. Exposure to AVTUR, AVCAT, MGO & lube oils	■ Health issues associated with exposure to fuel oils (carcinogens) either through inhalation, ingestion or direct dermal contact. Over exposure may lead to cancer and birth defects. **Eyes**: Contact may cause mild eye irritation resulting in redness stinging and eye watering. **Skin:** Direct contact may result in itching, burning or skin damage which may be exacerbated in cold conditions. Longer term and/or repeated exposure may result in, aggravation of existing skin conditions, dermatitis or severe skin damage. **Inhalation**: Over exposure can cause irritation to respiratory inhalation	■ Station specific 'Oil Spill Contingency Plans' produced ■ Comprehensive oil spill kit provided on all stations and stored in easily accessible location. ■ Oil spill response training provided to all wintering and relevant technical staff prior to season. ■ Additional training provided on station for wintering staff and key summer staff. ■ Biannual spill response exercises provided on station for wintering (and key summer) staff ■ Oil spill specific PPE provided on all stations which includes goggles, gloves, overalls, etc ■ Doctor and or medically trained staff on all stations. Comprehensive first aid kits available. ■ During a spill, clean areas (cold zone) will be set up for eating	Low	Training on station and biannual exercises ensures that all staff who may be involved in a spill are prepared, know how to deploy the equipment and understand their role in the event of a spill.	Station Leader or Winter Station Leader

	and central nervous system and asphyxiation. **Ingestion:** Lesser degree of toxicity if ingested but swallowing and vomiting may result in entry to lungs causing inflammation and more significant damage.	and drinking to reduce mouth to mouth contact and ingestion. ■ Various RAs and SOP have been prepared for activities involving the use of fuels with the aim of minimising the risk of spills through good practice. These include: ○ Use of Petrol, Oils and lubricants ○ Fuel Tank Cleaning ○ Vehicle Use on station ○ Vehicle refuelling ○ Station Refuelling procedures			
2. Exposure to Petrol	■ Health issues associated with exposure to petrol (carcinogens) either through inhalation, ingestion or direct dermal contact. Over exposure may lead to cancer, birth defects and death **Eyes**: Contact may cause eye irritation resulting in redness stinging and eye watering. **Skin:** Direct contact may result in itching, burning or skin damage which may be exacerbated in cold conditions. Longer term and/or repeated exposure may result in, aggravation of existing skin	■ Petrol spills are generally not to be recovered and should be left to evaporate. ■ Eating and drinking prohibited near to spill site. ■ Wash thoroughly after exposure. ■ Any contaminated clothing to be air dried in well ventilated area before washing. ■ Only small quantities of petrol stored on station ■ Petrol stored in designated areas away from station sensitivities such as freshwater source and sensitive environmental receptors.	Low	Report all petrol spills through Maximo Incident reporting	Station Leader or Winter Station Leader

	conditions, dermatitis or severe skin damage. **Inhalation**: Over exposure can cause irritation to respiratory inhalation, and central nervous system. Continued exposure may lead to unconsciousness and death. **Ingestion:** Lesser degree of toxicity if ingested but swallowing and vomiting may result in entry to lungs causing inflammation and more significant damage.	■ Petrol only to be handled in well ventilated areas or outdoors. ■ Refer to specific RAs for activities where petrol handling occurs e.g. refuelling skidoos			
3. Working with flammable & explosive materials	■ Petrol especially is extremely flammable and explosions or fire could cause severe burns or fatalities. ■ Electrostatic charges may be generated during handling. Electrostatic discharge may cause fire.	■ Majority of fuels used have very low flash points. ■ Petrol spills are generally not to be recovered and should be left to evaporate. ■ No petrol to be stored inside accommodation or admin buildings or in confined spaces. Petrol only stored in garage, workshop or external store areas. ■ Petrol stored in designated areas away from station sensitivities such as freshwater source and sensitive environmental receptors.	Low		Station Leader or Winter Station Leader

		■ Smoking near any stored or spilt oil is prohibited. ■ Remove ignition sources from spill site and consideration of remote ignition from vapours travelling along the ground to be made. ■ Refer to RAs and SOPs for refuelling bulk fuel tanks, day tanks, boats, tools and vehicles to minimise potential for spills ■ SDS sheets available for all fuels and oils used on station. ■ General principles are to not commence a spill response until an area has been made safe and is well ventilated. ■ Safety of staff during a spill is paramount and is reiterated in the OSCP.			
4. Work in confined spaces	■ Health issues associated with exposure to fuel oils (carcinogens) either through inhalation, ingestion or direct dermal contact. ■ Depleted oxygen, insufficient air. ■ Explosion or flash fire risk if spill is petrol. ■ Electrostatic conditions within buildings could cause ignition point for spilt petrol.	■ General principles are not to commence a spill response until an area has been made safe and is well ventilated. However, spill response should **not** occur in confined spaces unless specifically advised by BAS, Cambridge. ■ Safety of staff during a spill is paramount and is reiterated in the OSCP. ■ Refer to RAs for Bulk Fuel Tank Cleaning and Confined Space Working in Aviation Fuel and	Low		Station Leader or Winter Station Leader

		MGO tanks for general work in confined spaces. ■ Gas detector to be used at Halley station for the under croft. ■ No petrol to be stored in a confined space that cannot be well ventilated.			
5. Slips, trips and falls	■ Staff may suffer injuries if they slip on spilt fuel, or trip on uneven ground whilst trying to recover oil. Increased risk of slips, trips and falls due to tension involved with dealing with an emergency situation	■ Spill response to be coordinated by Station Leader (or Winter Station Leader) who will remind staff to be extra vigilant during clean up. ■ Safety of staff during a spill is paramount and is reiterated in the OSCP. ■ Absorbent mats are provided in all spill kits which would help to make oily surfaces less slippery. ■ Demarcation of hot, warm and cold zones will help to highlight areas of higher risk.	Low		Station Leader or Winter Station Leader
6. Manual Handling	■ Staff may suffer back injuries or pain elsewhere from handling heavy and/or bulky spill response equipment; e.g. entrapment of limbs, Ligament/ Tendon injuries, Muscular/Skeletal injuries, Rupture, Hernias, Crush injuries, Cuts, Bruises.	■ Refer to station specific manual handling RAs. ■ Eliminate the need for manual handling to occur where reasonably practicable. ■ Use trolleys and mechanical assistance where possible. ■ Make personnel aware of equipment available for specific tasks i.e. drum up righter tool; drum chains, cranes etc.	Low		Station Leader or Winter Station Leader

		■ Improve the task by making the loads lighter where possible at source or by breaking down into more manageable components. ■ Use the balance wheel truck, sack truck and pallet truck. ■ Whenever practicable limit load carrying capacity to 25kg per person and provide sufficient people to lift very heavy cases within this lifting capacity. ■ Increase awareness of manual handling hazards by regular training and supervision. ■ Advise all staff that rushing / peer pressure / work pressures are unsafe factors. ■ Wear PPE: safety boots, gloves, hard hats, goggles, overalls and clothing as appropriate to the task in hand. ■ Be aware of slippery uneven surfaces i.e. natural ice shelf surfaces, sledge decking etc ■ SL to ensure that personnel are rotated on a frequent basis to avoid fatigue.			
7. Working in extreme weather conditions	■ Effects of prolonged work in cold temperatures, wind and snow which could result in hypothermia, poor judgement, chilblains, asthma, frost nip or frost bite.	■ Refer to general RAs for working in Antarctica. Usual station procedures to be followed when weather conditions are adverse. ■ As stated in OSCP safety of personnel is paramount during a	Low		Station Leader or Winter Station Leader

	■ Increased risk of slips, trips and falls due to reduced capability and poor judgement.	spill and SL will stop response if conditions deteriorate. ■ SL to rotate staff to ensure that symptoms of prolonged work in the cold do not occur. ■ Appropriate cold weather clothing provided to all staff. ■ Where present station doctors to monitor staff symptoms and chefs to provide subsistence in the form of hot drinks and food			
8. Fatigue, hunger , de-hydration, stress	■ Dealing with an emergency situation can lead to staff forgetting to take appropriate breaks in the day to rest, eat, rehydrate and take stock of the situation.	■ SL to rotate staff to ensure that everyone has a break and an opportunity to eat and drink. ■ Where present station doctors to monitor staff symptoms and chefs to provide messing stations and refreshments.	Low		Station Leader or Winter Station Leader
9. Working on small boats or near water	■ Hypothermia / Drowning / Frostbite, Frostnip / Bites, Cuts and Scratches / Slips, Trips and Falls / Capsize, Sinking, Drifting, Immobilisation, Structural damage / Burns and Scalds (Heat and Chemical) / Laceration, Fracture, Unconsciousness/ Disorientation, Direction Loss / Sprains, Strains and Breaks	■ RAs for Small boating to be referred to. ■ Compliance with BAS Field Operations Manual and Boating Manuals by all personnel involved in small boat operations. ■ Appropriate training of coxswain and vehicle operatives. ■ PPE All boat occupants must wear approved thermal protection (e.g. boatsuits or diving drysuits) and life jackets. Shore line worker to wear appropriate cold weather	Low		Station Leader or Winter Station Leader/Boating Officers

		clothing (and waders and lifejackets if necessary.) ■ Where lifting operations are involved, all personnel involved must wear hard hats. ■ The Communications protocol of Boating Manuals to be followed. ■ All boat personnel are to remain aware and vigilant of local marine life. ■ Continuous observation of weather to be made by operating boat personnel. ■ Minimum of two people working on shoreline for shoreline operations.			
10. Working with and near to vehicles	■ During an emergency response reduced concentration could result in contact with people, buildings, aircraft, masts, scientific equipment, other vehicles and services. This could result in a possible loss, severe or otherwise, of scientific data / communications ■ Death or injury caused by overturning vehicle due to unstable loads, snow banks, high speed, uneven terrain, reduced visibility, unmarked construction hazards such as holes and trenches etc. ■ Electric shock from crane or digger striking overhead, or underground cables and antennas.	■ Vehicle specific RAs to be referred to. ■ Strictly adhering to the 'Trained and Designated driver' policy, whereby only selected and adequately trained operators are allowed to drive machines on base. ■ Garage to maintain all vehicles and mobile plant in a safe and reliable condition. ■ Provision of P.P.E. for working around vehicles. ie. hard hats, suitable gloves, steel toecap boots, high visibility jackets. ■ No vehicle or mobile plant operations to take place until the	Low		Station Leader or Winter Station Leader/Vehicles Manager

	■ Death, severe injury, crush, limb entrapment, puncture wounds etc. whilst assisting with vehicle loading/unloading.	mechanic has been informed of what is intended and has allocated the appropriate vehicle for that job. ■ No overloading of machines. Only use lifting /towing /winching gear as specified by the mechanic. ■ No vehicle or mobile plant operations to take place until the mechanic has been informed of what is intended and has allocated the appropriate vehicle for that job. ■ Driver awareness to be kept high and guarded against complacency during operation of any type of vehicle during spill response.			
11. Working in darkness	■ Could lead to increased danger from all of the above hazards	■ Spill response at night is not generally advocated unless inside in lit areas. Where it has to be completed during darkness (e.g. austral winter) RAs and operating procedures for station operations during winter must be adhered to. ■ Major refuelling of bases only occurs during daylight. See SOP for refuelling. ■ Most operations occur during Austral summer where there are long hours of daylight.	Very Low		

12. Environmental exposure to fuels	■ Fuels toxic to aquatic organisms, and may cause long-term adverse effects in the aquatic environment.	■ Station specific 'Oil Spill Contingency Plans' produced for each base ■ Comprehensive oil spill kit provided on all stations and stored in easily accessible location. ■ Clean up of oiled animals is not part of BAS oil spill response strategy and should not be undertaken without direction from BAS Cambridge	Low		
13. Wildlife	■ Bites from seals or pecks from birds ■ Disturbance to wildlife as a result of spill response activities ■ Stress to wildlife being affected by oil spill	■ Designate a member of staff on wildlife watch to ensure protection of wildlife and staff ■ Refer to RAs for 'Living amongst wildlife',' Working with Birds and Seals'. ■ If necessary to move wildlife away from spill response site then follow BAS Wildlfe Movement Guidelines ■ Clean up of oiled animals is not part of BAS oil spill response strategy and should not be undertaken without direction from BAS Cambridge.	Low		Station Leader or Winter Station Leader/Zoological Field Assistant
14. Generation of hazardous waste	■ Pollution to local environment and wildlife if not contained appropriately. ■ Exposure to spill response team and associated risks as per hazard No.1.	■ Waste Management Handbook (WMH) sets out how to deal with waste generated from a spill. ■ OSCP highlights the importance of managing waste as part of the	Low		Station Leader or Winter Station Leader/Station General Assistants

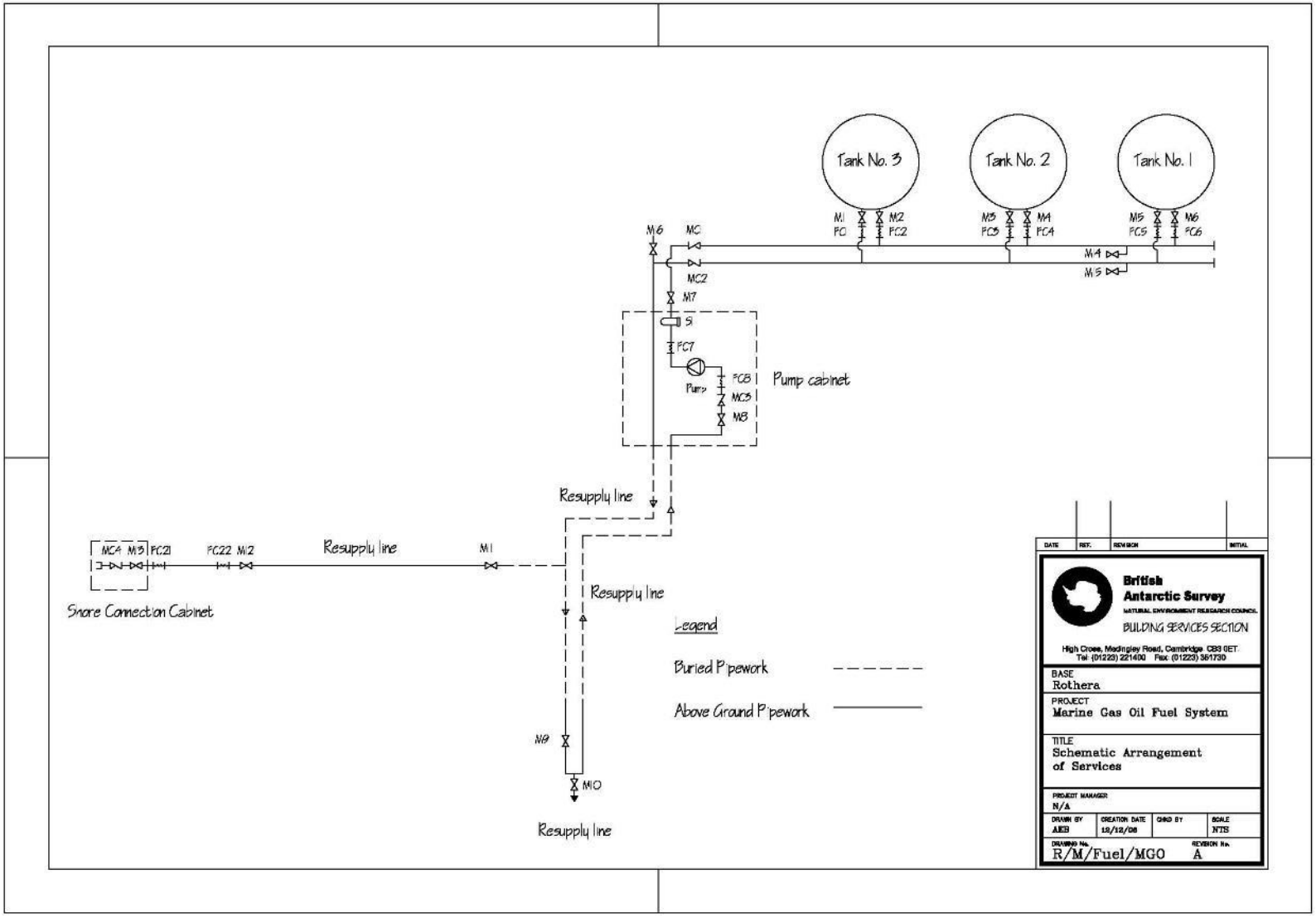
	■ During an emergency situation waste management may not be prioritised.	spill response and references the WMH. ■ Good culture of waste management on station and clear established procedures for removing waste from Antarctica. ■ Senior Environmental Manager to be contacted in the event of a spill who will where necessary, advise SL on appropriate waste management during a spill.			

Risk Evaluation guidance

Likelihood verses severity	1. Remote possibility (Rarely heard of in industry)	2. Possible (Is heard of in our industry)	3. Likely (Occurring at least once in 10 years at BAS)	4. Highly probable (Occurring at least once a year at BAS)	5. Virtually Certain (Occurring a number of times a year at BAS)
1. **Minor** - Causing minor injuries (e.g. cuts, scratches).	1	2	3	4	5
2. **Low** – Causing injuries and medical attention, but no lost time at work	2	4	6	8	10
3. **Medium** - Causing temporary disability and lost time at work	3	6	9	12	15
4. **High** - Causing permanent disability	4	8	12	16	20
5. **Major** - causing death to one or more people	5	10	15	20	25

Risk	Action
Very Low 1>2	No further action
Low 3>4	Further action: (if appropriate) as resources allow
Medium 5>9	Requires action: Set timetable for improvements
High 10>12	Priority action: Review controls immediately
Very High 15 >25	Unacceptable: Stop activity until risk can be reduced

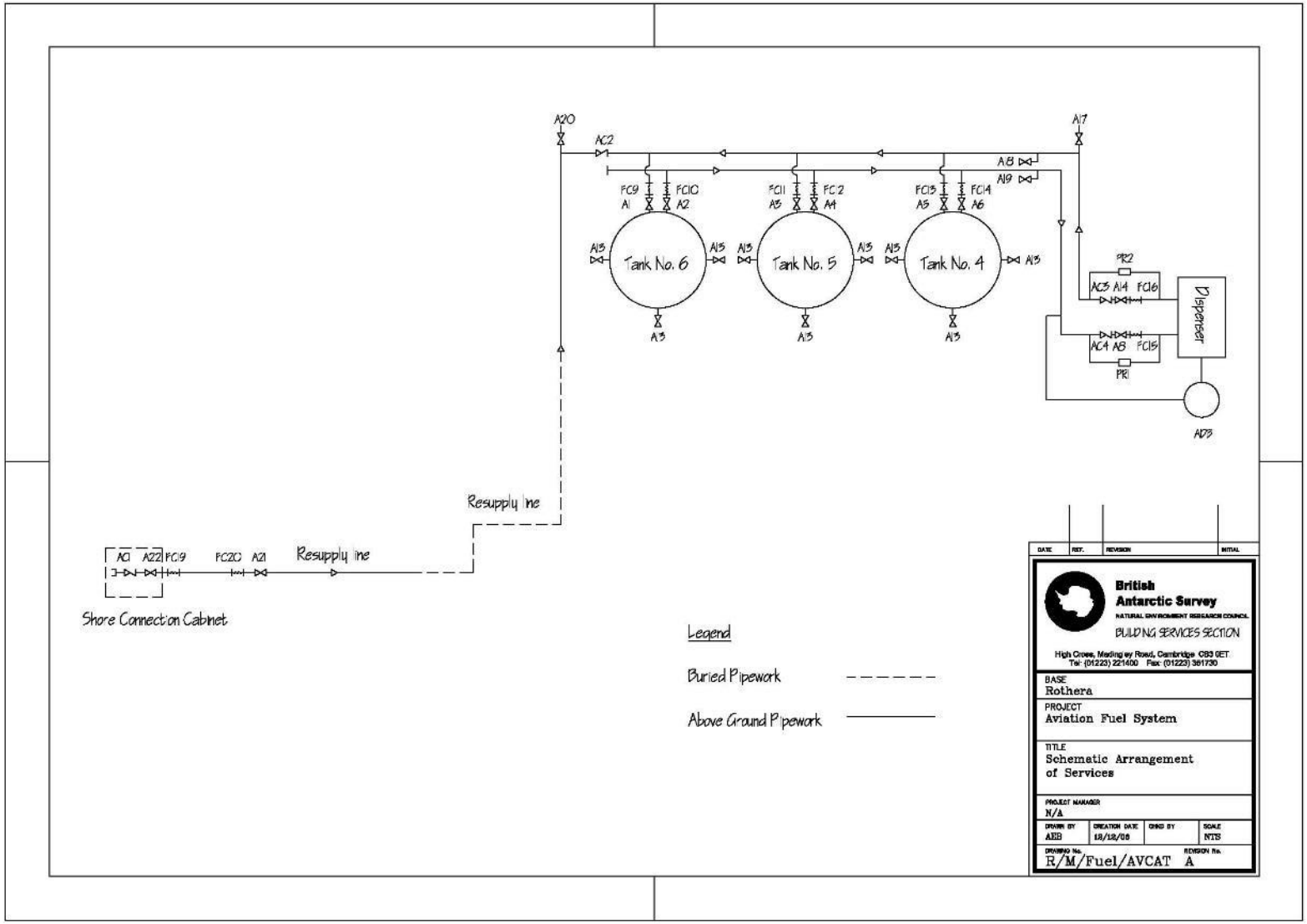
Appendix D Marine Gas Oil System



Appendix E Rothera Marine Gas Oil system components

No.	Component	Function	Remarks
MC1 MC3	Check valve 4" dia flanged	Prevents reverse flow from dispenser or day tank through to storage tanks	
MC2 MC4	Check valve 4" dia flanged	Prevents reverse flow from tanks to pipeline	Prevents loss of fuel from pipeline
MC7 MC8	Gate valve 4" dia	Isolates Marine Gas Oil dispenser from system	Keep open whilst system is operational
M9 M10	Circulation line stop valves	To shut down line	Keep open unless emergency or service
M9A	Gate valve 4" dia	Allows Marine Gas Oil to circulate through the system	Keep open to allow circulation close when filling the day tank
M10A	Gate valve 4" dia flanged	Isolates day tank	Open when filling day tank keep closed at all other times
M11	Gate valve 4" dia	Isolates shore connection line	Open only during Marine Gas Oil resupply
M12	Gate valve 4" dia	Allows Isolation of pipe sections between Boatshed and Bonner Lab	Keep closed at all times. Open only during resupply
M13	Gate valve 4" dia	Allows fuel transfer from flex hoses through system to tank valves. Prevents drainage of supply line	Keep closed at all times. Open only during resupply
M14	Gate valve 1" dia	Allows for venting on return line should line need draining	Keep closed at all times. Open only if line is to be drained
M15 M16	Gate valve 1" dia	Allows line drainage	Keep closed at all times. Open only to bleed line down.
M1 M2 M3 M4 M5 M6	Gate valve 4" dia flanged	Isolate each tank	Keep closed except when filling or dispensing fuel from tank
FC1 FC2 FC3 FC4 FC5 FC6 FC7 FC8 FC9 FC21 FC22	Flexible connectors 4" dia flanged	Accommodates for differential settlement acting upon the tank/dispenser or pipeline	Adjust pipe supports to keep flexible line straight

Appendix F Aviation Fuel System



Appendix G AVCAT and AVTUR system components

No.	Component	Function Performed	Remarks
A21	Gate valve 4" dia flanged	Allows fuel transfer from flex hose through system to tank valves. Prevents drainage of supply line.	Keep closed at all times. Open only during resupply.
AC1	Check valve 4" dia flanged	Prevents reverse flow from supply pipeline	Prevents supply line drainage if the flex hose ruptures
AC2	Check valve 4" dia flanged	Allows system recirculation without charging supply line	Prevents reverse flow from storage tanks to supply line.
A20 & A17	Gate valve 1" dia threaded	Allows for venting should line need drained.	Keep closed at all times except when draining the line.
A18 & A19	Gate valve 1" dia threaded	Allows supply and discharge lines to be drained	Keep closed at all times except when draining line.
A1, A3 & A5	Gate valve 4" dia flanged	Allows for tank filling. Isolates tank.	Keep open when filling or drawing from tank. Allows fuel to recirculate.
A2, A4 & A6	Gate valve 4" dia flanged	Allows fuel to be drawn from tank. Isolates tank.	Keep open when drawing from tank. Close when fuel not required.
A13	Gate valve 2" dia threaded	Allows water to be drawn from the tank sumps (3 per tank)	Keep closed at all times unless drawing water from tank sump basins.
FC9, FC10 FC11 FC12 FC13 FC14	Flexible connectors 4" dia flanged	Accommodates any differential settlement between tank and piping	Adjust pipe supports as required.
AC4	Check valve 3" dia flanged	Prevents reverse flow from dispenser back to suction line.	-
AC3	Check valve 3" dia flanged	Prevents reverse flow from supply line into dispenser piping	-
A14	Gate valve 3" dia	Isolates dispenser return line	Keep valve open when dispenser is operational
A8	Gate valve 3" dia flanged	Isolates dispenser from suction line	Keep open when dispenser is operational
FC15 & FC16	Flexible connecter 3" dia flanged	Accommodates differential settlement in piping	Adjust pipe support stands as required.

Appendix H How to use the equipment

Spill Equipment	What does it do?	Where can it be used?	How do I use it?
1. Blue/Grey Absorbents – socks -**general purpose** 	Designed to soak up and retain oils, coolants, solvents and **water.** (Contains vermiculite.)	• Indoors, around leaking machines, garage floors etc, • Work best when in direct contact with the floor or ground. (Heavier than the grey socks, so hugs the floor better) • Use outside in dry weather	• Can be used effectively as a barrier/dike to surround a spill and contain it. • Shake the sock before placing it to evenly distribute filler. • Place socks overlapping around the edge of spill to stop the flow. • Dispose of when saturated.
2. Blue and Grey absorbents – rolls, mats and pillows - **general purpos**e 	Grey and blue absorbents are usually for general purpose. Designed to soak up and retain oils, coolants, solvents and **water.**	• Highly absorbent, can be used anywhere. • Pre-cut mats e.g. for drum tops very useful for minimising leaks and spills during everyday use. • Rolls are ideal for covering large areas near or under machinery • Use outside in dry weather	• Ideal for recovery of fluids rather than containment. • Place directly on spilt fluid • Ideal for small spills • Dispose of when saturated
3. White absorbents - socks, pre-cut mats, pillows - **OIL ONLY/do not absorb water**	White absorbents are usually for OIL ONLY. Absorb oil-based liquids, lubricants and fuels but **do not absorb water.**	• Outdoors in wet conditions, rain or snow • In water and anywhere that you don't want to absorb water • Ideal for soaking up waterborne spills. • Fuel bunds	• Ideal for outdoor use, in wet and marine conditions. • Pillows and mats float on water. Ideal for collecting oil/fuel spilt in the water. • Socks should be used for containment (dikes/booms) and

  			pillows and mats for recovery of oils/fuels. • Pillows good for high volume spills. • Can be used during initial clean up but also useful for final sheen removal and longer term maintenance absorption of oil • Dispose of when saturated.
4. Pink Absorbents - socks, pre-cut mats, pillows - **use for chemicals**   	Pink (sometimes yellow) absorbents are usually for chemicals. Absorb acids, caustics, oil and water based liquids (won't degrade on contact with chemicals)	• Primarily for labs where **chemicals** are being used • Indoors	• Should only be used for chemical spills. • Socks for use as containment dikes, mats for recovery of fluids • Dispose of when saturated – segregate from other absorbents.
5. Pig Putty 	Patches up leaking drums and pipes as an emergency measure	• Damaged drums or fuel pipes	• Knead components together and apply to hole • Fuel should be decanted to an undamaged drum as soon as possible
6. Overpack Drum	Used to store leaking drums or waste absorbents	• Anywhere – this is a UN approved container so can be used to transport absorbents in ships and planes	• When recovering a drum – place lid on floor, position damaged drum on lid, screw overpack drum on top and then turn the whole thing the right way up. • Easily moved with forklift once fuel drum is inside.

			• Can be used for storing and transporting used absorbents and contaminated clothing. • X-rated for Packing groups I,II, and III for transportation on ships and aircraft
7. Waste bags yellow 	Used to store waste absorbents.	• Can be used for blue, grey and white absorbents that have been used for oil/fuel recovery. • May not be suitable for pink absorbents which contain chemicals. (Check what chemical has been recovered)	• Ensure filled bags are cabled tied and clearly labelled • Bags should be placed in UN approved over- pack drum prior to transportation by plane. • Bags should be placed in old fuel drums prior to transportation on board the ship.
8. Poly Drum Trolley 	• Transports 210l drums • Tilts to create a dispensing station • Acts as a temporary secondary containment for a leaking drum	• Anywhere drums are being used.	• Drums can be mounted onto the dolly for ease of transportation. • When the trolley is laid flat and the drum secured in place, the trolley provides a contained area to dispense the contents of the drum into another container. • Or it can be used as a temporary containment measure when a drum is leaking.

9. Fast tank 	Provides a 'quick to erect' temporary storage tank for collecting polluted water/snow where oils/fuel can be separated	• Anywhere there is flat ground. • Place to the side/ turn over any sharp stones/ rocks.	• Instructions for erection are provided with the kit. • Polluted water or snow can be collected in the tank and absorbents or skimmers can be used to collect oil. • The fast tanks are reusable and should be cleaned thoroughly after use. • Waste oil and waste absorbents should be packed in empty 205L drums.
10. Inflatable Booms  Intertidal Boom (three chambers: two lower water ballast chambers and one upper air chamber)  Sentinel Boom (Single chamber free floating boom which is filled with air only)	• Used to protect shorelines from encroaching spill • Used to contain large spills on open water	• Beaches and intertidal zones (all water and land interfaces) • Can be deployed from a boat or from the shore • Open waters, coastal waters, ports. • Can be deployed from a boat or from the shore	• Use depends on location and movement of spill. Booms can be deployed to contain oil, deflect a spill, or protect an area of shore. • Staff deploying booms should have attended the BAS oil spill training course. • Requires anchor points either on land or boat, to secure its position. • Requires use of air inflator to fill the air chambers of booms. • Care should be taken in strong winds as the boom may be uncontrollable. • Care is required when deploying in waters where there is floating ice and icebergs. • Inflatable booms are reusable and should be cleaned thoroughly after use.

11. Fence Boom (GlobeBoom) 	• Used to contain large spills on open water or to protect sensitivities on the shoreline from spills on the water	• Open waters, coastal waters, fast flowing water, rivers • Can be deployed from the wharf, shore or boat	• Lightweight, fast response boom • Floating boom due to high-density polyethylene (HDPE) round floats of hemi-spherical design. • Can be deployed without power packs, reels or inflators. • Requires anchoring • Each globe segment has a cast handle that allows for easy handling.
12. Rope Mop 	• 120m length of polypropylene absorbent mop which rotates on a pulley system to collect oil from the surface of water	• In calm waters (can be used where there is ice in the water) • Can recover oil over small or large areas, in fuel bunds, harbours and in icy conditions	• The floating rope is driven over the surface of the oil by a drive unit which also squeezes the oil out of the rope for recovery. • One end of mop is attached to a separating tank which separates and returns any water picked up by the rope mop. Only oil is collected in the separator for disposal. • Should only be used in calm water. • Requires boat deployment to tether pulley system to.

Appendix I Training Details

Station Leader Pre-deployment Training

Pre-deployment training for Station Leaders

Station Leader Spill Response Training	Content of training element	Frequency
Introduction and familiarisation with station/site OSCP– delivered by BAS Environment Office	**Classroom theory training** ▪ The role of OSCP ▪ BAS policy on oil pollution ▪ Activities and areas (scope) covered by each OSCP ▪ Introduction to the fuel storage at each site ▪ Highlighting spill risks at each site ▪ Spill incident Tier Classification ▪ Rapid Initial Assessments ▪ Station Leader Action Plan ▪ Escalating incidents to BAS Cambridge ▪ Mobilising station response teams ▪ Conditions required for clean-up ▪ Site management – hot/warm/cold zones ▪ Use of inflatable booms, skimmers and fast tanks ▪ SL responsibility for on-site training and conducting exercises	1 year
Two day bespoke Station Leader Training delivered by Oil Spill Response Ltd (OSRL) in Southampton	**Theory topics:** • Causes and fates of oil spills • Containment and protection • Recovery of oil • Cold weather specific considerations • Tabletop spill exercises – coordinating the response team **Practical training:** On site (coastal or river location) practical involving deployment of containment booms, use of recovery skimmers and fast tanks.	3 years

Station Response Team Pre-deployment Training

Classroom and practical training delivered to station staff by BAS staff and Oil Spill Response Ltd during pre-deployment training.

Station Spill Response Team Training	Content of Training element	Frequency
Classroom theory session/Presentations by BAS speakers	**Environment** ▪ Fate & Behaviour of Spilt Oil ▪ Environmental Impacts ▪ BAS Response Strategies	3 years
	Oil Spill Contingency Planning ▪ Purpose of OSCPs ▪ Tier classification ▪ Reporting spills ▪ Spill exercises	
	H&S ▪ Hazards of spilt oil ▪ Mitigating hazards ▪ First Aid Measures	
	Fuel Management ▪ Overview of all station fuel systems and networks ▪ Activities that involve fuel usage/transfer ▪ Spill prevention through design ▪ Spill prevention through procedures	
Practical familiarisation with BAS Spill Response Equipment/Delivered by Oil Spill Response Ltd	▪ Appropriate use of PPE ▪ Demonstration of site management - hot/warm/cold zones ▪ Demonstration and explanation of the different types of spill response equipment including: - absorbents/pom poms - Shoreline boom - Skimmer/Rope mop - Fast tank ▪ Practical hands-on experience inflating and anchoring the shoreline boom. ▪ Practical hands-on experience erecting/setting up a fast tank.	3 years
Desk-top spill scenario exercise/Facilitated by BAS Station Leaders or Facilities Engineers	Utilising the station OSCP to plan a response to a theoretical (but potentially real) spill scenario specific to the responder's station. Staff are required to: ▪ Prepare an initial notification of the spill ▪ Predict the movement of the spill ▪ Identify resources at risk and sensitive receptors ▪ Plan their response to stop or minimise the spill and attempt a clean-up. ▪ Plan the PPE and oil spill response equipment to be deployed ▪ Plan their site management ▪ Consider how they would manage waste	3 years

On-Site Station Response Team Training

Training must be delivered on station by the Station Leader, assisted by the Station Facilities Engineer where available, to the station response team. The table below details the requirements and frequency of the training and has been broken down into three key areas that can be delivered as a single session or as three separate sessions. The training should be delivered to the spill response team in early summer, prior to the bulk fuel delivery and prior to a spill response exercise taking place.

The Station Leader may choose to combine the training with one of the spill response exercises – please note that if they are combined that it is important that all training requirements are covered first so that staff are appropriately briefed and familiar with spill response equipment prior to undertaking the exercise and fully deploying the kit.

On-site Station response team training	Content of training element	Frequency
Theory introduction to OSCP and role of a responder	▪ Overview of Station OSCP including access to up-to-date copy for review ▪ Role of a spill responder (identifying any job specific responsibilities e.g., emergency shutdown or waste management) ▪ Reporting all spills regardless of fuel type/size ▪ BAS spill response strategies ▪ Spill site set-up and management (hot/warm/cold zones) ▪ H&S of responders highlighting risks of petrol and other volatile fuels	1 year
Physical introduction to station	▪ Physical walkaround station and introduction to: ▪ All oil storage locations (bulk tanks, day tanks, fuel bowsers, drummed fuel, smaller volumes of fuel such as those in hazardous cabinets) ▪ Locations of all spill response equipment kits including day to day absorbents in areas where fuel is routinely used ▪ Highlight all oil spill risks on station ▪ Locations of all station resources at risk of a spill such as fresh water source, long-terms science experiments. ▪ Locations of all sensitive environmental receptors such as seal breeding/haul out site, penguin moulting sites, nesting birds, feeding grounds, areas of vegetation etc.	1 year
Hands-on familiarisation with spill response kit	▪ Correct use of PPE ▪ Use of different absorbents including mats, socks, pillows, pom poms highlighting use of hydrophobic and hydrophilic. ▪ Hands-on practice with setting up and trialling all fence booms, shoreline booms and skimmers ▪ Erecting and setting up a fast tank	1 year

Appendix J Oil Spill Response Kit Inventory

Table 10 (Spill Kit Types) outlines where on station oil spill response kits are available, what type of spill kit should be there and who is responsible for the oil spill kit in that area. Table 11 (Spill Kit Type) outlines the contents of each different type of spill kit.

At Rothera the intention is:

- The Emergency Oil Spill Response container is only accessed in emergencies and for training.
- The Consumables Oil Spill Response container can be accessed by all and should be used to restock area oil spill kits or for routine use e.g., when refuelling/ decanting oil containers.
- The stocking of area oil spill kits is managed by the person responsible for that area.
- The Station Leader should instruct all area managers to restock their area spill kits prior to the Station Leader undertaking the annual indent of the 'consumables oil spill response container'.

Table 5: Spill Kit Types

Spill Kit Types	**Location**	**Indenting Responsibility (with ability to delegate)**
Emergency Oil Spill Response Container	Wharf	Station Leader
Consumables Oil Spill Response Container	Outside NBH	Station Leader
Wheelie Bin Oil Spill Response Kit	Vehicle's workshop (also includes drain cover)	Vehicles Manager
Overpack Drum Spill Kit (for 205L drums)	IWHF	Station Logistics Manager
	Hanger	Chief Pilot
	Genny shed	Facilities Engineer
Oil Spill Response Bag (ability to absorb 38.5L spills)	Kitchen	Station Logistics Manager
	Fuchs House	Field Operations Manager
	Incinerator	Station Logistics Manager
	Boat Shed	Deputy SOM
	NBH plant room OBH plant room Bonner lab plant room Vikings House plant room Giants plant room Admirals House plant room Fuel farm shed Fuel farm polishing shed	Facilities Engineer
	Petrol bowser 1- skidoos Petrol bowser 2- boats MGO/AVCAT/AVTUR bowser	Vehicles Manager for petrol, Facilities Engineer for MGO/ AVTUR
Vehicle spill kit	All vehicles • T,02 – Air Unit Tractor • T,03 – Boating Tractor • T,04 – Station Tractor • L5 – Air Unit Telehandler • L8 - Volvo L180H	Vehicles Manager

	• L9 – JCB 535-95 • L10 – Volvo L180H • EX02 – JCB JS130 Excavator • D4 – Dozer • POLAR2 – Pisten Bully 300 • NOD2 – Nodwell • CHPU1 – Hydraulic Power Unit – this also acts as the mini spill kit for the Wharf Crane	

Table 6: Spill Kit Type

Spill Kit Type	Contents[10]	Unit	Stock Level QTY[11]
Emergency Oil Spill Response Container			
	GlobeBoom 25m with 8" floats	Each	12
	GlobeBoom tow set including ASTM connectors, buoys, tow rope, bridles and shackles	Each	2
	GlobeBoom anchoring set for 15-20m water depth, 30m rope, 25kg anchor, 2 prong bridle, shackles and eye bolts	Each	6
	GlobeBoom float repair kit 8"	Each	6
	Rope Mop Skimmer (OM 140 mop skimmer system, stainless steel frame, diesel driven with recoil start and spark arrester)	Each	1
	Rope mop 30m x 100mm	Each	4
	Rope mop tail pully with Ø 10 x 12 m rope with snap hook and light weight 300 l aluminum oil separation tank with wheels. Including 3" ball valve with male Camlock	Each	1
	Plant nappy for rope mop	Each	1
	Crest Flowline inflatable boom (20 m length) *Description: Inflatable boom with one chamber (filled with air)* *Accessories: c/w Unicon connectors with stainless steel thumbscrews, Towing/mooring bridles*		3
	Hand reel	Each	1
	Crest Flowline inflatable intertidal boom (20m length) *Description: Inflatable boom with three chambers (2 filled with water and 1 with air)*	Each	2

[10] Contents do not need to be exact in terms of exact sizes and specification or exact quantity i.e., if the stock level indicates 1 box of absorbent pillows 31cm2 and you have none of that size but you have 1 box of slightly larger pillows that is fine. Use your judgement.

[11] This is the required stock minimum- if there is more and/ or more useful stock not listed here please keep.

	Accessories: c/w Unicon connectors and stainless steel thumbscrews		
	Petrol driven Water pump Pump type: WB20XT Drive: Honda 20 XT discharge capacity 620L Accessories: hose set and end strainer	Each	1
	Vikoma PB4600 Petrol driven air inflator		1
Consumables Oil Spill Response Container 1			
	Spate 75 PD self-priming transfer pump in steel frame with wheels and Yanmar 3.1 kW diesel engine.	Each	1
	Hose set for spate pump (2x 5m and 2x 10m 3" suction/discharge hoses, 2 hose floats, M/F couplings	Each	1
	Spares kit for spate pump	Each	
	Plant nappy for spate pump	Each	1
	Fastank 10m^3 with roof cover	Each	3
	Fastank repair kit	Each	1
	Vikoma M25B Peristaltic Pump Set Pump type: M25B Drive: Honda GX 160 Petrol Peristaltic hose: Hypalon Fittings: Quick release Kamlock couplings Accessories: Suction probe (1), Disc strainer (1), Flexi hose (15m), Semi-rigid hose (30m), Delta skimmer head & float (1)	Each	1
	Overpack drum	Each	2
	Overpack drum spill kit including contents	Each	1
	Pig Putty	Pack of 6	10
	Absorbent boom 20cm x 3m	Each	2
	Absorbent socks 8cm x 3m	Box of 6	4
	Absorbent socks 8cm x 122cm	Box of 10	8
	Absorbent pillows 31cm2	Box of 10	4

	Absorbent pom poms	Box of 20	1
	Drum top absorbent mats	Box of 25	2
	Oil only absorbent mats 38cm x 51cm	Box of 50	10
	Oil only absorbent mats 38cm x 46m	Box of 2 rolls	8
	Universal absorbent mats 38cm x 51cm	Box of 100	5
	Universal absorbent mat 38cm x 46m	Box of 2 rolls	4
	Molegrips (for bladder leaks)	Each	2
	Universal poly drum funnel	Each	2
	Various funnels	Each	10
	Yellow waste bags (roll)	Roll of 100	6
	Drum wrench	Each	1
	Protective coverall (Tyvek) S	Each	10
	Protective coverall (Tyvek) M	Each	10
	Protective coverall (Tyvek) L	Each	10
	Protective coverall (Tyvek) XL	Each	10
	Disposable gloves L pack	Box of 100	1
	Rubber Gloves S	Each	10
	Rubber Gloves M	Each	10
	Rubber Gloves L	Each	10
	Goggles	Each	20
	Decontamination bund 1m x 2m x 0.25m	Each	1
	Bootwasher	Each	1
	Bootbrush	Each	1
	4 drum bund	Each	2
	Empty 205L tighthead drums	Each	40
Types of spill kit available on station[12]:			
Wheelie Bin Oil Spill Response Kit			
	Socks 8cm x 122cm	Each	4
	Socks 8cm x 3m		2
	Pillows 31cm^2		4

[12] Spill kit type is only a guide; it does not need to be exact.

	Absorbent mats		50
	Yellow waste bags		10
	Drip Tray		1
	Pig Putty		6
	Rubber Gloves L		1
	Goggles		1
Overpack Drum Spill Kit			
	Socks 8cm x 122cm	Each	4
	Socks 8cm x 3m		2
	Absorbent Mats		50
	Drip Tray		1
	Drum funnel		1
	Yellow waste bags		10
	Pig Putty		2
	Rubber Gloves L		1
	Goggles		1
Oil Spill Response Bag (ability to absorb 38.5L spills)			
	Socks 8 x 122cm	Each	4
	Absorbent mats		25
	Yellow waste bags		10
	Pig Putty		2
	Rubber Gloves L		1
	Goggles		1
Vehicle Spill Kit			
	Pig Putty	Each	1
	Absorbent mats		2

Appendix 3
BIOSECURITY PLANS

Antarctic Construction Partnership – Rothera Modernisation

Employer	UKRI/British Antarctic Survey	Project Number	BAS.2066
Tech Adv	Ramboll	Document Number	RUNSUR-BAM-ZZ-ZZ-T-EN-0002
Contractor	BAM	Revision	P-02

Rothera Runway Surfacing and Lighting Biosecurity Plan

Reference Sheet

Document Number	Description
	BAS Biosecurity Regulations 2021

Revision History

Revision	Date	Revision Description
P-01		First Draft
P-02		Provisions for sand for sand replacement tests

Prepared by	Checked by		Approved by
NDG	DRO		MSI
Author	Project	Corporate / Area Process Owner	Project Manager

Status Definition (latest revision)	Total number of pages (including attachments)
For Issue	32

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Table of contents

1. Introduction

Many plant and animal species have been moved around the world through human activities to areas they would not reach naturally. Once in a new location, these 'non-native' species may establish, with potentially severe impacts on local species and ecosystems. The Antarctic continent currently has few confirmed non-native species, but numbers are increasing. Future increases in human presence in the Antarctic region, either through tourism, governmental operators or other commercial activities, will increase the risk of further non-native species introductions. At the same time, climate change may increase the chances of non-native species establishment and range expansion.

The Antarctic Act (1994, amended 2013) legislates to minimise the risk of non-native species introductions in the Antarctic, and BAM is obliged to conform to this legislation. BAM are also obliged to follow the BAS Biosecurity Regulations and the Biosecurity Policy with Contractors.

BAMs projects in the Antarctic cover several locations of distinct biological diversity. It is essential that all necessary precautions are taken to prevent the introduction of non-native species to Rothera Point and the surrounding area from other locations, including Europe, South America or any of the other BAS Research Stations or logistics hubs.

This document provides guidance to BAM personnel on the measures to be taken when moving plant, materials or personnel to Rothera Research Station.

1.1. Prohibited Items

No BAM personnel or their subcontractors will be permitted to take any of the items below to the Antarctic:

- Any living plant, animal or microorganism.
- Non-sterile soil or compost.
- Any plant propagules (e.g. seeds, bulbs, cuttings) or invertebrate eggs (e.g. brine shrimp or sea monkey eggs).
- Untreated wood where bark remains attached.
- Any perishable foods including fruit, vegetables, cheese, fish or meat in personal cargo (no personal foods are allowed but fresh foods as part of the construction team food supply will be arranged).
- Packing materials of used sacking, hay, straw, chaff or wood shavings. Polystyrene beads or chips should also be avoided for waste management purposes.

1.2. Roles & Responsibilities

- Environmental Lead –
    - Overall responsibility for environmental management of the project.
    - Ensuring that the designers, buyers and construction team are aware of the biosecurity issues covered in this document.
    - Nominating and training of biosecurity inspectors.
    - Training of the Environmental Engineer
    - Answer any queries or questions from BAM staff on environmental or biosecurity issues.

- Project Manager –

  - Responsible for all construction works including mobilisation and demobilisation
  - Appointing an Environmental Engineer from within the site team.
  - Ensuring cargo is biosecure before off loading at Rothera

- BAM Environmental Engineer: TBC (appointed from within the Rothera construction team on site)
  - Responsible for managing and monitoring the environmental performance and biosecurity measures on site.
  - Responsible for managing the Biosecurity Inspectors on site.
  - Carries out all final biosecurity inspections before cargo is offloaded from the ship to Rothera
  - Completes the relevant biosecurity checklists (Checklists 2, 3, 4, 5 and Form 1)
  - Reports to the BAM Environmental Lead

- BAM Biosecurity Inspectors: TBC (at least one member of the Rothera construction team and at least one BAM staff member responsible for checking cargo at packing and loading stages in the UK)
  - Responsible for ensuring that all plant and materials are thoroughly inspected and pose no biosecurity risk.
  - Responsible for completing the relevant biosecurity checklists (Checklists 2, 3, 4, 5)
  - Inspections will be required at the port where materials are loaded
  - Report to the BAM Environmental Lead unless at Rothera in which case reports to the Environmental Engineer

- All BAM Personnel
  - Personnel will be responsible for ensuring that their personal belongings are biosecure and do not contain any prohibited items.

2. Inspection Procedure

To ensure all plant and materials required for the Runway Surfacing and Lighting are biosecure, inspections will be undertaken at various stages of manufacture and transportation and at a number of different locations.

Inspections will be scheduled according to the biosecurity risk presented by the item.

For example

Plant poses a high biosecurity risk and is hard to clean and inspect and will therefore be inspected wherever possible by a trained BAM Biosecurity Inspector at the supplier's premises.

Pre-cast concrete elements pose a lower risk and are easier to clean and will therefore not be inspected before arrival at the port.

The following biosecurity inspections will be carried out

Location	**Inspection**	**Inspector**	**Requirement**
Supplier Premises	Manufacturing, storage and packing areas	Trained Supplier Biosecurity Inspector BAM Biosecurity Inspector	According to RA
Supplier Premises	Plant and materials before packing or transportation	Trained Supplier Biosecurity Inspector BAM Inspector	According to RA
Logistics Hub	Storage and packing areas	LV Shipping Biosecurity Inspector BAM Biosecurity Inspector	Compulsory
Logistics Hub	Plant, materials and ISO containers on arrival	LV Shipping Biosecurity Inspector BAM Biosecurity Inspector	Compulsory
Logistics Hub	Materials before packing	LV Shipping Biosecurity Inspector BAM Biosecurity Inspector	Compulsory
Logistics Hub	All cargo before loading onto vessel	LV Shipping Biosecurity Inspector BAM Biosecurity Inspector	Compulsory
Logistics Hub	Vessel	LV Shipping Biosecurity Inspector BAM Biosecurity Inspector	Compulsory

3. Pre-departure Biosecurity

3.1. Biosecurity Training

Prior to departure, all construction team members will receive a project specific briefing (in addition to the general environmental pre-departure briefing) to ensure that they are aware of the specific biosecurity requirements of the project's EIA and any associated permit.

Construction team members will sign a register to confirm that they have attended the briefing and understood the biosecurity requirements of the EIA and permit.

Additionally, selected members of the construction team will be trained as biosecurity inspectors to assist in inspections at the port of departure and more specifically on arrival at Rothera.

3.2. Personal Biosecurity

- Immediately before leaving home for Rothera, BAM personnel should ensure that all outer clothing has been washed, at the hottest temperature suitable for the garment, to remove seeds, soil and other propagules. Particular attention should be paid to Velcro, gaiters, pockets, turn-ups in trousers and hoods of jackets. (Please see Appendix A. Checklist 1).
- Footwear should be cleaned (inside and out) to remove soil, seeds or any other plant material.
- Personal clothing and equipment shall also be checked on the ship prior to arrival in Antarctica.
- Avoid picking up soil, seeds and other propagules on your clothing during travel to Antarctica (i.e. be careful to ensure clothing is clean after walking in the countryside in any South American countries or South Atlantic gateways prior to departure)
- If possible, before entering Antarctica wear new items of outer clothing which will be free of non-native species and propagules.
- If moving between BAS stations please check clothing and personal belongings to prevent transport of biological material between sites (especially from South Georgia station to Antarctic locations).
- Ensure all clothing and personal effects are packed indoors in a clean environment.
- Before handing in any personal items to the BAM Logistics Stores in the UK, Netherlands or Chile for transportation to Antarctica, ensure that they are clean and free of soil and propagules.

3.3. Supplier/Partner Biosecurity

Limited materials are required for the Runway Resurfacing and Lighting project. These can be classified into the following groups:

- Pre-cast concrete chambers, pipes and ducting.
- Plastic ducting and accessories
- M&E equipment
- Aggregate
- Plant

Of these, plant items carry the highest biosecurity risk and currently the only supplier visits envisaged as required are to the plant suppliers.

Containers for M&E components will be packed at our M&E Partner, GA Barnies establishment in Inverness. Inspections of GA Barnies premises will be carried out when containers are being packed.

3.4. Cargo Packing Areas

Materials bound for the Rothera Runway Resurfacing and Lighting project will be inspected for biosecurity and loaded into containers at either LV Shipping in Middlesbrough or GA Barnie in Inverness. The following biosecurity measures, where reasonably practical, will be adopted for all cargo packing areas (Please see Appendix A. Checklist 2).

- Cargo is to be packed in an indoor area.
- Cargo packing and storage areas shall be deep cleaned prior to the commencement of use by BAM and, thereafter, at least once per year or as deemed necessary. The area must be kept clean (which means free from soil, dirt, litter, weeds, plants, etc.).
- There must be no weeds or plants within 10m of doors to the packing area, except doors used purely as fire exits. Any plants within 10m are to be eradicated prior to use for packing.
- All doors and window must remain closed as far as possible. This is particularly important if packing after the hours of darkness, when insects will be attracted to light.
- A Rodent Control Plan will be produced for the facility indicating location and monitoring frequency of bait stations.
- UV fly killers must be installed, one for every 50 m^2 of internal floor space, and they should be serviced once a year with UV tubes replaced. Insect sticky traps should be installed, one for every 25 m^2 of internal floor space. These must be inspected once every three months, replaced as necessary, and a record of the check made for auditing purposes

3.5. Cargo Storage Areas

Plant and materials will need to be stored either before packing or after at both suppliers' premises or close to the cargo packing area. Wherever possible, plant and material are to be stored in an indoor area conforming to the requirements of packing areas. Where indoor storage areas are not available, external storage will be used and the following biosecurity measures will be adopted.

- Stored plant and equipment should be stored on concrete surfaces (as opposed to bare earth). When containers cannot be stored on concrete, they will be raised above the ground on batons of, either timber, concrete or steel, and additional checks shall be made to ensure they are free from soil and biological material prior to onward transportation.
- External cargo storage and packing areas shall be free of weeds, plants and invertebrate infestations. (i.e. regular spraying of weeds that emerge on hard standing).
- Any pallets stored outside shall be checked for bird nests before use, and if found should be removed and the pallet cleaned.
- A Rodent Control Plan will be produced for the facility indicating location and monitoring frequency of bait stations.

3.6. Packaging

Wherever possible plant and materials will be packed into ISO containers. This improves the efficiency of the logistics operation and increases biosecurity due to the ability to fumigate containers.

- All crates are to be lined with plastic sheeting
- Wood packaging (such as cases, crates, dunnage, pallets and timbers for the purpose of bracing, separating, protecting or securing cargo) are to be new and comply with the International Standards for Phytosanitary Measures No. 15 (ISPM 15).
- Packaging and filling materials may include shredded paper, vermiculite, bubble wrap and other air-filled cushioning materials.

- Where other cost-effective options exist, use of corrugated cardboard and plastic boxes should be minimized, as they may carry non-native invertebrates within the corrugations.

The following packaging materials are prohibited:

- No soil, moss, used sacking, hay, straw, chaff or wood shavings will be used. Polystyrene beads or chips should also be avoided to help waste management.

3.7. Break Bulk Cargo

Break bulk cargo may present a more substantial biosecurity risk than containerised cargo, therefore, it is important that the amount of break bulk cargo generated is kept to a minimum. Break bulk cargo can vary greatly in shape, size and type (e.g. construction materials, timber, scaffolding poles, etc.). All break bulk cargo must be clean and free of soil and biological material before loading on the ship. All items of break bulk cargo, including packaging, shall be visually inspected for signs of rodent gnawing or rodent ingress. Cargo shall also be checked for any soil or biological material and if found the item shall be cleaned.

3.8. Small Plant & Tools

Prior to packing any previously used small tools or small plant items for transport to, or between, Antarctic Research Stations, the following procedure is to be followed. The high levels of cleanliness apply to all mechanical plant and tools, irrespective of size; however, individual hand tools do not need to be listed separately in the Appendix A. Biosecurity Checklist 3 Small Plant and Tools.

- Plant items are to be placed on a clean concrete or asphalt hard standing.
- Where practical, plant is to be cleaned externally using a high pressure jet wash to ensure that no soil, mud or biological material is left on the items. Where the use of water is not possible, the item will be cleaned using a combination of hard and soft brushes and/or a damp cloth.
- Following cleaning, small tools and plant are to be inspected by a nominated Biosecurity Inspector to ensure that they are free of visible soil and biological material (e.g. plant fragments, seeds and insects) This information is to be recorded for auditing purposes (Please see section Appendix A. Checklist 3)
- Care should be taken not to contaminate the small tools and plant prior to loading onto the ship or aircraft. Plant storage facilities should minimise the potential for recontamination of cleaned small plant and tools to transport and, if necessary, arrangements should be made to thoroughly clean the small plant and tools at the ship or aircraft loading site.
- Immediately before being loaded onto the ship or aircraft for transportation, all small tools and plant should be checked by a nominated Biosecurity Inspector to ensure they are free of soil and biological material. If any soil or biological material is found, the contaminated item should be cleaned and re-inspected before being transported.

3.9. Vehicles & Large Mechanical Plant

Mechanical plant (particularly tracked vehicles) pose a high risk to biosecurity. The undercarriage of wheeled or tracked plant can pick up soil which could contain plant fragments, seeds, invertebrates or invertebrate eggs.

Prior to loading any item of large mechanical plant for transport to or between Antarctic Research Stations, the following procedure is to be followed (Please see Appendix A. Checklist 4):

- Plant items are to be placed on a clean concrete or asphalt hard standing.

- Where practical, plant is to be cleaned externally using a high pressure jet wash to ensure that no soil, mud or biological material is left on the vehicle, including the wheels, wheel arches, tracks and areas underneath the vehicle. Plant accessories, such as forks and buckets, should be cleaned in a similar manner.
- To the maximum degree feasible, panels should be removed to ensure there is no entrapment of soil and mud within internal vehicle compartments.
- Engine and hydraulic control compartments are to be thoroughly cleaned. Manufacturers' guidance may be required with respect to cleaning methodology to ensure no damage is done to the engine electronics or hydraulic systems.
- Where the plant has a cab, upholstery and mats should be brushed and/or vacuum cleaned to remove any soil or biological material.
- Following cleaning, plant is to be inspected by a nominated Biosecurity Inspector to ensure that they are free of visible soil and biological material (e.g. plant fragments, seeds and insects).
- Care should be taken not to contaminate the plant prior to loading onto the ship or aircraft. Plant storage facilities should minimise the potential for recontamination of cleaned vehicles prior to transport and, if necessary, arrangements should be made to thoroughly clean the vehicles at the ship or aircraft loading site.
- Immediately before being loaded onto the ship or aircraft for transportation, all vehicles should be checked by a nominated Biosecurity Inspector to ensure they are free of soil and biological material. If any soil or biological material is found, the contaminated vehicle should be cleaned and re-inspected before being transported.
- Motorised plant is to have its engines started before loading, to ensure rats and mice are not living in the engine compartments.

3.10. Construction Materials

The following section does not constitute a complete list of the construction materials but simply identifies the materials considered to pose the highest biosecurity risk and details the specific measures to be taken.

3.10.1. Aggregates

Aggregate is defined as any course particulate material used in construction, including sand, gravel, crushed stone, boulders, pebbles or slag. It presents a biosecurity risk because biological material such as seeds, soil and invertebrates can easily become entrained during production and transport.

The only aggregate identified as being required to be exported to Rothera is sand for the sand replacement density testing of the runway. The measures below should be followed if imported aggregate is required.

- Aggregate must be kiln dried or if this is not possible, obtained from marine sources.
- To prevent seed contamination during storage and transport aggregate must be contained in clean sealed packaging (such as FIBCs).
- Packaged aggregate will be transported in clean ISO containers.
- Aggregate must be carefully handled to prevent damage to the packaging.
- Only the minimum amount of aggregate needed for the project will be sent to the site.
- All aggregate will be used as quickly as possible after delivery to the site to reduce the risk of establishment of any non-native species present in the aggregate.

- Bulk aggregates must be stored in a defined area at the construction site. Any spilled aggregate must be cleaned up immediately and contained within packaging, until used.
- Aggregate will be stored in its sealed packaging at the site and will not be left open to the environment.
- When aggregate is removed from its packaging for use, it must be used as soon as possible.

In the event that one or more of these management steps are not possible, further consultation with the BAS Environment Office must take place. Consultation with the BAS Environment Office must occur prior to any aggregate being purchased from suppliers.

3.10.2. Timber

Timber will be required for packaging materials. Due to the risk of infestation by pests the following precautions must be observed before timber can be imported to Antarctica:

- Timber materials must be heated in accordance with a specific time–temperature schedule that achieves a minimum temperature of 56 °C for a minimum duration of 30 continuous minutes throughout the entire profile of the wood (including at its core).
- All timber products are to be inspected for signs of wood borrowing animals such as wood boring beetles and woodworm (a beetle larvae) before being shipped.
- If any evidence wood burrowing animals is discovered the timber must be treated with a pesticide or fumigated in a sealed container.
- All packaging timber should conform to the requirements of International Standards for Phytosanitary Measures No. 15 (ISPM 15) and be stamped with IPPC logo, country of origin and method of treatment.

3.10.3. Mechanical and Electrical (M&E) Fittings

M&E equipment will be required within the lighting of the runway. This equipment will mostly consist of luminaires. This equipment will be received by our M&E partner GA Barnies and packed into containers in their premises. All items will be stored in an area conforming to the requirements of storage areas (section 3.5) and checked for biosecurity prior to loading into containers.

3.10.4. Ducting

Ducting forms an ideal place for invertebrates to hide from predation. Scaffold tubes shall be thoroughly inspected and if necessary, cleaned using a pressure washer or compressed air. Ideally, ducting will be transported in sealed containers, but where this is not possible, ducting ends are to be sealed after inspection/cleaning with duct tape or end caps to prevent the future ingress of biosecurity threats.

3.11. ISO Containers

Prior to loading any ISO or other sealed container for transport to or between Antarctic Research Stations, the following procedure is to be followed.

- Shipping containers are to be stored on concrete surfaces (as opposed to bare earth).
- Shipping containers are to be kept clean and free of soil, mud, spiders' webs, invertebrates, debris, wood fragments (e.g. from pallets), plant material or mould. A record shall be kept of this inspection for auditing purposes (Please see Appendix A. Checklist 5).

- Prior to loading, if deemed necessary by the nominated Biosecurity Inspector, the inside of the container is to be washed
- Air vents and drainage holes (if any) are sealed before loading the container with cargo. As condensation will be created without ventilation during the voyage, suitable desiccants, such as 'ProDriPole' are to be provided to ensure the cargo remains dry. 4-6 ProDriPoles are required per 20ft ISO container.

During loading any ISO or other sealed container for transport to or between Antarctic Research Stations, the following procedure is to be followed

- If possible, containers should be loaded within a warehouse/closed environment. If a container must be loaded outside, then it should be placed on a hard standing with a minimum of 2 metres all around it that is free of soil and vegetation
- During loading, vigilance must be exercised in respect of rodents, birds, insects and airborne seeds or leaves. An insecticide aerosol is to be available to eradicate any insects entering the container. Dead insects are to be removed.
- If loading outdoors, the container doors area must be continually attended. If loading is suspended, even temporarily, the doors to the container must be closed. Container doors are to be closed overnight, even if loading indoors.

Once the loading of the container is complete, the following procedure is to be followed

- For all containers, the following must be installed:
  - One pre-baited mouse box - to be placed inside the container as close to the doors as practicable.
  - One pre-baited rat box - to be placed inside the container as close to the doors as practicable.
  - Two crawling insect traps - to be positioned parallel and adjacent to the container walls or doors, and as close to the doors as practicable.
- The container should be fumigated using a permethrin smoke bomb or permethrin fogger. Use one 'Digrain One Shot 300 ml 1.46% Permethrin' (or similar) total release aerosol per 20' container or according to manufacturer's instructions. The container should be shut and sealed immediately. This should be undertaken by an appropriately trained person where practical. Container doors must have an appropriate label showing the date and time of fumigation.
- The outside of the container, including the underside and lifting points are inspected to ensure they are free of soil, mud, spiders' webs, invertebrates and bird droppings. If deemed necessary by the nominated Biosecurity Inspector, the outside of the container is to be washed using a high pressure washer.

3.12. Fresh foods

Provisions for biosecurity measures associated with fresh foods have not be detailed in this document, as all fresh foods for BAM personnel will be supplied by BAS

4. In-transit Biosecurity

4.1. Ships

It is not envisaged that cargo for the Runway Surfacing and Lighting project will be transported on a chartered vessel. Instead cargo will be transported on available commercial lines to the Falkland and/or the SDA to Rothera. If a chartered vessel is required, the following measures will be followed

Any ship chartered by BAM for the transport of cargo and personnel must meet the following biosecurity measures and evidence needs to be provided to BAS that the following biosecurity requirements are included in the contract:

- All ships must have a Ship Sanitation Certificate (SSC).
- All ships must conform with Resolution MEPC.163(56) Guidelines For Ballast Water Exchange In The Antarctic Treaty Area.
- All ships shall have rodent boxes with poison bait that are inspected before, during and after each port visit.
- Insect sticky traps should be placed in food storage areas, and replaced when necessary.
- Electric UV insect killers shall be used in food storage areas.
- Biosecurity inspections of all ship and Antarctic station cargo shall be undertaken prior to loading and off-loading. (Please see checklists 3, 4, and 5)

4.1.1. When in Port

- Ships must have rat guards on the mooring lines.
- The gangway shall be lifted at night, or if lowered, lit with flood lights. An ultrasonic rat deterrent must be available and switched on.
- External doors and windows should be closed, wherever possible, to minimise the attraction of insects onto the ship.
- Boot/shoe washing facilities must be made available at the gangway to allow boot/shoe washing ON and OFF the ship.
- The inside of the tenders shall be cleaned between each landing to remove soil and other biological material knocked off passengers' boots.
- It is important that the boots and clothing of those arriving in Antarctica by ship is adequately cleaned before disembarkation. At a suitable interval before the arrival date, BAM should inform landing personnel and crew that clothing must be cleaned to remove soil, seed and other propagules. Spot check shall be undertaken to ensure compliance.
- Just prior to disembarkation at locations in Antarctica, all footwear must be cleaned in disinfectant (e.g. Virkon S).
- Disinfectants can become ineffective over time, or if contaminated excessively with soil or organic material. Therefore, disinfectant solutions provided for footwear cleaning shall be changed regularly (at least once per week), and a specific individual assigned this task as part of their duties.

4.2. Cargo Inspection Pre-offload

Where possible, biosecurity inspection of cargo should be carried out aboard the vessel before the cargo is unloaded. Time constraints and quarantine measure may render inspections aboard the vessel impossible. In these circumstances, an area of the wharf should be allocated as a quarantine area where all cargo can be inspected before transferring to another area of the station.

4.2.1. Cargo Boxes and Break Bulk

All items of break bulk cargo, including packaging, shall be visually inspected by the Biosecurity Inspector for signs of rodent gnawing or rodent ingress. If signs of rodents are detected, The BAS environment office is informed immediately and off-loading of any cargo halted until the presence of rodents has been investigated and the BAS Environmental office permits the continued off-loading. Cargo will also be checked for any soil or biological material. If soil or biological material is found the BAS Environment Office will be informed and the item shall be cleaned. Once these checks are complete and the item is biosecure, a nominated BAM staff member will check the item against the manifest and then allow it to be transported to the station. If any biosecurity issue is noted, the cargo shall not be off-loaded until this issue is resolved.

4.2.2. Vehicles and Large Mechanical Plant

All vehicles must be inspected before off-loading and a record of this made (Please see Appendix A. Checklist 4). If contamination is found, further cleaning must be done before off-loading. The BAS environment office should be informed of the intention to off-load plant and be given the opportunity to witness the inspection.

4.2.1. ISO Containers

ISO containers shall be inspected externally for soil, plant material and invertebrates prior to off-loading. Details of the check shall be kept for auditing purposes (Please see Appendix A. Checklist 5)

5. Biosecurity on Arrival at Rothera

5.1. Personnel Disembarkation

- Personnel disembarking at Rothera Point or elsewhere in Antarctica or South Georgia must adequately clean their clothing, personal belongings and boots before they leave the ship and upon returning to the ship (see Appendix A: Biosecurity Checklist 1. Personal Biosecurity).
- Clothing and personal belongings (such as bags, camera cases etc.) must be checked for biological material at a suitable time before arrival - remove any seeds, soil and other propagules found whilst still on the ship. Check Velcro, gaiters, pockets, turn-ups in trousers and hoods of jackets.
- Boots must be inspected and cleaned and any soil or seeds removed before arrival at Rothera Point.
- All personnel must use the boot washing facilities (provided by the vessel) at the gangway to disinfect their footwear before disembarkation.

5.2. Inspection of Cargo

External surfaces shall be checked to ensure cargo items are free of soil, biological material and signs of gnawing, or other routes of rat ingress. Those opening ISO containers upon arrival, should stay vigilant for signs of live rats, mice or invertebrates. The rodent bait boxes are to be inspected for any signs of gnawing, and if found, the container door should be shut, and the BAS Environment Office informed immediately. If invertebrates are found, they should be eradicated immediately (physically or using an insecticide spray) and the BAS Environment Office informed.

When opening cargo boxes, remain vigilant for imported soil or biological material.

5.3. Aggregate

On arrival at Rothera, aggregate should be contained in sealed packaging and stored in a demarked area (preferably hard standing/concrete or on a tarpaulin.

5.4. General Awareness

When on station all personnel shall remain vigilant for any indications of:

- biosecurity breaches
- evidence of non-Antarctic soil importation
- non-native species colonisation, including within buildings
- rats or rodents

If in doubt, personnel should report any potential issues to the BAM Environmental Lead, who will assess the situation and, as appropriate, take any immediate action and complete and submit a MAXIMO report.

6. Recording Biosecurity Inspections

A number of different methods have been adopted for recording biosecurity inspection, each suitable for a different situation. We continue to look at new and alternative Technology to improve the recording and reporting of the biosecurity inspection process.

6.1. BIM 360 Field

BIM 360 Field is system that enables data to be collected on mobile devices such as phones and tablets. Reports are uploaded to a cloud based database. Inspections can be recorded using BIM 360 on pre prepared checksheets. Photographic evidence is attached to the checksheet to demonstrate compliance. Reports can be saved on the mobile device, where there is no internet availability, and uploaded later, but a reasonable internet connection is required to upload data. Data should be uploaded as soon as possible to prevent possible loss of data from the mobile device.

6.2. Work Mobile

Work Mobile is similar to BIM 360 Field in that it enables data to be collected on a mobile device, stored and uploaded to a central database. . Inspections are also recorded on pre prepared checksheets and photographic evidence attached. The main difference is that a database has been set up on the server at Rothera. This enables Work Mobile to be used with no internet requirements. All data is only accessible from within Rothera, until the end of the season.

6.3. Paper

If neither of the above options is available, checksheets are included as Appendix A to this document. Photographic evidence of compliance with the checklist items should be provided wherever possible.

7. Non-conformances

- All biosecurity breaches and near misses should be reported to the BAM Environmental Lead, the BAM Project Manager, the BAS Station Leader and the BAS Environment Office at the time of the incident.

- A near miss/environmental incident report must be produced and provided to the BAS Station Leader for inclusion in the MAXIMO Reporting System as soon as relevant information is available and at most within 48 hours.

- Examples of biosecurity breaches may include, but are not limited to, the following:
    - Non-Antarctic soil or biological material (e.g. weeds) found on vehicles or other plant after unloading at Rothera
    - Live insects within cargo
    - ISO containers with soil or biological material on the interior and exterior surfaces
    - Any rodent sighting or any evidence of rodents (gnawing, etc.)
    - Failure to clean items delivered to station
    - Failure for biosecurity measures to be performed at appropriate stage of the supply chain
    - Failure for personnel to adequately clean their clothing or personal equipment.
    - Unintentional or deliberate importation of soil or biological material by BAM staff.
    - Importation of wood with bark still attached.
    - Failure for appropriate biosecurity checks of cargo packing areas to be performed.

Appendix A: Biosecurity Checklists

Biosecurity Checklist 1. Personal Biosecurity

(Pre-departure and pre-arrival for individuals going to Antarctica)

This checklist will be circulated to all BAM personnel prior to their deployment to Antarctica and is intended as a guide to assist individuals in undertaking their own biosecurity checks before travelling south.

Non-native species are those species that do not occur naturally in an area, but have been introduced by human activities, either intentionally or unintentionally. Unpermitted importation of non-native species is a breach of UK legislation and is in contravention of the Environmental Protocol and could lead to serious consequences for the responsible individual and BAM, including up to two years imprisonment and/or an unlimited fine.

Use the following checklist to reduce your risk of importing non-native species:

Biosecurity Checklist 1	**Personal Biosecurity**	
Name		
Signature		
Date		
		Tick to confirm compliance
All clothing is either new (i.e. straight out of the packet) or has been washed to remove plant seeds, invertebrates and soil (*Tip: check any Velcro® is clean and pay particular attention to pockets!*)		
All footwear has been scrubbed free of all plant seeds, invertebrates and soil (*Tip: check under the insole and tongue too!*)		
All bags and personal equipment have been cleaned, washed and/or vacuumed and are free of plant seeds, invertebrates and soil.		
All personal recreational equipment (including climbing gear, walking poles, ski and snow board equipment, kiting equipment and bicycles) has been cleaned and is free of soil and biological material.		
The following items have NOT been packed:		
• Any living plant, animal or microorganism - unless in possession of an appropriate permit		
• Non-sterile soil or compost		
• Any plant propagules (e.g. seeds, bulbs, cuttings) or invertebrate eggs (e.g. brine shrimp or sea monkey eggs) - growing plants and animals in Antarctica and South Georgia is NOT permitted		
• Untreated wood where bark remains attached		
• Any perishable foods including fruit, vegetables, cheese, fish or meat.		
You have explained the above restrictions to any person that is likely to send gifts or packages to you while in Antarctica.		

Biosecurity Checklist 2. Cargo Packing Areas

For each Cargo Packing Area that BAM utilises, a weekly checklist will be completed (for the duration of the packing period). The checklists will be stored on file and made available for auditing purposes either by BAM or by BAS personnel.

Biosecurity Checklist 2	Cargo Packing Area	
Name of Facility Being Inspected		
Name (print) and Signature of Inspector		
Date of Inspection		
Check Items	**Yes/No**	**Any subsequent action or other notes**
Site is clean i.e. free from soil, dirt, litter, weeds, plants, etc.		
No weeds or plants within 10 m of doors[1]		
Site is free of wind-blown seeds (e.g. from dandelions)		
Site is free of invertebrate infestation		
Site is free of rodents		
Rodent bait boxes are charged with poison bait[2]		
Sticky insect traps are present and effective (1 per 25m^2 floor area)[3]		
UV insect traps are present and effective (1 per 50m^2 floor area)[3]		
Storage area doors are kept closed as much as possible		
Pallets and packing materials are kept inside in a clean area		
ISO containers are stored on hard standing		

[1]Regular use of herbicides may be required
[2]Using the MAXIMO system, provide details of any rodents caught in bait stations.
[3]State the date when the insect sticky traps are replaced (typically every 2 months)

Biosecurity Checklist 3. Small Plant & Tools

All small plant and tools that have been used on jobs in other parts of the world shall be cleaned and checked prior to being sent to Antarctica.

Checks prior to off-loading shall be simple visual checks as described for all general cargo. If for some reason any checks are not possible at any stage of the supply chain, please note details of the circumstances here and report using the MAXIMO system. Individual hand tools do not need to be listed separately using this checklist, but do need to be free of soil and biological material before transfer to Rothera. The checklists will be stored on file and made available for auditing purposes either by BAM or BAS personnel.

Biosecurity Checklist 3	**Small Plant and Tools**				
Name (print) and Signature of Inspector					
Date of Inspection					
Location of Inspection					
Stage of Journey	Supplier	Logistics Hub	Pre Departure	Pre Offload	Post Offload
Details of journey initial and final destinations					
Transporting vessel (e.g. RRS Shackleton):					
Small plant/tools identification details:					

Check Items	**Clean?**	**Notes (including details of any associated MAXIMO reporting)**
Exterior surfaces (top and side)		
Exterior underneath surfaces		
Interior surfaces (as possible)		
Insect spray in crevices (as possible)		

Biosecurity Checklist 4. Vehicle & Large Mechanical Plant

Mechanical plant (particularly tracked vehicles) pose a high risk to biosecurity. The undercarriage of wheeled or tracked plant can pick up soil which could contain plant fragments, seeds, invertebrates or invertebrate eggs.

The following checklist and the procedures listed in Section 2.6 of this document will be followed to ensure vehicles and large mechanical plant arrive in Antarctica and/or the sub-Antarctic free of soil and biological material. If these checks are not completed at any stage of the supply chain, please note details of the circumstances here and report using the BAS MAXIMO system

A checklist for each vehicle or plant consigned to Rothera will be stored on file and made available for auditing purposes either by BAM or by BAS personnel.

Biosecurity Checklist 4	Vehicle & Large Mechanical Plant				
Name (print) and Signature of Inspector					
Date of Inspection					
Location of Inspection					
Stage of Journey	Supplier	Logistics Hub	Pre Departure	Pre Offload	Post Offload
Details of journey initial and final destinations					
Transporting vessel (e.g. RRS Shackleton):					
Vehicle model and identification details:					

Check Items	**Clean?**	**Notes (including details of any associated MAXIMO reporting)**
Vehicle exterior (top and sides)		
Vehicle wing mirrors and windscreen		
Vehicle exterior (underneath)		
Wheels and wheel arches		
Vehicle interior (including under floor mats, door pockets, down the sides and below the front seats, the boot/trunk, and under the spare tyre).		
Vehicle accessories (forks, buckets, etc.)		
Engine started to ensure no rodents/birds in vehicle interior		
Use insecticide spray in crevices where possible		

Biosecurity Checklist 5. ISO Containers

All ISO containers must be checked prior to loading on the ship and prior to off-loading at the stations. Appropriate cleaning equipment must be made available during checks.

For each ISO container consigned to Rothera a checklist will be completed and stored on file. The checklist will be made available for auditing purposes either by BAM or by BAS personnel.

If these checks are not completed at any stage of the supply chain, please note details of the circumstances here and report using the BAS MAXIMO system

Biosecurity Checklist 5	ISO Containers				
Name (print) and Signature of Inspector					
Date of Inspection					
Location of Inspection					
Stage of Journey	Supplier	Logistics Hub	Pre Departure	Pre Offload	Post Offload
Details of journey initial and final destinations					
Transporting vessel (e.g. RRS Shackleton):					
ISO Container identification details:					

Check Items (as required by state of packing)	**Clean?**	**Notes (including details of any associated MAXIMO reporting)**
Container exterior surfaces (top and sides)		
Container exterior doors and hinges		
Container exterior underneath surfaces (as possible)		
Container interior surfaces		
Container interior high and low level corners and door hinges		
Contents of container		
Baited rodent trap and two insect traps placed inside container		
Container fumigated prior to locking doors		

Biosecurity Checklist 6.- All break-bulk items (any item which is not containerised and not covered by a specific checklist)

All breakbulk (individual boxes/crates, timber, cladding and other cargo which is not containerised) must be checked prior to loading on the ship and prior to off-loading at the stations. Appropriate cleaning equipment must be made available during checks. If these checks are not completed at any stage, please note details of the circumstances here and report using the BAS MAXIMO system.

For each break-bulk inspection a checklist will be completed and stored on file detailing the items inspected and any outcomes. The checklist will be made available for auditing purposes either by BAM or by BAS personnel.

Biosecurity Checklist 6	Break Bulk Cargo				
Name (print) and Signature of Inspector					
Date of Inspection					
Location of Inspection					
Stage of Journey	Supplier	Logistics Hub	Pre Departure	Pre Offload	Post Offload
Details of journey initial and final destinations					
Transporting vessel (e.g. RRS Shackleton):					
Description and identification details of break bulk cargo:					

Check Items	**Clean?**	**Notes (including details of any associated MAXIMO reporting)**
Items exterior surfaces (top and sides)		
Items exterior underneath surfaces (where possible)		
Items clean and free of soil, biological material and any signs of rodent gnawing or ingress, invertebrates such as spider webbing or cocoons.		
Insect spray in crevices (as possible)		

Biosecurity Checklist 7. Crates

All crates must be checked prior to loading on the ship and prior to off-loading at the stations. Appropriate cleaning equipment must be made available during checks.

For each crate consigned to Rothera a checklist will be completed and stored on file. The checklist will be made available for auditing purposes either by BAM or by BAS personnel.

If these checks are not completed at any stage of the supply chain, please note details of the circumstances here and report using the BAS MAXIMO system.

Biosecurity Checklist 7	Crates				
Name (print) and Signature of Inspector					
Date of Inspection					
Location of Inspection					
Stage of Journey	Supplier	Logistics Hub	Pre Departure	Pre Offload	Post Offload
Details of journey initial and final destinations					
Transporting vessel (e.g. RRS Shackleton):					
Crate identification details:					

Check Items (as required by state of packing)	**Clean?**	**Notes (including details of any associated MAXIMO reporting)**
Crate is unused and ISPM15 compliant		
Crate lined with polythene		
Crate exterior surfaces (top and sides)		
Crate exterior underneath surfaces (as possible)		
Crate interior surfaces		
Crate and contents clean and free of soil, biological material and any signs of rodents or invertebrates.		

Biosecurity Checklist 8.- Vessels

Any vessel used to transport materials to KEP must be inspected prior to loading any cargo. If these checks are not completed at any stage, please note details of the circumstances here and report using the BAS MAXIMO system.

For each vessel inspection a checklist will be completed and stored on file detailing the items inspected and any outcomes. The checklist will be made available for auditing purposes either by BAM or by BAS personnel.

Biosecurity Checklist 8	Vessel Biosecurity	
Name (print) and Signature of Inspector		
Date of Inspection		
Location of Inspection		
Details of journey initial and final destinations		
Transporting vessel (e.g. RRS Shackleton):		
Check Items (as required by state of packing)	**Yes/No**	**Notes (including details of any associated MAXIMO reporting)**
Ship's hold is clean and free of soil and insect infestation		
Sticky insect traps or electric UV traps are placed in hold and food storage areas.		
Rat bait boxes with poison bait are on board.		
Rat bait box inspection regime is in place		
Mooring line rat guards are available and in place when in port.		
Ultrasonic rat deterrent available and in place.		
Floodlights available at gangway and used when the gangway is lowered in the hours of darkness.		
Boot/shoe washing facilities are available at the gangway and topped up with Virkon S or similar		
Ship sanitation certificate (SSC) is available and in date.		

Antarctic Construction Partnership – Rothera Modernisation

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Rothera Modernisation Biosecurity Plan

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1. Introduction

Many plant and animal species have been moved around the world through human activities to areas they would not reach naturally. Once in a new location, these 'non-native' species may establish, with potentially severe impacts on local species and ecosystems. The Antarctic continent currently has few confirmed non-native species, but numbers are increasing. Future increases in human presence in the Antarctic region, either through tourism, governmental operators or other commercial activities, will increase the risk of further non-native species introductions. At the same time, climate change may increase the chances of non-native species establishment and range expansion.

The Antarctic Act (1994, amended 2013) legislates to minimise the risk of non-native species introductions in the Antarctic, and BAM is obliged to conform to this legislation. BAM are also obliged to follow the BAS Biosecurity Regulations and the Biosecurity Policy with Contractors.

BAMs projects in the Antarctic cover several locations of distinct biological diversity. It is essential that all necessary precautions are taken to prevent the introduction of non-native species to Rothera Point and the surrounding area from other locations, including Europe, South America or any of the other BAS Research Stations or logistics hubs.

This document provides guidance to BAM personnel on the measures to be taken when moving plant, materials or personnel to Rothera Research Station.

1.1. Prohibited Items

No BAM personnel or their subcontractors will be permitted to take any of the items below to the Antarctic:

- Any living plant, animal or microorganism.
- Non-sterile soil or compost.
- Any plant propagules (e.g. seeds, bulbs, cuttings) or invertebrate eggs (e.g. brine shrimp or sea monkey eggs).
- Untreated wood where bark remains attached.
- Any perishable foods including fruit, vegetables, cheese, fish or meat in personal cargo (no personal foods are allowed but fresh foods as part of the construction team food supply will be arranged).
- Packing materials of polystyrene beads or chips, used sacking, hay, straw, chaff or wood shavings.

1.2. Roles & Responsibilities

- Environmental Lead –
    - Overall responsibility for environmental management of the project.
    - Ensuring that the designers, buyers and construction team are aware of the biosecurity issues covered in this document.
    - Nominating and training of biosecurity inspectors.
    - Training of the Environmental Engineer
    - Answer any queries or questions from BAM staff on environmental or biosecurity issues.

- Project Manager –
    - Responsible for all construction works including mobilisation and demobilisation

- Appointing an Environmental Engineer from within the site team.
- Ensuring cargo is biosecure before off loading at Rothera

- BAM Environmental Engineer: TBC (appointed from within the Rothera construction team on site)
  - Responsible for managing and monitoring the environmental performance and biosecurity measures on site.
  - Responsible for managing the Biosecurity Inspectors on site.
  - Carries out all final biosecurity inspections before cargo is offloaded from the ship to Rothera
  - Completes the relevant biosecurity checklists (Checklists 2, 3, 4, 5 and Form 1)
  - Reports to the BAM Environmental Lead

- BAM Biosecurity Inspectors: TBC (at least one member of the Rothera construction team and at least one BAM staff member responsible for checking cargo at packing and loading stages in the UK)
  - Responsible for ensuring that all plant and materials are thoroughly inspected and pose no biosecurity risk.
  - Responsible for completing the relevant biosecurity checklists (Checklists 2, 3, 4, 5)
  - Inspections will be required at the port where materials are loaded
  - Report to the BAM Environmental Lead unless at Rothera in which case reports to the Environmental Engineer

- All BAM Personnel
  - Personnel will be responsible for ensuring that their personal belongings are biosecure and do not contain any prohibited items.

2. Inspection Procedure

To ensure all plant and materials required for the Discovery Building and Site Wide Services are biosecure, inspections will be undertaken at various stages of manufacture and transportation and at a number of different locations.

Inspections will be scheduled according to the biosecurity risk presented by the item.

For example

Plant poses a high biosecurity risk and is hard to clean and inspect and will therefore be inspected wherever possible by a trained BAM Biosecurity Inspector at the supplier's premises.

Pre-cast concrete elements pose a lower risk and are easier to clean and will therefore not be inspected before arrival at the port.

The following biosecurity inspections will be carried out

Location	Inspection	Inspector	Requirement
Supplier Premises	Manufacturing, storage and packing areas	Trained Supplier Biosecurity Inspector BAM Biosecurity Inspector	According to RA
Supplier Premises	Plant and materials before packing or transportation	Trained Supplier Biosecurity Inspector BAM Inspector	According to RA
Logistics Hub	Storage and packing areas	LV Shipping Biosecurity Inspector BAM Biosecurity Inspector	Compulsory
Logistics Hub	Plant, materials and ISO containers on arrival	LV Shipping Biosecurity Inspector BAM Biosecurity Inspector	Compulsory
Logistics Hub	Materials before packing	LV Shipping Biosecurity Inspector BAM Biosecurity Inspector	Compulsory
Logistics Hub	All cargo before loading onto vessel	LV Shipping Biosecurity Inspector BAM Biosecurity Inspector	Compulsory
Logistics Hub	Vessel	LV Shipping Biosecurity Inspector BAM Biosecurity Inspector	Compulsory

3. Pre-departure Biosecurity

3.1. Biosecurity Training

Prior to departure, all construction team members will receive a project specific briefing (in addition to the general environmental pre-departure briefing) to ensure that they are aware of the specific biosecurity requirements of the project's EIA and any associated permit.

Construction team members will sign a register to confirm that they have attended the briefing and understood the biosecurity requirements of the EIA and permit.

Additionally, selected members of the construction team will be trained as biosecurity inspectors to assist in inspections at the port of departure and more specifically on arrival at Rothera.

Only those trained as Biosecurity Inspectors are to carry out inspections of cargo.

3.2. Personal Biosecurity

- Immediately before leaving home for Rothera, BAM personnel should ensure that all outer clothing has been washed, at the hottest temperature suitable for the garment, to remove seeds, soil and other propagules. Particular attention should be paid to Velcro, gaiters, pockets, turn-ups in trousers and hoods of jackets. (Please see Appendix A. Checklist 1).
- Footwear should be cleaned (inside and out) to remove soil, seeds or any other plant material.
- Personal clothing and equipment shall also be checked on the ship prior to arrival in Antarctica.
- Avoid picking up soil, seeds and other propagules on your clothing during travel to Antarctica (i.e. be careful to ensure clothing is clean after walking in the countryside in any South American countries or South Atlantic gateways prior to departure)
- If possible, before entering Antarctica wear new items of outer clothing which will be free of non-native species and propagules.
- If moving between BAS stations please check clothing and personal belongings to prevent transport of biological material between sites (especially from South Georgia station to Antarctic locations).
- Ensure all clothing and personal effects are packed indoors in a clean environment.
- Before handing in any personal items to the BAM Logistics Stores in the UK, Netherlands or Chile for transportation to Antarctica, ensure that they are clean and free of soil and propagules.

3.3. Supplier Biosecurity

Many of the components that will be used to construct the Science and Operations building will be prefabricated in factories in Europe. Other goods such as mechanical and electrical components may be packed ready for export in the supplier's premises.

In order to ensure that that pre-fabricated elements such as wall cassettes are biosecure, inspection will be carried out on supplier's premises at the earliest opportunity to ensure that biosecurity arrangements meet the required standards. Supplier's premises must conform to the standard shown below for cargo packing areas.

3.4. Cargo Packing Areas

Plant and materials bound for the Rothera Modernisation project will be loaded onto ships at either LV Shipping in Middlesbrough or at a port of BAS's choosing. Logistic centres will be established close to the ports for storing plant and material before loading onto vessels. Cargo may also be packed at suppliers' premises. The following biosecurity measures will be adopted for all cargo packing areas (Please see Appendix A. Checklist 2).

- Cargo is to be packed in an indoor area.
- Cargo packing and storage areas shall be deep cleaned prior to the commencement of use by BAM and, thereafter, at least once per year or as deemed necessary. The area must be kept clean (which means free from soil, dirt, litter, weeds, plants, etc.).
- There must be no weeds or plants within 10m of doors to the packing area, except doors used purely as fire exits. Any plants within 10m are to be eradicated prior to use for packing.
- All doors and window must remain closed as far as possible. This is particularly important if packing after the hours of darkness, when insects will be attracted to light.
- A Rodent Control Plan will be produced for the facility indicating location and monitoring frequency of bait stations.
- UV fly killers must be installed, one for every 50 m^2 of internal floor space, and they should be serviced once a year with UV tubes replaced. Insect sticky traps should be installed, one for every 25 m^2 of internal floor space. These must be inspected once every three months, replaced as necessary, and a record of the check made for auditing purposes

3.5. Cargo Storage Areas

Plant and materials will need to be stored either before packing or after at both suppliers' premises or close to the port prior to loading. Wherever possible, plant and material are to be stored in an indoor area conforming to the requirements of packing areas. Where indoor storage areas are not available, external storage will be used and the following biosecurity measures will be adopted.

- Stored plant and equipment should be stored on concrete surfaces (as opposed to bare earth). When containers cannot be stored on concrete, they will be raised above the ground on batons of, either timber, concrete or steel, and additional checks shall be made to ensure they are free from soil and biological material prior to onward transportation.
- External cargo storage and packing areas shall be free of weeds, plants and invertebrate infestations. (i.e. regular spraying of weeds that emerge on hard standing).
- Any pallets stored outside shall be checked for bird nests before use, and if found should be removed and the pallet cleaned.
- A Rodent Control Plan will be produced for the facility indicating location and monitoring frequency of bait stations.

3.6. Packaging

Wherever possible plant and materials will be packed into ISO containers. This improves the efficiency of the logistics operation and increases biosecurity due to the ability to fumigate containers.

- All crates are to be lined with plastic sheeting
- Wood packaging (such as cases, crates, dunnage, pallets and timbers for the purpose of bracing, separating, protecting or securing cargo) are to be new and comply with the International Standards for Phytosanitary Measures No. 15 (ISPM 15).
- Packaging and filling materials may include shredded paper, vermiculite, bubble wrap and other air-filled cushioning materials.
- Where other cost-effective options exist, use of corrugated cardboard and plastic boxes should be minimized, as they may carry non-native invertebrates within the corrugations.

The following packaging materials are prohibited:

- No polystyrene beads or chips, soil, moss, used sacking, hay, straw, chaff or wood shavings will be used.

3.7. Break Bulk Cargo

Break bulk cargo may present a more substantial biosecurity risk than containerised cargo, therefore, it is important that the amount of break bulk cargo generated is kept to a minimum. Break bulk cargo can vary greatly in shape, size and type (e.g. construction materials, timber, scaffolding poles, etc.). All break bulk cargo must be clean and free of soil and biological material before loading on the ship. All items of break bulk cargo, including packaging, shall be visually inspected for signs of rodent gnawing or rodent ingress. Cargo shall also be checked for any soil or biological material and if found the item shall be cleaned.

3.8. Small Plant & Tools

Prior to packing any previously used small tools or small plant items for transport to, or between, Antarctic Research Stations, the following procedure is to be followed. The high levels of cleanliness apply to all mechanical plant and tools, irrespective of size; however, individual hand tools do not need to be listed separately in the Appendix A. Biosecurity Checklist 3 Small Plant and Tools.

- Plant items are to be placed on a clean concrete or asphalt hard standing.
- Where practical, plant is to be cleaned externally using a high pressure jet wash to ensure that no soil, mud or biological material is left on the items. Where the use of water is not possible, the item will be cleaned using a combination of hard and soft brushes and/or a damp cloth.
- Following cleaning, small tools and plant are to be inspected by a nominated Biosecurity Inspector to ensure that they are free of visible soil and biological material (e.g. plant fragments, seeds and insects) This information is to be recorded for auditing purposes (Please see section Appendix A. Checklist 3)
- Care should be taken not to contaminate the small tools and plant prior to loading onto the ship or aircraft. Plant storage facilities should minimise the potential for recontamination of cleaned small plant and tools to transport and, if necessary, arrangements should be made to thoroughly clean the small plant and tools at the ship or aircraft loading site.
- Immediately before being loaded onto the ship or aircraft for transportation, all small tools and plant should be checked by a nominated Biosecurity Inspector to ensure they are free of soil and biological material. If any soil or biological material is found, the contaminated item should be cleaned and re-inspected before being transported.

3.9. Vehicles & Large Mechanical Plant

Mechanical plant (particularly tracked vehicles) pose a high risk to biosecurity. The undercarriage of wheeled or tracked plant can pick up soil which could contain plant fragments, seeds, invertebrates or invertebrate eggs.

Prior to loading any item of large mechanical plant for transport to or between Antarctic Research Stations, the following procedure is to be followed (Please see Appendix A. Checklist 4):

- Plant items are to be placed on a clean concrete or asphalt hard standing.
- Where practical, plant is to be cleaned externally using a high pressure jet wash to ensure that no soil, mud or biological material is left on the vehicle, including the wheels, wheel arches, tracks and areas underneath the vehicle. Plant accessories, such as forks and buckets, should be cleaned in a similar manner.

- To the maximum degree feasible, panels should be removed to ensure there is no entrapment of soil and mud within internal vehicle compartments. This is essential for used plant.
- Engine and hydraulic control compartments are to be thoroughly cleaned. Manufacturers' guidance may be required with respect to cleaning methodology to ensure no damage is done to the engine electronics or hydraulic systems.
- Covers to hydraulic hose or electrical cable trays must be removed and the trays cleaned thoroughly.
- Where the plant has a cab, upholstery and mats should be brushed and/or vacuum cleaned to remove any soil or biological material.
- Following cleaning, plant is to be inspected by a nominated Biosecurity Inspector to ensure that they are free of visible soil and biological material (e.g. plant fragments, seeds and insects).
- Care should be taken not to contaminate the plant prior to loading onto the ship or aircraft. Plant storage facilities should minimise the potential for recontamination of cleaned vehicles prior to transport and, if necessary, arrangements should be made to thoroughly clean the vehicles at the ship or aircraft loading site.
- Immediately before being loaded onto the ship or aircraft for transportation, all vehicles should be checked by a nominated Biosecurity Inspector to ensure they are free of soil and biological material. If any soil or biological material is found, the contaminated vehicle should be cleaned and re-inspected before being transported.
- Motorised plant is to have its engines started before loading, to ensure rats and mice are not living in the engine compartments.

3.10. Construction Materials

The following section does not constitute a complete list of the construction materials but simply identifies the materials considered to pose the highest biosecurity risk and details the specific measures to be taken.

3.10.1. Aggregates

Aggregate is defined as any course particulate material used in construction, including sand, gravel, crushed stone, boulders, pebbles or slag. It presents a biosecurity risk because biological material such as seeds, soil and invertebrates can easily become entrained during production and transport.

- Aggregate to be obtained from marine sources.
- To prevent seed contamination during storage and transport aggregate must be contained in clean sealed packaging (such as FIBCs).
- Packaged aggregate will be transported in clean ISO containers.
- Aggregate must be carefully handled to prevent damage to the packaging.
- Only the minimum amount of aggregate needed for the project will be sent to the site.
- All aggregate will be used as quickly as possible after delivery to the site to reduce the risk of establishment of any non-native species present in the aggregate.
- Aggregate must be stored in a defined area at the construction site. Any spilled aggregate must be cleaned up immediately and contained within packaging, until used.
- Aggregate will be stored in its sealed packaging at the site and will not be left open to the environment.
- When aggregate is removed from its packaging for use, it must be used as soon as possible.
- Aggregate must be encapsulated as a component of concrete, or buried so that propagule release is not possible.

In the event that one or more of these management steps are not possible, further consultation with the BAS Environment Office must take place. Consultation with the BAS Environment Office must occur prior to any aggregate being purchased from suppliers.

3.10.2. Timber

Timber will be required as a construction material and required for packaging materials. Due to the risk of infestation by pests the following precautions must be observed before timber can be imported to Antarctica:

- Timber materials must be heated in accordance with a specific time–temperature schedule that achieves a minimum temperature of 56 °C for a minimum duration of 30 continuous minutes throughout the entire profile of the wood (including at its core).
- All timber products are to be inspected for signs of wood borrowing animals such as wood boring beetles and woodworm (a beetle larvae) before being shipped.
- If any evidence wood burrowing animals is discovered the timber must be treated with a pesticide or fumigated in a sealed container.
- All packaging timber should conform to the requirements of International Standards for Phytosanitary Measures No. 15 (ISPM 15) and be stamped with IPPC logo, country of origin and method of treatment.

3.10.3. Mechanical and Electrical (M&E) Fittings

An extensive quantity of M&E fittings will be required within the new Operations Building. The fittings include pipework, ducting, conduit and pumps, all of which contain voids where invertebrates could hide from predation. Inspections and audits will be carried out on the premises of sub-contractors supplying this equipment. All tubes (ducting and pipework) have ends sealed to prevent ingress of contaminants immediately after manufacture. Where possible, all M&E equipment will be transported in containers, which will be fumigated before loading onto the vessel for transportation.

3.10.4. Scaffold Tubes

Scaffold tubes will be used for temporary works such as access to the façade of the new Operations Building. The hollow section forms an ideal place for invertebrates to hide from predation. Scaffold tubes shall be cleaned using a pressure washer, taking care to clean any invertebrates or their eggs from the inside of the tubes. After cleaning, scaffolding tube ends are to be sealed with duct tape or scaffold end caps to prevent the future ingress of contaminants.

3.11. ISO Containers

Prior to loading any ISO or other sealed container for transport to or between Antarctic Research Stations, the following procedure is to be followed.

- Shipping containers are to be stored on concrete surfaces (as opposed to bare earth).
- Shipping containers are to be kept clean and free of soil, mud, spiders' webs, invertebrates, debris, wood fragments (e.g. from pallets), plant material or mould. A record shall be kept of this inspection for auditing purposes (Please see Appendix A. Checklist 5).
- Prior to loading, if deemed necessary by the nominated Biosecurity Inspector, the inside of the container is to be washed

- Air vents and drainage holes (if any) are sealed before loading the container with cargo. As condensation will be created without ventilation during the voyage, suitable desiccants, such as 'ProDriPole' are to be provided to ensure the cargo remains dry. 4-6 ProDriPoles are required per 20ft ISO container.

During loading any ISO or other sealed container for transport to or between Antarctic Research Stations, the following procedure is to be followed

- If possible, containers should be loaded within a warehouse/closed environment. If a container must be loaded outside, then it should be placed on a hard standing with a minimum of 2 metres all around it that is free of soil and vegetation
- During loading, vigilance must be exercised in respect of rodents, birds, insects and airborne seeds or leaves. An insecticide aerosol is to be available to eradicate any insects entering the container. Dead insects are to be removed.
- If loading outdoors, the container doors area must be continually attended. If loading is suspended, even temporarily, the doors to the container must be closed. Container doors are to be closed overnight, even if loading indoors.

Once the loading of the container is complete, the following procedure is to be followed

- For all containers, the following must be installed:
  - One pre-baited mouse box - to be placed inside the container as close to the doors as practicable.
  - One pre-baited rat box - to be placed inside the container as close to the doors as practicable.
  - Two crawling insect traps - to be positioned parallel and adjacent to the container walls or doors, and as close to the doors as practicable.
  - Bait boxes must be checked to ensure that they are baited
- The container should be fumigated using a permethrin smoke bomb or permethrin fogger. Use one 'Digrain One Shot 300 ml 1.46% Permethrin' (or similar) total release aerosol per 20' container or according to manufacturer's instructions. The container should be shut and sealed immediately. This should be undertaken by an appropriately trained person where practical. Container doors must have an appropriate label showing the date and time of fumigation.
- The outside of the container, including the underside and lifting points are inspected to ensure they are free of soil, mud, spiders' webs, invertebrates and bird droppings. If deemed necessary by the nominated Biosecurity Inspector, the outside of the container is to be washed using a high pressure washer.

3.12. Fresh foods

Provisions for biosecurity measures associated with fresh foods have not be detailed in this document, as all fresh foods for BAM personnel will be supplied by BAS

4. In-transit Biosecurity

4.1. Ships

Any ship chartered by BAM for the transport of cargo and personnel must meet the following biosecurity measures and evidence needs to be provided to BAS that the following biosecurity requirements are included in the contract:

- All ships must have a Ship Sanitation Certificate (SSC).
- All ships must conform with Resolution MEPC.163(56) Guidelines For Ballast Water Exchange In The Antarctic Treaty Area.
- All ships shall have rodent boxes with poison bait that are inspected before, during and after each port visit.
- Insect sticky traps should be placed in food storage areas, and replaced when necessary.
- Electric UV insect killers shall be used in food storage areas.
- Biosecurity inspections of all ship and Antarctic station cargo shall be undertaken prior to loading and off-loading. (Please see checklists 3, 4, and 5)

4.1.1. When in Port

- Ships must have rat guards on the mooring lines.
- The gangway shall be lifted at night, or if lowered, lit with flood lights. An ultrasonic rat deterrent must be available and switched on.
- External doors and windows should be closed, wherever possible, to minimise the attraction of insects onto the ship.
- Boot/shoe washing facilities must be made available at the gangway to allow boot/shoe washing ON and OFF the ship.
- The inside of the tenders shall be cleaned between each landing to remove soil and other biological material knocked off passengers' boots.
- It is important that the boots and clothing of those arriving in Antarctica by ship is adequately cleaned before disembarkation. At a suitable interval before the arrival date, BAM should inform landing personnel and crew that clothing must be cleaned to remove soil, seed and other propagules. Spot check shall be undertaken to ensure compliance.
- Just prior to disembarkation at locations in Antarctica, all footwear must be cleaned in disinfectant (e.g. Virkon S).
- Disinfectants can become ineffective over time, or if contaminated excessively with soil or organic material. Therefore, disinfectant solutions provided for footwear cleaning shall be changed regularly (at least once per week), and a specific individual assigned this task as part of their duties.

4.2. Cargo Inspection Pre-offload

4.2.1. Cargo Boxes and Break Bulk

All items of break bulk cargo, including packaging, shall be visually inspected by the Biosecurity Inspector for signs of rodent gnawing or rodent ingress. If signs of rodents are detected, The BAS environment office is informed immediately and off-loading of any cargo halted until the presence of rodents has been investigated and the BAS Environmental office permits the continued off-loading. Cargo will also be checked for any soil or biological material. If soil or biological material is found the BAS Environment Office will be informed and the item shall be

cleaned. Once these checks are complete and the item is biosecure, a nominated BAM staff member will check the item against the manifest and then allow it to be transported to the station. If any biosecurity issue is noted, the cargo shall not be off-loaded until this issue is resolved.

4.2.2. Vehicles and Large Mechanical Plant

All vehicles must be inspected before off-loading and a record of this made (Please see Appendix A. Checklist 4). If contamination is found, further cleaning must be done before off-loading. The BAS environment office should be informed of the intention to off-load plant and be given the opportunity to witness the inspection.

4.2.1. ISO Containers

ISO containers shall be inspected externally for soil, plant material and invertebrates prior to off-loading. Details of the check shall be kept for auditing purposes (Please see Appendix A. Checklist 5)

5. Biosecurity on Arrival at Rothera

5.1. Personnel Disembarkation

- Personnel disembarking at Rothera Point or elsewhere in Antarctica or South Georgia must adequately clean their clothing, personal belongings and boots before they leave the ship and upon returning to the ship (see Appendix A: Biosecurity Checklist 1. Personal Biosecurity).
- Clothing and personal belongings (such as bags, camera cases etc.) must be checked for biological material at a suitable time before arrival - remove any seeds, soil and other propagules found whilst still on the ship. Check Velcro, gaiters, pockets, turn-ups in trousers and hoods of jackets.
- Boots must be inspected and cleaned and any soil or seeds removed before arrival at Rothera Point.
- All personnel must use the boot washing facilities (provided by the vessel) at the gangway to disinfect their footwear before disembarkation.

5.2. Inspection of Cargo

External surfaces shall be checked to ensure cargo items are free of soil, biological material and signs of gnawing, or other routes of rat ingress. Those opening ISO containers upon arrival, should stay vigilant for signs of live rats, mice or invertebrates. The rodent bait boxes are to be inspected for any signs of knowing and if found, the container door should be shut and the BAS Environment Office informed immediately. If invertebrates are found they should be eradicated immediately and the BAS Environment Office informed.
When opening cargo boxes, remain vigilant for imported soil or biological material.

5.3. Aggregate

- On arrival at Rothera Point, aggregate should be contained in sealed packaging and stored in a demarked area (preferably hard standing/concrete or on a tarpaulin.
- If aggregate is to be used in concrete, this should be done at a designated concrete batching area and then the concrete moved out to the site where it is to be used

5.4. General Awareness

When on station all personnel shall remain vigilant for any indications of:

- biosecurity breaches
- evidence of non-Antarctic soil importation
- non-native species colonisation, including within buildings
- rats or rodents

If in doubt, personnel should report any potential issues to the BAM Environmental Lead, who will assess the situation and, as appropriate, take any immediate action and complete and submit an AINME report.

6. Recording Biosecurity Inspections

A number of different methods have been adopted for recording biosecurity inspection, each suitable for a different situation. We continue to look at new and alternative Technology to improve the recording and reporting of the biosecurity inspection process.

6.1. BIM 360 Field

BIM 360 Field is system that enables data to be collected on mobile devices such as phones and tablets. Reports are uploaded to a cloud based database. Inspections can be recorded using BIM 360 on pre prepared checksheets. Photographic evidence is attached to the checksheet to demonstrate compliance. Reports can be saved on the mobile device, where there is no internet availability, and uploaded later, but a reasonable internet connection is required to upload data. Data should be uploaded as soon as possible to prevent possible loss of data from the mobile device.

6.2. Work Mobile

Work Mobile is similar to BIM 360 Field in that it enables data to be collected on a mobile device, stored and uploaded to a central database. . Inspections are also recorded on pre prepared checksheets and photographic evidence attached. The main difference is that a database has been set up on the server at Rothera. This enables Work Mobile to be used with no internet requirements. All data is only accessible from within Rothera, until the end of the season.

6.3. Paper

If neither of the above options is available, checksheets are included as Appendix A to this document. Photographic evidence of compliance with the checklist items should be provided wherever possible.

7. Non-conformances

- All biosecurity breaches and near misses should be reported to the BAM Environmental Lead, the BAM Project Manager, the BAS Station Leader and the BAS Environment Office at the time of the incident.

- A near miss/environmental incident report must be produced and provided to the BAS Station Leader for inclusion in the Accident, Incident, Near-Miss and Environment (AINME) Reporting System as soon as relevant information is available and at most within 48 hours.

- Examples of biosecurity breaches may include, but are not limited to, the following:
    - Non-Antarctic soil or biological material (e.g. weeds) found on vehicles or other plant after unloading at Rothera
    - Live insects within cargo
    - ISO containers with soil or biological material on the interior and exterior surfaces
    - Any rodent sighting or any evidence of rodents (gnawing, etc.)
    - Failure to clean items delivered to station
    - Failure for biosecurity measures to be performed at appropriate stage of the supply chain
    - Failure for personnel to adequately clean their clothing or personal equipment.
    - Unintentional or deliberate importation of soil or biological material by BAM staff.
    - Importation of wood with bark still attached.
    - Failure for appropriate biosecurity checks of cargo packing areas to be performed.

Appendix A: Biosecurity Checklists

Biosecurity Checklist 1. Personal Biosecurity

(Pre-departure and pre-arrival for individuals going to Antarctica)

This checklist will be circulated to all BAM personnel prior to their deployment to Antarctica and is intended as a guide to assist individuals in undertaking their own biosecurity checks before travelling south.

Non-native species are those species that do not occur naturally in an area, but have been introduced by human activities, either intentionally or unintentionally. Unpermitted importation of non-native species is a breach of UK legislation and is in contravention of the Environmental Protocol and could lead to serious consequences for the responsible individual and BAM, including up to two years imprisonment and/or an unlimited fine.

Use the following checklist to reduce your risk of importing non-native species:

Biosecurity Checklist 1	**Personal Biosecurity**	
Name		
Signature		
Date		
		Tick to confirm compliance
All clothing is either new (i.e. straight out of the packet) or has been washed to remove plant seeds, invertebrates and soil (*Tip: check any Velcro® is clean and pay particular attention to pockets!*)		
All footwear has been scrubbed free of all plant seeds, invertebrates and soil (*Tip: check under the insole and tongue too!*)		
All bags and personal equipment have been cleaned, washed and/or vacuumed and are free of plant seeds, invertebrates and soil.		
All personal recreational equipment (including climbing gear, walking poles, ski and snow board equipment, kiting equipment and bicycles) has been cleaned and is free of soil and biological material.		
The following items have NOT been packed:		
• Any living plant, animal or microorganism - unless in possession of an appropriate permit		
• Non-sterile soil or compost		
• Any plant propagules (e.g. seeds, bulbs, cuttings) or invertebrate eggs (e.g. brine shrimp or sea monkey eggs) - growing plants and animals in Antarctica and South Georgia is NOT permitted		
• Untreated wood where bark remains attached		
• Any perishable foods including fruit, vegetables, cheese, fish or meat.		
You have explained the above restrictions to any person that is likely to send gifts or packages to you while in Antarctica.		

Biosecurity Checklist 2. Cargo Packing Areas

For each Cargo Packing Area that BAM utilises, a weekly checklist will be completed (for the duration of the packing period). The checklists will be stored on file and made available for auditing purposes either by BAM or by BAS personnel.

Biosecurity Checklist 2	**Cargo Packing Area**	
Name of Facility Being Inspected		
Name (print) and Signature of Inspector		
Date of Inspection		
Check Items	**Yes/No**	**Any subsequent action or other notes**
Site is clean i.e. free from soil, dirt, litter, weeds, plants, etc.		
No weeds or plants within 10 m of doors[1]		
Site is free of wind-blown seeds (e.g. from dandelions)		
Site is free of invertebrate infestation		
Site is free of rodents		
Rodent bait boxes are charged with poison bait[2]		
Sticky insect traps are present and effective (1 per 25m^2 floor area)[3]		
UV insect traps are present and effective (1 per 50m^2 floor area)[3]		
Storage area doors are kept closed as much as possible		
Pallets and packing materials are kept inside in a clean area		
ISO containers are stored on hard standing		

[1]Regular use of herbicides may be required
[2]Using the AINME system, provide details of any rodents caught in bait stations.
[3]State the date when the insect sticky traps are replaced (typically every 2 months)

Biosecurity Checklist 3. Small Plant & Tools

All small plant and tools that have been used on jobs in other parts of the world shall be cleaned and checked prior to being sent to Antarctica.

Checks prior to off-loading shall be simple visual checks as described for all general cargo. If for some reason any checks are not possible at any stage of the supply chain, please note details of the circumstances here and report using the AINME system. Individual hand tools do not need to be listed separately using this checklist, but do need to be free of soil and biological material before transfer to Rothera. The checklists will be stored on file and made available for auditing purposes either by BAM or BAS personnel.

Biosecurity Checklist 3	**Small Plant and Tools**				
Name (print) and Signature of Inspector					
Date of Inspection					
Location of Inspection					
Stage of Journey	Supplier	Logistics Hub	Pre Departure	Pre Offload	Post Offload
Details of journey initial and final destinations					
Transporting vessel (e.g. RRS Shackleton):					
Small plant/tools identification details:					

Check Items	**Clean?**	**Notes (including details of any associated AINME reporting)**
Exterior surfaces (top and side)		
Exterior underneath surfaces		
Interior surfaces (as possible)		
Insect spray in crevices (as possible)		

Biosecurity Checklist 4. Vehicle & Large Mechanical Plant

Mechanical plant (particularly tracked vehicles) pose a high risk to biosecurity. The undercarriage of wheeled or tracked plant can pick up soil which could contain plant fragments, seeds, invertebrates or invertebrate eggs.

The following checklist and the procedures listed in Section 2.6 of this document will be followed to ensure vehicles and large mechanical plant arrive in Antarctica and/or the sub-Antarctic free of soil and biological material. If these checks are not completed at any stage of the supply chain, please note details of the circumstances here and report using the BAS AINME system

A checklist for each vehicle or plant consigned to Rothera will be stored on file and made available for auditing purposes either by BAM or by BAS personnel.

Biosecurity Checklist 4	**Vehicle & Large Mechanical Plant**				
Name (print) and Signature of Inspector					
Date of Inspection					
Location of Inspection					
Stage of Journey	Supplier	Logistics Hub	Pre Departure	Pre Offload	Post Offload
Details of journey initial and final destinations					
Transporting vessel (e.g. RRS Shackleton):					
Vehicle model and identification details:					

Check Items	**Clean?**	**Notes (including details of any associated AINME reporting)**
Vehicle exterior (top and sides)		
Vehicle wing mirrors and windscreen		
Vehicle exterior (underneath)		
Wheels and wheel arches		
Vehicle interior (including under floor mats, door pockets, down the sides and below the front seats, the boot/trunk, and under the spare tyre).		
Vehicle accessories (forks, buckets, etc.)		
Engine started to ensure no rodents/birds in vehicle interior		
Use insecticide spray in crevices where possible		

Biosecurity Checklist 5. ISO Containers

All ISO containers must be checked prior to loading on the ship and prior to off-loading at the stations. Appropriate cleaning equipment must be made available during checks.

For each ISO container consigned to Rothera a checklist will be completed and stored on file. The checklist will be made available for auditing purposes either by BAM or by BAS personnel.

If these checks are not completed at any stage of the supply chain, please note details of the circumstances here and report using the BAS AINME system

Biosecurity Checklist 5	**ISO Containers**				
Name (print) and Signature of Inspector					
Date of Inspection					
Location of Inspection					
Stage of Journey	Supplier	Logistics Hub	Pre Departure	Pre Offload	Post Offload
Details of journey initial and final destinations					
Transporting vessel (e.g. RRS Shackleton):					
ISO Container identification details:					

Check Items (as required by state of packing)	**Clean?**	**Notes (including details of any associated AINME reporting)**
Container exterior surfaces (top and sides)		
Container exterior doors and hinges		
Container exterior underneath surfaces (as possible)		
Container interior surfaces		
Container interior high and low level corners and door hinges		
Contents of container		
Baited rodent trap and two insect traps placed inside container		
Container fumigated prior to locking doors		

Biosecurity Checklist 6.- All break-bulk items (any item which is not containerised and not covered by a specific checklist)

All breakbulk (individual boxes/crates, timber, cladding and other cargo which is not containerised) must be checked prior to loading on the ship and prior to off-loading at the stations. Appropriate cleaning equipment must be made available during checks. If these checks are not completed at any stage, please note details of the circumstances here and report using the BAS AINME system.

For each break-bulk inspection a checklist will be completed and stored on file detailing the items inspected and any outcomes. The checklist will be made available for auditing purposes either by BAM or by BAS personnel.

Biosecurity Checklist 6	**Break Bulk Cargo**				
Name (print) and Signature of Inspector					
Date of Inspection					
Location of Inspection					
Stage of Journey	Supplier	Logistics Hub	Pre Departure	Pre Offload	Post Offload
Details of journey initial and final destinations					
Transporting vessel (e.g. RRS Shackleton):					
Description and identification details of break bulk cargo:					
Check Items	**Clean?**	**Notes (including details of any associated AINME reporting)**			
Items exterior surfaces (top and sides)					
Items exterior underneath surfaces (where possible)					
Items clean and free of soil, biological material and any signs of rodent gnawing or ingress, invertebrates such as spider webbing or cocoons.					
Insect spray in crevices (as possible)					

Biosecurity Checklist 7. Crates

All crates must be checked prior to loading on the ship and prior to off-loading at the stations. Appropriate cleaning equipment must be made available during checks.

For each crate consigned to Rothera a checklist will be completed and stored on file. The checklist will be made available for auditing purposes either by BAM or by BAS personnel.

If these checks are not completed at any stage of the supply chain, please note details of the circumstances here and report using the BAS AINME system.

Biosecurity Checklist 7	**Crates**				
Name (print) and Signature of Inspector					
Date of Inspection					
Location of Inspection					
Stage of Journey	Supplier	Logistics Hub	Pre Departure	Pre Offload	Post Offload
Details of journey initial and final destinations					
Transporting vessel (e.g. RRS Shackleton):					
Crate identification details:					

Check Items (as required by state of packing)	**Clean?**	**Notes (including details of any associated AINME reporting)**
Crate is unused and ISPM15 compliant		
Crate lined with polythene		
Crate exterior surfaces (top and sides)		
Crate exterior underneath surfaces (as possible)		
Crate interior surfaces		
Crate and contents clean and free of soil, biological material and any signs of rodents or invertebrates.		

Biosecurity Checklist 8.- Vessels

Any vessel used to transport materials to KEP must be inspected prior to loading any cargo. If these checks are not completed at any stage, please note details of the circumstances here and report using the BAS AINME system.

For each vessel inspection a checklist will be completed and stored on file detailing the items inspected and any outcomes. The checklist will be made available for auditing purposes either by BAM or by BAS personnel.

Biosecurity Checklist 8	Vessel Biosecurity	
Name (print) and Signature of Inspector		
Date of Inspection		
Location of Inspection		
Details of journey initial and final destinations		
Transporting vessel (e.g. RRS Shackleton):		
Check Items (as required by state of packing)	**Yes/No**	**Notes (including details of any associated AINME reporting)**
Ship's hold is clean and free of soil and insect infestation		
Sticky insect traps or electric UV traps are placed in hold and food storage areas.		
Rat bait boxes with poison bait are on board.		
Rat bait box inspection regime is in place		
Mooring line rat guards are available and in place when in port.		
Ultrasonic rat deterrent available and in place.		
Floodlights available at gangway and used when the gangway is lowered in the hours of darkness.		
Boot/shoe washing facilities are available at the gangway and topped up with Virkon S or similar		
Ship sanitation certificate (SSC) is available and in date.		

Appendix 4
WILDLIFE INTERACTION MANUAL

BAS Wildlife Interaction Manual

Edited by the Environment Office

Edition	Version	Date	Reason for amendment	Status/Approved by
1	1.3	07/12/23	Addition of a new chapter on HPAI. Addition of SOP for bird strikes on ships (Appendix 1). Instruction to seek advice from BAS Avian Influenza Response Team, as relevant (Chpt. 7)	KH

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Contents

1. Introduction to the BAS Wildlife Manual

The British Antarctic Survey undertakes scientific and logistical activities across a large geographic area in the Antarctic region, and increasingly in other parts of the world. Inevitably, BAS personnel on the ships, stations and in the field interact with wildlife when undertaking scientific, logistical and recreational activities. In this Manual, wildlife is considered to include vertebrate species such as whales, seals and birds.

The aim of the BAS Wildlife Manual is to provide:

- information on the legislation relating to wildlife interactions in Antarctica and South Georgia and the South Sandwich Islands;
- guidelines on how to interact with wildlife when operating in the Antarctic region; and
- details of the additional processes required for scientific research on wildlife.

The BAS Wildlife Interaction Manual is managed by the BAS Environment Office, but includes information developed by departments across the organisation. The Manual will be reviewed and updated at regular intervals, so please ensure you refer to the most recent version (available on the BAS Environment Office webpage: https://www.bas.ac.uk/for-staff/polar-predeployment-prep/intro-guidelines-and-forms/preliminary-environmental-assessment/).

Chapter 2 sets out basic information that must be followed by everyone traveling to Antarctica, South Georgia and the South Sandwich Islands. Chapter 3 provides information on Highly Pathogenic Avian Influenza (HPAI). Chapter 4 describes the overarching BAS/NERC approach to animal welfare and provides details of the requirement for project ethical review and approval by the BAS Animal Welfare and Ethical Review Body (AWERB). Chapter 5 is the BAS bird welfare policy and describes the acceptable circumstances and methods for the human killing of injured birds. Chapter 6 describes the BAS response to situations where humane killing of a mammal might be considered appropriate. Chapter 7 sets outs prevention and response regulations should a bird strike occur. Chapter 8 sets out procedures that should be considered when planning the use of Remotely Piloted Aircraft Systems (RPAS) over concentrations of wildlife. Chapter 9 provides practical guidance should it be necessary for scientific or operational reasons to move wildlife on station. The Appendices provided in Chapter 10 include legal documents and guidelines produced by scientific and/or policy bodies concerning interaction with wildlife within the Antarctic Treaty area and/or South Georgia and the South Sandwich Islands.

Table 1. Relevance of each chapter to different areas of BAS science and operations.

Chapter No.	BAS operations and science areas				
	Antarctic stations and field activities	South Georgia stations and field activities	Air operations	Ship operations	Science
1	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓
5	✓	✓		✓	✓
6	✓	✓		✓	✓
7	✓	✓	✓	✓	✓
8	✓	✓		✓	✓
9	✓	✓			✓
10	✓	✓	✓	✓	✓

For further information, please contact: animalwelfare@bas.ac.uk

2. Antarctic wildlife – basic information you need to follow

(NB: closer interaction with wildlife may be possible if appropriately assessed and permitted)

1 The taking of, or harmful interference with, Antarctic wildlife is prohibited. Do not collect anything of biological/geological origin unless you are permitted to do so.

2 When in the vicinity of wildlife, move slowly and keep noise to a minimum.

3 Maintain an appropriate distance from wildlife to avoid disturbance. While in many cases a greater distance may be necessary, in general keep at least 5 metres from wildlife on land.

at least 5 m

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4 Always give animals the right of way. Do not block their access routes between the sea and land, nesting places or other destinations.

5 Animals may alter their behaviour if disturbed. If wildlife changes its behaviour (standing when it was sitting, moving its head around alerted, start vocalizing when it was silent, etc.) then slowly move away.

6 Stay outside the margins of a colony and observe from a safe distance. Animals are particularly sensitive to disturbance when they are breeding (including nesting) or moulting.

7 Watch your steps for eggs, chicks or nest materials.

8 Do not feed wildlife or leave food or scraps lying around.

3. Avian influenza

What is Avian Influenza?

- A viral infection, meaning it is sickness caused by a virus.
- The virus is highly contagious among birds.
- The virus has been around globally a long time, since at least the early 1960s.
- Found in domestic poultry (such as chickens) and in many different types of wild birds.
- The virus has evolved over time. There are a range of types of avian influenza, some are
- low pathogenic (causing no disease in wild birds: all HA subtypes) and some are high
- pathogenic (associated with disease and death in poultry and wild birds: only the H5 and
- H7 subtypes). The virus can infect some mammals.
- Many Antarctic bird species are hosts for the low pathogenic type of virus and it does not
- cause concern.
- The type we are concerned about regarding Antarctic species is Highly Pathogenic Avian
- Influenza of the Clade 2.3.4.4b.
- Commonly referred to as HPAI H5N1.
- To date, HPAI H5N1 has spread globally very rapidly but has not been found in the Antarctic Treaty Area. There is now a heightened risk that it will arrive there through natural migration of wild bird species this austral summer season 2023/24. The Antarctic bird groups considered most vulnerable are the gulls and skuas. Fur seals and elephant seals are considered the most vulnerable Antarctic mammal species.

HPAI H5N1

- "HP" or "Highly Pathogenic" means it makes infected birds [and some infected mammals] sick and causes mass mortality events where many infected animals die.
- An infected bird usually displays visible signs of the infection, such as nervousness, tremors, lack of coordination, lack of movement or odd movements, coughing/gasping for air, and swelling or redness around the eyes, neck and head.
- Although, some infected birds may not show any of these symptoms.
- Multiple dead animals in one area may be an indication that the virus is present.

What is the risk to humans?

- Recently, there have been increasing reports of outbreaks among mammals, with sporadic detection in humans reported but remaining very rare. To date, human-to-human transfer has never been detected.
- Infections in humans can cause severe disease with a high mortality rate.
- The human cases thus far are mostly linked to close contact with infected birds, or from their carcasses, body fluids or faeces, and from virus contaminated environments mostly occurring in the poultry industry

What does BAS need you to do?

We cannot prevent the natural migration of wildlife to/from Antarctica, which is the most likely way HPAI will spread; however, we still have a responsibility to stop our activities having any chance of spreading the virus. Actions you must take: -

1. Avoid close contact with bird colonies or poultry farms (in home country) immediately before you depart for Antarctica.

2. Thoroughly complete your biosecurity checks and clean your kit before travel.

3. When at gateways take particular care to follow methodically the BAS biosecurity measures asked of you.

4. Whilst out and about at Gateways (e.g., Punta Arenas/ Falkland Islands/ South Africa) do not enter bird colonies and stay at least 10 meters from birds and seals you encounter.

5. Whilst in Antarctica or Sub Antarctica do not enter bird colonies unless given prior permission by the Station Leader or local scientist.

6. Please remain vigilant, while in the Gateway, Antarctic or sub-Antarctic and please follow these instructions:

× Do not approach or interact with birds acting strangely or showing signs of illness.

× Do not in the event of discovering dead birds or mass mortality events, closely

investigate, touch or dispose of the dead bird carcasses.

× Do not if you encounter dead mammals such as seals, investigate, touch or dispose of

the dead animal carcasses.

✓ Do remain a reasonable distance from birds and seals (10 meters)

✓ Do take photos or videos to record what you saw to support further investigations.

✓ Take note of the location(s).

✓ Do report to the responsible person at your location (Station Leader, Master, or local Agent). Alternatively, you can send details direct to the BAS Avian Influenza Response Team by email avian@bas.ac.uk.

Station Leaders, Master, Local Agents or line managers if you are notified that a suspected HPAI case has been observed in you locality.

- Ensure this is reported directly via the avian@bas.ac.uk email. Ideally all details, photos and videos should be collated and sent.
- Ensure the avoidance and data gathering instruction above are being followed.
- You may be instructed by BAS to move to Phase 2 in the BAS HPAI protocol and all activities involving close contact with birds in you locality should be paused until further assessment.
- All staff should be reminded to be vigilant and importantly to stay clear of birds.
- The BAS Avian Influenza Response Team will assess the evidence and provide instructions on next steps.

Latest global information at: https://www.woah.org/en/disease/avian-influenza/.

Latest COMNAP guidance at: https://www.comnap.aq/heightened-risk-of-hpai-in-antarctica.

Latest information from the SCAR Antarctic Wildlife Health Working Group at:

https://www.scar.org/

4. Animal welfare

BAS expects and strives for excellence in animal welfare, with all research being assessed against the principles of the 3Rs and a harm/benefit analysis of the research. The 3R's are the replacement, reduction and refinement of animal experiments wherever possible and the use of innovative techniques to achieve these aims is expected. The harm/benefit assessment ensures that any potential harms to the animal are fully considered and are justified by the knowledge-benefits that will help protect the species/marine ecosystem, etc.

All research involving animals that if performed in the UK would require a licence from the UK Government must be permitted by the BAS AWERB (Animal Welfare and Ethical Review Body). If you want to work with animals, please complete the form available from Simon Morley (smor@bas.ac.uk) who chairs the AWERB.

All research that would not require a UK licence and non-research animal interactions must adhere to similar high animal welfare and undergo ethical approval.

Reporting procedure

1) Reporting an animal welfare incident

- Any incident should be reported through your management chain via the BAS Incident Reporting System, i.e., Maximo. It is important that the BAS AWERB [chaired by Simon Morley: smor@bas.ac.uk] and the BAS Environment Office are aware of any animal related incidents so that relevant authorities can be notified and investigations initiated.

2) Reporting an animal welfare concern

- Concerns should be raised, in the first instance, through your management chain. Hopefully these can be resolved quickly with your managers
- Concerns can also be raised with the AWERB [smor@bas.ac.uk] at any stage where they will be investigated thoroughly
- Unresolved concerns will be passed to a third party for resolution

Animal pathogen awareness

Any concerns about illness in the wild should be reported to the BAS Environment Office BUT animals should not be approached due to the risk of spreading any pathogens. (see the BAS Animal Mass Mortality Event Response Plan in the BAS Biosecurity Regulations, Section 11.5)

Response to injured animals

- **Animals injured by natural means**. The BAS policy under these circumstances is that there should be no intervention by BAS personnel and nature should be permitted to run its course

- **Animal injured as a consequence of interaction with BAS infrastructure or personnel (e.g. bird strike injury)**. If an animal is injured by a BAS employee or as a result of an interaction with BAS scientific or logistical infrastructure then BAS has an obligation to minimise the suffering of this animal within the bounds of the directions set out in the 'BAS Bird Welfare Policy' and the 'Euthanasia of Marine Mammals' documents within this manual (Chapters 5 and 6, respectively).

5. BAS bird welfare policy

For further information on this policy, please contact: animalwelfare@bas.ac.uk.

6. Euthanasia of marine mammals

For further information on this policy, please contact: animalwelfare@bas.ac.uk.

7. BAS bird strike prevention and response regulations

Introduction

- All Antarctic birdlife is protected under the Protocol on Environmental Protection to the Antarctic Treaty (1998), while birdlife on South Georgia and the South Sandwich Islands is protected under the Wildlife and Protected Areas Ordinance (2011). BAS has an obligation to minimise the likelihood of bird strike incidents and, should such incidents occur, to report to the relevant government authority and take appropriate mitigation action.
- A bird strike occurs when there is a collision between a bird and a vehicle (e.g., ship or aircraft) or man-made structure (e.g., power lines, masts, buildings and wind turbines).
- Analysis of existing data show that BAS infrastructure presents a risk to birds in the Antarctic and South Georgia. Most BAS research stations are located in close proximity to bird colonies, which increases the risk of bird strike. Lights on ships and BAS stations can sometimes lead to bird disorientation, which may result in bird strikes. Bird strikes on aircraft, while rare, may put the aircraft at risk.

Aims and objectives

These regulations aim to:

- detail steps to prevent bird strikes
- describe response actions should a bird strike occur across BAS stations and vessels

The regulations

<u>General instructions</u>

- All bird strikes shall be recorded on the BAS incident reporting system (MAXIMO). These should include all occasions when a bird collides with a man-made structure, irrespective of the subsequent outcome, e.g., a bird that:
    - takes off again of its own accord,
    - is successfully released after recuperating under BAS care,
    - is injured to some degree, or
    - is killed by the collision.

  The incident report should include date, time, location, weather conditions, species (with reference photograph), condition of bird, where found, treatment and outcome, plus any relevant information relating to why the bird may have been involved. This information may also be passed to the BAS Animal Welfare Ethical Review Board (AWERB) for review.

- All bird fatalities shall be reported to the BAS Environment Office within 48 hours so that the UK Government or Government of South Georgia and South Sandwich Islands (GSGSSI) can be informed where relevant.
- Where possible, all unavoidable interactions with birds (e.g., following a bird strike) should be undertaken by trained and experienced bird biologists. Where this option is not

available, advice should be sought from designated members of the BAS Conservation Biology group and the Environment Office kept informed of developments. In the first instance, please provide details of the incident to animalwelfare@bas.ac.uk and we shall endeavour to provide advice as soon as possible.

Prevention

Personal behaviour

- Nothing shall be done to encourage or attract birds to the vicinity of the research stations and ships. Do not feed any wildlife, including birds. Do not attempt to attract any wildlife using food. This information should be communicated during environmental briefings for all staff going south during their pre-deployment training, and during safety briefings on station.
- Do not leave any food in a position whereby it may attract wildlife, including birds. Take care not to leave food waste outside.

Aerials, antennae, masts and wind turbines

- Masts and antennae shall only be installed where necessary, and in accordance with the mitigation measure detailed in the associated Environmental Impact Assessment.
- Particular caution must be exercised when considering the installation of masts, aerials, wind turbines and antennae on stations located in close proximity to flying seabird colonies (e.g., Rothera, Bird Island, Signy and King Edward Point). Environmental Impact Assessments will be required on each occasion.
- The scale of infrastructure shall be kept to the minimum needed to deliver the scientific or logistical objective.
- All antenna and mast guy lines located at Rothera and at island stations shall have bird deflectors installed at an interval of 3 metres, unless such installations shall interfere with the operation of the equipment. In such cases, there should be consultation with the BAS Environment Office to consider other mitigation measures.

Aircraft

- Use of techniques to chase away birds from the Rothera Research Station runway are authorised by the UK Government, as they are essential to ensure the safe operation of the landing facility.

Station buildings located near concentrations of birds

- During periods of dusk/darkness, the level of light emitted from research station buildings must be kept to a minimum, unless engaged in essential science or logistical operations that require the use of external lighting. For example, for reasons of safety, some limited external building lighting may be maintained to ensure safe outdoor movement of personnel during the hours of darkness.
- Window blackout blinds must be installed and used on all station windows, every night at dusk, including accommodation. All personnel must be made aware they have a shared

responsibility. Station leaders must be made aware of and approve reasons for specific exceptions to this rule.

- External lighting must be kept to the minimum required and switched off when not in use. Where possible, external lighting should incorporate movement sensors, or other similar technology, to minimise the duration of illumination. Lighting must be restricted to the areas requiring illumination at the minimum intensity practicable. Lighting must be directed downwards where possible.
- The requirement to close blinds after dark every day, must be included in environmental briefings for all staff going south during their pre-deployment training, and at the usual safety briefing on first arrival at the station.
- Nightly checks to ensure all blinds are closed should be included as part of the standard "Night Watch" duties.
- A Bird Strike station member must be designated. Ideally this will be a trained bird biologist or individual trained to manage the welfare of a bird following a strike. If no such person is present, then the Station Leader should select the most appropriately trained and responsible person available.

<u>Vessels</u>

Bird strikes occur on vessels as a result of light pollution, in particular when operating around the shores of South Georgia. The problem is exacerbated on foggy nights. This may result in mortality or injury to birds. Birds may also become coated in oil or grease by coming into contact with mechanical parts on ships (e.g., hydraulic cranes). It is not uncommon for tens of birds to be affected in one night, generally small petrels. The presence of BAS staff on board with training and experience in handling birds will be a significant contribution towards mitigating this impact. Vessels sailing in Antarctic waters require artificial light, including deck lights and high power search lights to assist safe navigation and scientific work undertaken at night. **Nothing in these guidelines will affect the safety of operations on BAS ships**. The following points detail ways to minimize bird strikes due to light pollution aboard ship:

- During periods of dusk/darkness, the level of light emitted from vessels shall be kept to a minimum, unless engaged in essential science or logistical operations that require the use of external (including deck) lighting. For example, for reasons of safety, vessel searchlight(s) shall be used during the hours of darkness when the ship is operating immediately to the south or south east of the Falkland Islands (see the Polar Water Operational Manual (PWOM) available on MAXIMO).
- Window blackout blinds shall be installed and used at night.
- Avoid over-lighting: do not leave lights on unnecessarily.
- The requirement to close blinds and curtains on board ship after dark every day, must be included in environmental briefings for all staff and crew going south during their pre-deployment training, and at safety briefings on-board ship.
- Posters/notices should be displayed instructing crew and staff to draw blinds in cabins and common spaces when lights are on at night. Instructions to close blinds and curtains should be included in all cabin information booklets.
- Nightly checks to ensure all blinds are closed in public areas on board ship must be carried out.
- The AWERB will arrange for the training of appropriate members of the ship's crew and/or other BAS staff to deal with bird strikes. As far as possible, on each cruise, at least one suitably trained member of the crew shall be nominated as the designated Bird Strike staff member. The most suitable individuals will likely be the Laboratory Supervisors.

- When in areas of increased bird strike risk (e.g., at South Georgia), the designated Bird Strike staff member must carry out daily checks of decks and external superstructure, when safe to do so and in coordination with the ship's crew. Ideally, this should take place as early as possible after dawn.

Response

Actions if a bird is discovered following a bird strike

Inform the designated Bird Strike response staff member immediately, who should take charge of the bird's care. The designated Bird Strike staff member must assess the condition of the bird and decide on the appropriate course of action, i.e., determine if the bird is injured and if so, how badly and whether or not it is likely to survive. Record the circumstances of the bird strike (i.e., time, date, location, distance from the nearest structure, bird species, age and the nature of any injury to the bird) and report this on the Bird Strike Log. The course of actions will depend upon the status of the bird:

- **Dead bird**: Report the bird strike on the BAS incident reporting system. Provide a photograph of the dead bird. Inform the BAS Environment Office within 48 hours. If possible, identify the bird species. BAS seabird experts can be contacted to assist. Place the bird in an appropriate location in the field (e.g., in the sea or on the beach), some distance from the station and allow natural decomposition/consumption by scavengers. Ensure that protective equipment or utensils used to handle the bird are washed (or placed in the appropriate hazardous waste if washing is not possible).
- **Bird stunned or disorientated, but with no obvious injury**: Appropriate PPE should be used when handling birds (e.g., stout gloves, eye-protection, face masks). To allow time for recovery, place the bird in a cardboard box and leave in a secure, quiet and dry place at ambient temperature for several hours or overnight. Depending on species, release the bird during daylight (skua, kelp gull, shag, giant petrel, albatross spp.) or at dusk (all other species). Timing of release will reduce the risk of predation, and risk of the bird being attracted back to the station. Where possible, maintain observations to ensure that it has resumed normal flight. Release the bird ensuring that down-wind of your location there is an unobstructed flight route. As far as possible, birds must be handled and released by trained personnel. All releases must be logged as part of the bird strike log. If aboard a vessel, release the bird towards the stern of the ship, ensuring that down-wind of your location there is an unobstructed route to the water's surface. In rough conditions contact the officer on watch to ensure it is safe to access the deck. For advice, please send make a request at the following e-mail address: animalwelfare@bas.ac.uk.
- **Bird alive, but with an injury that will limit long-term survival (e.g., broken wing)**: Humane killing may be appropriate. Birds may be killed by trained personnel using humane methods. Training will be provided through the BAS Animal Welfare and Ethical Review Board (AWERB).

Birds oiled following bird strike

BAS do not have the capacity to deal with more than a very small number of oiled birds. If a large number of birds are oiled the Environment Office should be contacted. Advice will be provided following consultation with relevant BAS and external experts (as appropriate).

If an individual bird has become oiled/greased from lubricants, etc., where feasible, it should be cleaned straight away to avoid the bird ingesting chemicals during preening. Equipment needed may include a cardboard box to temporarily hold the recovering bird, absorbent towels, mild detergent and cleaning cloths. PPE must be worn, including gloves and eye protection. The Bird Strike staff member will clean the bird using mild detergent and appropriate cleaning cloths in a "dirty" sink area designated for this task. When cleaned, the bird should be placed in a dry box and allowed to rest, dry out and warm up. NOTE: a "cleaned" bird will need time to re-waterproof its feathers before release and as such advice should be sought from the AWERB and/or Conservation Biology scientists as to how long to retain the bird before attempting release. Please contact animalwelfare@bas.ac.uk and we shall endeavour to provide suitable advice as soon as possible.

Bird strikes and aircraft

- In accordance with BAS Air Unit policy and operational requirements, all bird strikes involving BAS aircraft shall be reported to the regulator Air Safety Support International (ASSI).
- Bird strikes involving aircraft in the Antarctic shall be reported to the BAS Environment Office as soon as possible, and within 48 hours, providing as much information as is practically possible, depending upon the circumstances of the incident. A report shall also be provided to the BAS Incident Reporting System (MAXIMO).

Highly Pathogenic Avian Influenza (HPAI)

At all times there should be vigilance for evidence of avian influenza in wildlife populations (e.g., unusual mortality levels or atypical behaviour in birds or marine mammals) (see Chapter 3). Potential evidence of avian influenza shall be reported immediately to the BAS Avian Influenza Response Team (AVIAN@bas.ac.uk), as well as the Ship Master, as appropriate.

Before the commencement of any bird strike response, and at regular intervals during the cruise, the individuals dealing with bird strikes shall check which phase of the BAS avian influenza action plan is in effect (as described in the document: 'BAS Response to a Potential Avian Flu Epidemic'). Relevant information can be obtained by contacting the BAS Avian Influenza Response Team at: AVIAN@bas.ac.uk. See also Appendix 1: SOP: Handling of live birds involved in ship strikes.

If the BAS avian influenza action plan is at Phase 2 or above, the bird strike response shall not proceed. Following this point, activities involving close interaction with wildlife shall only proceed following the consultation with the Avian Influenza Response Team and with the full implementation of any further specified conditions.

8. Procedure for operation of multirotor Remotely Piloted Aircraft Systems (RPAS) of < 7 kg over colonies of seabirds and seals in the Antarctic and South Georgia

All activities involving the use of a Remotely Piloted Aircraft System (RPAS) will need to be assessed through the Environmental Impact Assessment process and permitted, as appropriate. This document is a procedure designed to standardise permit applications to the BAS Environment Office and Animal Welfare Ethical Review Board (AWERB) when planning RPAS surveys of colonial seabirds and seals. The additional risks and mitigation of any proposed work that deviates from this procedure will need to be explained in Environment and AWERB documentation for ethical review, Environmental Impact Assessment and Permit applications.

This procedure falls under the umbrella of the Civil Aviation Authorities UK Civil Aviation Authority Drone Code and the BAS Unmanned Aircraft Systems (UAS) Operations Regulations. All RPAS pilots should observe the broader set of restrictions outlined in these documents. Carl Robinson of the BAS Airborne Survey Technology Unit (carob@bas.ac.uk) should be consulted on any survey work involving RPAS. RPAS flights for any purpose in South Georgia must adhere to further requirements set out by the Government of South Georgia and the South Sandwich Islands and be assessed through the Regulated Activity Permit (RAP) process.

This procedure is relevant to multirotor RPAS of a mass < 7 kg. Heavier multirotor or fixed wing aircraft are outside the scope of this document, and a permit application for their use in wildlife surveys will need to be developed in consultation with the Airborne Survey Technology Unit, Environment Office and AWERB will be required.

Risk 1. RPAS crash, forced landing or fly-away that injures wildlife:

Malfunctions, pilot error or bird attack causes the RPAS to fall to the ground in an uncontrolled manner and strike an animal. This results in the animal suffering blunt trauma (from being struck by the airframe) or cut injuries (from spinning propellers).

Risk assessment without mitigation

Likelihood: Low Impact (individuals): High Impact (population): Very Low

Risk assessment with mitigation (see measures below)

Likelihood: Very Low Impact (individuals): Medium Impact (population): Very Low

Justification: Likelihoods are low as modern RPAS have numerous safety features and are easy to fly, and risks are minimised where competent pilots are following appropriate operational procedures. Impacts on individuals are high because being struck could include severe injury or death: mitigation by use of small drones with propeller guards will reduce the impact (see below). As no more than one or two individuals are likely to be injured by a crash owing to the small size of multirotor RPAS the effects on the population will be very low.

Risk 2. UAV causes disturbance to animals: The sight or sound of the drone causes a behavioural response in animals that might have a significant adverse effect on their individual fitness.

Risk assessment without mitigation

Likelihood: Low Impact (individuals): Medium Impact (population): Very Low

Risk assessment with mitigation

Likelihood: Very Low Impact (individuals): Medium Impact (population): Very Low

Justification: Studies have shown that most seabird and seal species show little response to RPAS other than vigilance, unless they are flown at very low altitudes or in an erratic manner (see Note 1 and Further Reading): these are not compatible with survey work so should not occur. If the mitigation measures are followed (see below) the likelihood of disturbance is very low. The impact on individuals is medium as disturbed birds may lose eggs or chicks to skuas, but since they are long-lived they are likely to breed again in future years. When following the mitigation measures (see below) the likelihood of birds exposing nest contents is minimised. The impact across the population is likely to be very low as only a small proportion of breeding birds are likely to lose eggs or chicks during a survey.

Mitigation Measures

1. *Aircraft safety*

- RPAS models used for survey work should be recognised as airworthy by the BAS Airborne Survey Technology Unit.
- Inspections of the airframe, propeller, motors and controls for damage and functionality should be completed prior to take off.
- The RPAS compass should be calibrated away from metallic objects. GPS/RC signal reception confirmed before flights. Pilots should avoid flying near sources of electromagnetic or radio signal interference.
- The home point (the take-off and landing point) should have a flat, level surface for gyroscope calibration and be protected with a portable helipad to prevent moisture/dirt ingress into the aircraft at take-off and landing.
- Efforts should be made to keep batteries within recommended operational temperatures to ensure stable, safe flights. If batteries are below the recommended operational temperatures pilots must warm them up under their coat.
- A short test flight should be completed >150 m away from wildlife to ensure all systems are working as expected.
- Propeller guards or crash cages should be fitted to reduce the risk of cut injuries from spinning propellers. The smallest possible RPAS model that is suitable for the application should be used to minimise impact trauma.
- The return to home altitude should be set at a height that provides ample clearance of all collision hazards within the area of operation and at a height that will limit disturbance to wildlife.

2. *Personnel competence*

- Pilots should have a CAA recognised qualification to fly small (< 7 kg) multi-copters and a current pilot's log to prove their competence (> 20 hours flying with similar aircraft in a range of conditions in lifetime, and > 2 hours within the past year).
- An observer with knowledge of the animals and survey area must accompany the pilot to witness any incidents, warn of hazards (approaching bird strike risk or squalls), control additional personnel and defend the pilot from fur seals (as necessary). The observer must

also be instructed in the emergency procedures. In the event that the pilot is incapacitated, the observer must know how to initiate the return-to-home protocol and call for help.

3. *Flight restrictions*

- Operations must remain within Visual Line of Sight, defined as 400 ft above ground level (AGL) and 500 m from the pilot. AGL is taken from the highest point of relief within the survey area.
- Flights should not enter areas to be avoided (special wildlife protection areas, air traffic control zones, danger areas) without authorisation and/or the relevant permit from the FCDO or GSGSSI.
- Pilots should avoid routes that cause topography to obscure their view of the aircraft or compromise the signal between RPAS and ground station.
- Aircraft should only be flown in weather conditions within those stipulated by the manufacturer of the RPAS model used in the survey (wind speed, temperature, precipitation). An anemometer and thermometer should be used to quantify conditions prior to flights.
- Flights should be avoided if bird strike risk in the area is considered high (e.g. several albatrosses or giant petrels gliding above the colony within the operational altitude of the RPAS).

4. *Operational procedures*

- The home point (take off/landing point) should be in a safe location that provides a clear view of the area of operation. It should be at least 30 m from any breeding colonies to minimise significant disturbance risk to animals.
- The survey should be flown at the highest altitude that provides the ground sampling distance (GSD: Note 2) required for the survey's objectives. This will reduce the number of transects required to cover the colony, minimise disturbance and allow more time to move the aircraft away from the colony if pilot errors or malfunctions occur. The altitude shall be calculated in advance of the field work and reported in any documentation (EIA, permit applications, etc.) required by the BAS Environment Office, FCDO, AWERB or GSGSSI.
- Flights should not be flown at altitudes that cause significant disturbance (Note 1) to wildlife (defined in Note 1). Reference to previous literature will provide guidelines for safe separation distances (see Further Reading), but observers should monitor for disturbance to animals during surveys as sensitivity can vary across species, sites and environmental conditions.
- Should the observer see disturbance occurring at the selected flight altitude he/she should instruct the pilot to increase survey altitude or increase separation distance of the home point.
- If the separation distance needed to prevent significant disturbance is greater than that at which the required GSD can be achieved, the survey work will need to be conducted using an RPAS with a higher resolution camera sensor or greater focal length.
- Flights should be of the minimum duration required to fulfil the objectives of the research.
- Reductions in altitude should be made outside the colony boundary as vertical movements toward animals tend to elicit higher disturbance than horizontal passes.
- If a bird-strike hazard approaches the RPAS, the pilot should make evasive manoeuvres in a controlled and predictable manner, avoiding sudden changes in direction or altitude. An attacking bird will usually veer away from the RPAS without making contact; by making

sudden changes to the RPAS flight path there is increased likelihood of a bird-strike. If the interaction is a persistent attack (e.g., from a skua, gull or tern) the pilot should land the aircraft. Operations should be modified to avoid the risk of attack (e.g., change home point, increase altitude) and if attacks continue, the survey should be abandoned.

- Controls should be applied gently to avoid sudden changes in direction / speed or increases in propeller noise that might alarm animals.
- The RPAS should be landed once the battery reaches 30% of maximum charge.
- In the event of a crash or forced landing reasonable efforts should be made to recover the drone. This should be avoided, however, if the retrieval would be dangerous (e.g. on cliff faces, in water or seal colony), leads to intrusion into a controlled area (consult with the appropriate authority to arrange potential recovery) or will lead to high levels of wildlife disturbance.

Reporting requirements

- Pre-deployment forms (Appendices 1 and 2 in UAS Operating Safety Case – Volume 1 Operation Manual: BAS RPAS Operations Manual) should be completed prior to flights that will recognise hazards in the operating area and make specific plans for mitigation of impacts on wildlife.
- Any incidents should be reported on the BAS incident reporting system (i.e., Maximo), including a detailed description of the incident and submission of the pre-deployment form.

Notes

1. Significant disturbance is classed here as changes in behaviour caused by the RPAS that might affect individual fitness. This includes incubating/brooding birds fleeing the nest or chicks dispersing from crèches, which could increase predation risk or cause ejection of nest contents. Vigilance or movements of non-breeding/off duty animals are not considered significant here as these have negligible time/energy/stress costs in the context of their normal daily activity budget. Previous studies have found disturbance responses by seabirds and seals other than vigilance are rarely found at survey altitudes above 50 m (see Further Reading).
2. Ground sampling distance (GSD) is the number of mm on the ground per image pixel. This is determined by the attributes of the camera (sensor megapixels, focal length) and its altitude. A lower GSD provides higher image resolution, and allows better recognition of count units. GSD will need to be lower where birds are difficult to distinguish from the background (small size, cryptic colouration), where identification of similar looking species is necessary (e.g., chinstrap and Adélie penguins) or nesting birds need to be distinguished from non-breeding or off-duty ones. Based on experience in previous surveys, altitudes of 30 m – 50 m will be a suitable option for most seabird and seal applications.

Further reading

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9. BAS station wildlife movement guidance

Training

- A member of the station management team who has been fully briefed by the BAS Environment Office should deliver the animal movement training to staff on station. (They can also train other members of the BAS station management team to deliver the training on station).

- Anyone involved with moving wildlife (seals or penguins), must be appropriately trained in how to do this safely prior to undertaking the activity. This includes all BAS staff and any subcontractors.

- The training must include a practical element to ensure that everyone has the opportunity to demonstrate their skills and their understanding of animal stress signs whilst being observed by the trainer (animals will only be moved where there is a requirement and not for the purposes of training only). Only when the trainer is content that an individual is competent can they attempt to move wildlife independently.

When to move wildlife

- Wherever possible, find a route that minimises interaction with wildlife.

- Your safety and the wildlife's' safety must never be jeopardised. The first option should always be to pause and allow wildlife to move away naturally. Intervention to move wildlife should only be used if it is absolutely necessary.

- If wildlife is preventing essential work from progressing or is in close proximity with vehicles or construction works the first step should be to stop the work/engines and allow the animal some time (5 minutes is a useful guide but will depend on the situation) to move away or follow its original path without human interference.

- The following are example situations where wildlife may need to be moved – this is not an exhaustive list:

    - During cargo offload from the vessel to protect wildlife from crane operations, cargo depoting and vehicle movements.
    - During aircraft operations at Rothera to protect or move wildlife from the runway.
    - Where seals are resting on equipment or cargo materials that need to be used/accessed.
    - Where seals are resting on the road/track preventing vehicles from passing and have not moved away naturally after a pause in operations.

- Use the techniques described in Section 0 to move animals only where absolutely necessary. The least intrusive methods should be attempted first before moving onto more intrusive methods. In general, be patient and don't rush to move to a more intrusive method straight away. Each situation and animal will be different and so it is important to read the behavioural signs of the animals and the urgency of the situation to determine whether the method you are using is effective or whether it is necessary to move onto a new technique or seek additional help.

General advice and safety

- Avoid approaching seals at all other times. On-going unnecessary human interaction makes seals habituated to humans and more difficult to move later.

- Moving wildlife is a high-risk activity and should not be attempted alone. At least one other person should be present even if they are an untrained observer.

- **NEVER** directly touch wildlife as part of an attempt to move the animal. It can put you and the animal in danger and means you are far too close.

- Moving wildlife, especially seals, takes time to do in a safe manner. Remember the wildlife has more right to be there than you. Do not lose your temper, working with wildlife requires patience!

- Look out for signs of stress and aggressive behaviour. If observed, back away from the animal until it has returned to pre-interaction behaviours.

- Consider other station activities around you. Do not herd animals to a location where they will need to be moved again later.

- Be aware of your surroundings and watch out for other wildlife, concentrating on an individual seal can often lead to people forgetting about other seals in the vicinity and getting too close.

- Ensure the animal has an obvious and safe (to the animal) route to move away. If cornered, animals can get confused, stressed and may become aggressive.

- Do not purposely drive a seal into another seal's space as this may cause unnecessary aggressive behaviour between the seals that could result in their injury.

- Vehicle drivers need to be able to see the entire animal at all times. Where available, vehicles should only be used to encourage seals (elephants only) to move as a last resort and only if other methods have not been effective. Where this technique is used then vehicles should be kept a minimum of 5 metres away (or 3 metres with a seal movement trained banksman).

- Be vigilant for signs of moulting. Seals and penguins moult during the summer. As a result, their fur and feathers are less waterproof during this time and they conserve energy ashore by not feeding at sea. They are more sensitive to disturbance at this time and should not be moved unless absolutely necessary. Do not try to herd them into the water.

Species Specific Guidance

The guidance below refers to the commonly found species across most BAS research stations.

Elephant Seals

- Although elephant seals are large animals, they can move extremely quickly over short distances. Your safety is paramount so make sure you can get out of their way before they start to charge. They can easily lunge over a metre in distance, so avoid standing close enough that you could be bitten. They also have a large turning circle and can easily (unintentionally) hit you with their tail.

- Whilst elephant seals have thick skins, they can still be injured. An injury could affect an animal's ability to hunt for food or defend itself. The most vulnerable areas of an elephant seal are the eyes, so ensure that any equipment that is used to move seals e.g. flags, are not in direct contact with their eyes.

- Elephant seals are well insulated which means that if forced to move quickly they can easily overheat on land. Seals must be allowed to rest between periods of movement. Rule of thumb is that a 5 minute rest should be given to individual seals once they have moved a distance equal to twice their length. Be extra cautious on hot sunny days.

- When moving elephant seals, move the animals a short distance, retreat and return a few minutes later. They tend to become habituated to constant disturbance.

- Avoid moving them over: i) ground containing trenches, pits or deep depressions as they can get stuck due to their weight, ii) towards objects they can damage or injure themselves on and iii) towards a jetty or other steep drop as they can injure themselves by falling.

- Watch out for signs of stress. An open mouth, without making sound, can indicate stress. If an elephant seal evacuates its bowls whilst you are attempting to move it this is a further sign of stress. Back-off and give the animal time and space to rest.

- If you are unable to successfully move a seal after 15-20 mins you should stop. The animal is likely to be stressed and assistance or advice from a more experienced member of staff is needed. Retreat to a safe distance and contact BAS Station Management for further advice and assistance.

Fur seals

- Antarctic Fur Seals, particularly breeding/territorial fur seals, can at times be highly aggressive animals. They are generally more aggressive than elephant seals and are considerably quicker and more mobile. Wherever possible find a route that minimises contact with fur seals.

- Fur seals want to avoid getting hurt as much as you do and their reaction to a person is often brought on by fear and confusion. Fur seals will normally provide ample warning of their intentions through the use of threat behaviour. This is obvious to a person intruding upon their territorial space. The fur seal will turn towards the 'intruder' and will display an open mouth threat accompanied by a growl. It may begin moving towards the intruder or if startled it may instead turn tail and run. Note that if a fur seal is surrounded by other fur seals it could perceive that the easiest way out is past you rather than face other seals - thus you may inadvertently be rushed at and most likely get bitten during its 'escape'.

- Extreme care is needed not to cause the animal to think it is cornered, i.e. ensure that there is an obvious escape route for the seal, that is clear from other seals, objects and people. Animals that feel trapped, are likely to run directly at people and will bite.

- The most dangerous circumstances are when a fur seal is showing signs of fear. This is most common amongst non-territorial males. Such fear is often shown by "snake neck" behaviour involving the rapid movement of the head from side to side as the seal looks for a way out of the

danger it believes it is in. Recognise this behaviour and ensure that you allow a frightened animal room for escape.

- If a person does not recognise the common fur seal behavioural signs (below) then there is a greater probability of being attacked and sustaining an injury.
    - Initially fur seals will approach and lunge out to snap at the legs, they will then retire quickly.
    - The first attack is often a sham and the animal may not bite - this should persuade the intruder to retire.
    - The second attack carries a greater chance of actual injury when the attack is driven home.

- Where it is essential to move a fur seal, refer to the appropriate **Techniques to move wildlife** . Clapping (gently) or other low level noise is usually effective and should be used in the first instance. Where individuals are not responding to efforts to move them then a long blunt stick can be used to tickle the whiskers under the animal's chin. This mimics the snapping by female fur seals at the whiskers of males to deter unwanted attention.

- **Do not hit the seal.** Only as a last resort when there is imminent danger of being bitten[1], should the stick be used to deter an attack. Note that heavy-handedness with a stick can often provoke rather than avert an aggressive encounter with a fur seal and it could cause permanent injury to the seal. Avoiding a seal encounter is always the preferred option. If a seal is struck, then an incident report must be submitted and will result in an internal investigation by BAS.

Penguins

- Penguins will move easily if disturbed by simply approaching them. Move slowly and carefully (do not make excessive movements such as clapping or waving your arms and avoid shouting or loud noises such as laughter) and allow the penguins to walk if possible. Moving them too quickly, aggressively or noisily can instil panic and erratic behaviour and they may not take the obvious escape route.

- Ensure that they have a safe route away. Guide them away from hazards such as steep drops or objects they may become entangled in.

- Be extra cautious with moulting penguins (often seen resting on snowy patches) and all penguins on hot sunny days (often seen resting and panting). Do not move moulting penguins into the sea as their waterproof feathers will not have developed and they will not survive at sea.

Situational Awareness

- Do not take photos or videos of anyone moving animals. Without a full explanation such images and footage can be misinterpreted.

- Wherever possible, avoid or delay moving animals when tourists are present as without context the displacement of animals can be misinterpreted.

- Do not share any images on personal blogs or social media - this is a requirement of the BAS Communications Policy as communicated to all staff at the BAS pre-deployment training.

[1] Bites should be reported to the doctor immediately for treatment (seal bite kits are on station)

Injury or fatality

Unpermitted injuring or killing of native wildlife through human activities is a breach of the GSGSSI Wildlife and Protected Area (WPA) Ordinance and the Antarctic Act (1994;2013). In the event of an injury to animal, as a result of human activity:

- Do not attempt to help or move the animal as this could cause further distress.
- Contact the BAS Station Management team immediately.

Station management should follow the BAS Bird Welfare Policy and note on Euthanasia of marine mammal in the BAS Wildlife Interaction Manual. The BAS Environment Office should be notified. At KEP, the BAS Station Management shall inform the GSGSSI Government Officer as soon as possible. BAS Environment Office will consult with the GSGSSI and Foreign, Commonwealth and Development Office on any appropriate action.

Techniques to move wildlife

	Techniques for moving wildlife (listed in priority order – the lower graded techniques should be attempted first before higher graded methods are attempted)	Elephant seal **Be aware of:** - Open mouth (no sound) - They overheat when moving on land - Become habituated to efforts to move them. - Moulting	Fur seal **Be aware of:** - Open mouth threat/growling - Lunging & snapping - "Snake neck" behaviour	Penguin **Be aware of:** - Erratic movement - Moulting - Panting
1	**Slow walking:** Move slowly and carefully (do not make excessive movements such as clapping or waving your arms) and allow animal to move away slowly. Speak quietly avoiding loud noises such as laughter.	✓(for young elephant seals)	✓(for young fur seals)	✓
2	**Clapping (low level):** Gentle clapping or other low-level noise is usually enough to get the attention of seals and encourage them to move away.	✓	✓	×
3	**Arm Waving**: Making yourself as large as possible and approach to a safe distance. A safe distance will vary enormously on the situation and could be up to 30 metres.	✓	✓	×
4	**Bamboo flags**: Dominance in elephant seals is usually established by being the tallest, so holding or waving an object, like a flag, above the seal will mimic this. To turn a seal around flags can sometimes be effective if used to gently 'tickle' tails and flippers. Never wave a flag in the seals eyes.	✓	×	×
5	**Big flag**: Use a long thin piece of wood around 5 meters in length as a flagpole. Attach an FIBC bag to the end, stretched out so that the maximum surface area is displayed, almost like a kite. Hold high and approach to a safe distance and wave it about in a controlled manner. This method works on the same basis as using the flags where dominance is established by being the tallest animal.	✓	×	×
6	**Long blunt stick:** Only as a last resort with particularly stubborn fur seals. A stick can be used to tickle the whiskers under the animal's chin.	×	✓	×
7	**Vehicles (last resort technique where all other methods must have been attempted first)**: Approaching slowly (< 5mph), no closer than 5m, in a large vehicle with bucket or forks held high in the air can encourage elephant seals to move. **However, extra caution must be taken to avoid any contact or injury to the seal.** A 'banks person'	✓ (for large elephant seals)	×	×

	should always be used if getting closer than 5 metres (but no closer than 3m) and they must be seal trained.			

10. Appendices

Appendix 1. SOP: Handling of live birds involved in ship strikes

COSHH Assessment(s): SCI-AL-CSH-ENV-1000

Risk Assessment(s): SCI-AL-RA-ENV-1004

Chemicals Required:

Chemical	Hazard Class	H-phrases
BioGuard disinfectant		H315 – Causes skin irritation

Other Hazards:

Biological pathogen		Suspected known animal pathogen
Physical terrain		Extreme cold. Slips, trips and falls.
Biological physical		Scratches and pecks

Sustainability Actions:

Reuse boxes	Use cardboard boxes from ship logistic supply waste

- Potential Group 2 or 3 known Pathogens: Only carry out if fully trained.
- Wear Tyvek suit, boots, face shield/safety glasses and suitable chemically/biologically resistant gloves (double nitrile gloved).
- Wear ffp2 face mask that has been face fit tested and approved for the user
- Only fully trained staff can carry out this procedure
- Two people should be assigned to this activity. One to carry out the bird handling and one to assist with procedure and PPE removal.

Procedure aligns with Chapter 7 of BAS Wildlife Interaction Manual

For further advice, contact animalwelfare@bas.ac.uk

Application

- For rescue of birds that have accidentally collided with the ship and subsequently alighted on deck.
- For handling of birds to cause minimum stress and to minimise any long-term and acute effect of handling on the welfare of the birds.
- For temporarily holding disorientated and wet birds prior to safe release, ideally within 24 hours.
- For close examination of birds to assess health status and to permit the safe handling of birds while other first aid procedures are being conducted (such as cleaning grease off feathers and releasing by hand).

Ship Safe Operations

In rough sea conditions contact the officer on watch to ensure it is safe to access the deck. Always follow ship safety instructions as provided by the crew.

When catching birds always be aware of personal surroundings: ensure you are spatially aware of any risks from equipment, slippery surfaces, ship superstructure before attempting to capture a bird.

Only proceed with a bird capture if you are satisfied you can do so safely.

Cautions

- Covering the nostrils of a bird while holding the bill can prevent breathing.
- Incorrect restraint, allowing the bird to struggle excessively, increases the likelihood of it sustaining injuries.
- The greatest risks come at the point of capture and release, if birds are moved or if there is a change of handler.

Pre-prepare a box of suitable size for the bird species.

1. The box should be constructed of cardboard or other material that can be destroyed by incineration after use. Ensure it is undamaged and the lid flaps close properly. The box should be of a suitable size to hold the bird with enough room for the bird to comfortably move around. Also ensure the sides are high enough to prevent the bird from escaping by climbing out.
2. Line bottom of box with paper towels which can be destroyed by incineration after use.
3. Make a minimum of 10 holes and maximum of 40 holes of roughly 0.5 cm in size in the lid of the box with a pen, screwdriver, or similar tool, or ensure box lid is not a close seal (i.e. air flow can take place).

Handling procedure for small birds (e.g. diving petrels and prions)

Initial restraint is achieved by gaining control of the head of the bird using the one-handed 'ringers grip', as follows:

1. Use the most comfortable hand to grasp the bird (e.g. if you are right-handed, it may be more comfortable to hold the bird in your left hand, or vice versa for left handers), leaving the dominant hand and free for other tasks such as checking for injury
2. Gently but firmly grasp the bird with its back and closed wings against the palm of the hand.
3. The head should be held between the index and middle finger while remaining fingers are closed around the body of the bird.
4. The wing can be held open (to check for injury) by gripping the upper wing (humerus) between the thumb and tip of the index finger. This can also be done using the index and middle finger.
5. The wings should be secured by naturally folding against each flank of the bird as per the natural resting posture of the bird, and then by holding the bird in such a way as the wings are not able to move.
6. Usual handling time should be less than a minute to allow a handler to safely capture and restrain the bird, before placing it in a suitable container (see below).

Handling procedure for medium to large birds (e.g. skua, white-chinned petrel)

Initial restraint is achieved by using both hands:

1. Firmly but gently grasp the bird with the hands placed either side of the bird so that the wings are held against the bird's body by the handler's palms.
2. The thumbs should be placed on the bird's backbone at the level of the scapulae or shoulder and the fingers curled around the breast and abdomen, with the legs tucked up against the underside of the bird. A variation on this technique can be to brace the back of the head with the index and middle finger to prevent bites.
3. The bird's body can be held horizontally (with the head facing away from the handler) or tilted vertically (head up) with the legs facing forward

Handling procedure for very large birds (e.g. albatross)

Restrained by at least two handlers; one to hold the body and wings and another to restrain the head and legs using an underarm hold as follows:

1. The body of the bird is held under the handler's left or right arm with the wings held against the bird's body with pressure from the handler's torso and left or right elbow and forearm (which side of the body the handler is holding the bird against will correspond with which arm is under the bird) .
2. In most cases, the bird's head can be held behind the handler because this will prevent it from lunging at the handler's face and eyes (i.e. a handler will be holding a bird so that it is facing backwards, whilst held against their side)
3. Place the left hand under the bird's abdomen and the right hand across the bird's back to help restrain the legs and wings, respectively.
4. Another handler can restrain the bird's head and legs to prevent injuries caused while struggling to escape.

Care of birds for recovery

Be aware that birds may overheat in warm conditions, such as in a cabin. Only place in approved recovery area.

The box must be handled by the person assisting to prevent contamination of the external surfaces.

1. Carefully place the bird in the pre-prepared box and secure closed.
2. With help of assistant, spray gloves and Tyvek suit (if worn) with BioGuard and remove, placing in bag for disposal.
3. Place the box in the designated recovery area, which should be quiet, moderately warm and dry: Heli Hanger area identified.
4. Check on bird every 2 hours to ensure it is still alive. Open the box by minimal amount required for good visualisation of the bird.
5. Do not provide any food or drink during recovery.

Release of recovered birds

- Incorrect release could result in the bird colliding with ship superstructure or crashing into the sea.
- Timing of release will reduce the risk of predation, and risk of the bird being attracted back to the vessel.
    - Daylight - skua, kelp gull, shag, giant petrel, albatross species
    - Dusk – all other species

- Ensure that the beak is kept under control at all times.
- All birds must be released prior to vessel moving off station to ensure release in same location as strike.

1. Move slowly, quietly and carefully to avoid unnecessary stress and to avoid the bird panicking and attempting to escape. This could lead to it becoming injured.
2. A careful check on the bird's breathing and posture should be made for the complete duration of the procedure.
3. Only one bird per person should be held simultaneously, even if the bird is very small (e.g. diving petrel).
4. Select a launch spot relatively high up on the ship's superstructure to allow the bird more air space to manoeuvre and reduce risk of it hitting the sea. Use the Observation deck or heli-deck.
5. Release the bird towards the stern of the ship, ensuring that down-wind of your location there is an unobstructed route to the water's surface.
6. Maintain observations to ensure that it has resumed normal flight.

Report details of bird strike on BAS Maximo and GSGSSI reporting system

Waste Disposal

- Decontaminate all PPE before disposal to mitigate the suspected pathogen risk. Use only approved disinfectant.
- Dispose of any PPE and tissues as biohazard waste in accordance with local waste procedures.
- Waste material that has been in contact with the bird must be bagged and incinerated.

Emergency Procedures

- First Aid: BAS standard procedures. Provide COSHH & SDS if chemicals involved.
- Chemical Spill: BAS standard procedures for chemical spill response.

Waste Produced:

Decontaminated PPE		>1% biological pathogens (deactivated)	Plastic waste bag
Contaminated box		>1% biological pathogens	Waste bag for incineration on board

Sign Off:

Document Owner: M D

Accepted by Lab Manager: E F

To be made available as a generic procedure? Y

User Sign-off

Name: Date:

Approved by Line Manager:

Name: Date:

Appendix 2. SCAR's Environmental code of conduct for terrestrial scientific field research in Antarctica

Background

This Scientific Committee on Antarctic Research (SCAR) Code of Conduct (CoC) provides guidance for scientists undertaking terrestrial scientific field research in Antarctica. Reference was made to the need for this CoC during CEP IX (CEP IX Final Report; para. 132). A CoC was approved by the XXX SCAR Delegates Meeting in Moscow July 2008. SCAR presented the CoC to the CEP XII (2009) as IP 4. A further review of the CoC was coordinated by SCAR in 2017, through experts and the broader SCAR community, and the revised version submitted for consideration at CEP XX (WP 18). Further consultation was carried out in the 2017/18 intersessional period, including with COMNAP.

This CoC has its origins in the 2006 CEP discussions on avoiding the introduction of propagules[2] of non-native species. Since those discussions, the CoC has been broadened to provide guidance to design and conduct terrestrial scientific field research in a way that minimises environmental impacts, including, but not limited to, the transfer of non-native species.

Introduction

Antarctica contains many unique geological, paleontological, glaciological, and biological features. This landscape and its biological communities often have limited natural ability to recover from disturbance. Many features could be easily and irreversibly damaged. This CoC provides recommendations on how scientists and associated personnel can undertake scientific field activities while protecting the Antarctic environment for future generations, as well as not compromising future scientific research. These protocols ensure that human presence will have as little impact as possible. All personnel undertaking scientific research in Antarctica should be familiar with this CoC and field activities in Antarctica should be designed to have as little environmental impact as possible.

The Protocol on Environmental Protection to the Antarctic Treaty (also known as the Madrid Protocol or Environmental Protocol) provides a basis for environmental protection and management in the Antarctic. Climate change and increasing pressure from human activities suggest that comprehensive guidelines are needed to protect the unique features of Antarctica. This CoC complements the relevant sections of the Protocol and provides guidance for researchers conducting land-based field research (including, but not limited to - limnological, terrestrial, coastal/littoral, glaciological, biological, paleontological, sociological, historical, archaeological, climatological and geological research). A 'field' activity is defined here as any scientific activity, and the logistics to support this activity, which is conducted in the natural environment, irrespective of its duration.

All countries with researchers that undertake terrestrial field research in Antarctica are encouraged to include this CoC within their operational procedures and to ensure that personnel undertaking or supporting scientific field research follow this CoC.

It is recommended that this CoC be followed by all personnel undertaking scientific research to the maximum extent possible and as long as it does not affect the safety of the expedition.

[2] Propagule: means of propagation, *e.g.*, seed, spore, egg, live insect (including microbes in non-sterile soil)

General Guidelines

Antarctic scientists potentially have a higher likelihood of carrying non-native propagules to Antarctic [and sub-Antarctic] ecosystems than other Antarctic travellers because their field of study often takes them to alpine or northern polar habitats. Moreover, Antarctic scientists also move between the Antarctic Conservation Biogeographic Regions (ACBRs)[3,4,5] which can differ substantially in biodiversity and geodiversity. In the process of conducting research within these habitats, Antarctic scientists can inadvertently entrain propagules and/or soil on clothing, equipment and equipment cases. If these items are then taken to the Antarctic, or among ACBRs, and they have not been cleaned/sterilised to remove or kill the propagules, an opportunity to transfer such material to and around Antarctica is created. Equipment should be properly cleaned before it enters the Antarctic, or moves between regions within Antarctica.

The implications of human transfer of taxa between locations can range from the modification of the genetic structure of populations to changes in local biodiversity and subsequent effects on community dynamics. Human transfer may involve species (or their propagules) from sites outside Antarctica, and such species would in most cases be considered non-native. However, given the differences between regions, intra-regional transfer of indigenous species also needs to be minimised. Such accidental movement of indigenous biota could compromise scientific studies of molecular adaptation, regional evolution and biogeography and reduce the inherent value that Antarctica offers as a system with very limited anthropogenic influence.

Before going into the field

Report planned activities to the appropriate national authority as thoroughly as possible and well in advance, in order to allow an assessment of the environmental impact that may be caused on the field site(s) visited, as required by Annex I to the Protocol on Environmental Protection to the Antarctic Treaty.

Prior to conducting any scientific activity, it is essential to consider and clearly define the scope of the planned activity, including its area, duration, and intensity.

Be aware of the cumulative impacts of the activity, both by itself and in combination with other activities within the region. Consider lower impact alternatives to the activity and re-use of existing facilities wherever possible.

In order to minimise environmental impacts of field activities:

i. Choose sites as close as possible to research stations and use existing pathways.
ii. Limit the number of visitors to field sites to the people required to carry out the fieldwork.
iii. Where possible avoid areas that are especially vulnerable to disturbance such as vegetated areas, breeding sites, patterned ground, and water bodies.
iv. Re-use existing sites wherever possible.
v. Consider the capacity required to prevent and respond promptly and effectively to any environmental accident or incident.

Everything taken into the field must be cleaned before being taken into the field, and returned to the main station for proper cleaning, where it is feasible and safe to do so.

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[3] Terauds A, Chown SL, Morgan F, Peat HJ, Watts DJ, Keys H, Convey P & Bergstrom DM (2012) Conservation biogeography of the Antarctic. *Diversity and Distributions* 18:726-741.
[4] Terauds A & Lee JR (2016) Antarctic biogeography revisited: updating the Antarctic Conservation Biogeographic Regions. *Diversity and Distributions* 22:836-840.
[5] Resolution 6 (2012) - ATCM XXXV Hobart; Resolution 3 (2017) - ATCM XL Beijing

Precautions should be taken to avoid introduction of non-native species, or of chemical contamination, and transfer of materials between sites:

i. Ensure that all equipment and clothing, including footwear, is thoroughly cleaned.
ii. Avoid taking unnecessary packaging and materials into the field. Note that several products used for packaging are prohibited in Antarctica, such as polystyrene beads or chips.

Once in the field

Particular care should be taken in areas with sensitive biological, geological, paleontological, historical, archaeological and geomorphological features such as bird and seal colonies, roosting areas, vegetated areas, freshwater lakes and ponds, sand dunes, screes, fluvial terraces, fossil beds, fragile or vulnerable landforms (*eg*, patterned ground, unconsolidated or poorly consolidated sediments, biological soil crusts, weathering pits, water-saturated soils during summer melt periods, etc.), ice core pyramids and ventifacts.

Avoid unnecessary disturbance of Antarctic flora and fauna. Avoid areas where wildlife is easily disturbed, especially during the breeding season.

When taking samples (*ie*, geological, paleontological, biological, ice, etc.) take as small a sample as possible to minimise environmental impacts. Only take samples in accordance with the Environmental Impact Assessment undertaken for the activity and, where appropriate, any permits issued by an appropriate national authority.

The location of any spill, camp site, soil pit, drilling site, sampling site, experimental site, or any other disturbance should be recorded (preferably using a GPS), and reported to the appropriate national authority, for the benefit of future researchers.

Minimise impacts when moving around in the environment:

i. Stay on established trails where available.
ii. Avoid walking on vegetated areas, streambeds, lake margins, and delicate rock, landforms and soil formations.
iii. Restrict ground vehicle usage to snow and ice surfaces, or designated tracks, wherever possible.
iv. Where feasible, use recognized helicopter landing sites and ensure that markers for helicopter pads are clearly visible from the air.
v. Minimise the disturbance to wildlife by following the ATCM guidelines for operations of aircraft near concentrations of birds[6].
vi. Restore any disturbances caused by activities, as long as such restoration does not cause any further environmental impacts.
vii. Algae and invertebrates live beneath stones. Moving rocks and stones should therefore be minimised to the extent required for the work being undertaken.
viii. Do not build cairns.

Management of scientific field sites

Minimise environmental impacts of field sites:

i. Make sites no larger than needed for the proposed scientific activities.
ii. Keep sites tidy during use.

[6] ATCM Resolution 2 (2004) Antarctic Treaty Consultative Meeting XXVII – Cape Town.

iii. Avoid activities which could result in the dispersal of foreign materials into the environment. In particular, avoid the use of spray paint, wooden post markers, etc., and, where feasible, conduct activities such as sawing or unpacking inside a tent or hut.

iv. Secure equipment from being blown away or stolen by inquisitive birds (*eg*, skuas, penguins).

v. Wherever possible, all precautionary measures should be taken to ensure collection and removal of human waste and grey water.

When the work is complete, restore sites as far as feasible without creating further environmental impact. Remember that sites may require subsequent monitoring to comply with the Protocol for Environmental Protection to the Antarctic Treaty.

As it is important to prevent the introduction of foreign materials and contaminants into the environment:

i. Avoid materials liable to shatter at low temperatures, *e.g.*, polyethylene-based plastics.

ii. Take care when handling fuel, chemicals and isotopes (stable or radioactive) to avoid spills or unintentional release into the environment. Consider the recommendations in the CEP Clean-up Manual[7].

iii. Store and handle fuel and chemicals using appropriate containers.

iv. Use drip trays where possible when handling fuels or other liquids and take special care when handling fuel in high winds.

Report any environmental accident or incident to the appropriate national authority.

If equipment is planned to be installed in the field in the longer term:

i. Ensure an Environmental Impact Assessment is undertaken prior to any installation, as required by Annex I to the Protocol for Environmental Protection to the Antarctic Treaty.

ii. Clearly identify any equipment by country, name of the principal investigator and year of installation, and state the duration of the deployment.

iii. Make sure installations can be retrieved and removed when no longer required, unless it is impractical, or would result in a higher environmental impact, or have been identified as useful for long-term monitoring and/or research.

Do not displace materials or collect samples of any kind, except in accordance with the associated Environmental Impact Assessment and any required permits.

When undertaking research with live animals, consider the legal requirements of national authorities and those set out in *SCAR's Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica*.

Field camps

Camping and scientific equipment should be cleaned before being brought into the Antarctic or before being transferred between sites.

Minimise the environmental footprint of field camps by:

i. Camping on permanent snow or glaciers where possible and only if safe to do so.

ii. Locating camps as far as feasible from lake margins, stream beds and associated fans, and vegetated areas, to avoid damage or contamination.

[7] Committee for Environmental Protection Clean-up Manual (http://www.ats.aq/documents/recatt/att540_e.pdf)

iii. Taking special care to ensure that no food or wastes are accessible to animals.

iv. Re-using campsites whenever possible.

v. Keeping camps tidy during use and restore, as far as is feasible and without causing any further environmental damage, after use.

vi. Using solar and wind power as much as possible to minimise fuel usage.

Ensure that equipment and supplies are properly secured at all times to avoid dispersion by high winds or helicopter downdrafts. Remember that in some locations high velocity katabatic winds can arrive suddenly and with little warning.

Remember that when working in an ASPA or ASMA, the area management plan may have additional requirements for field camps. Follow any conditions contained in the entry permit required for access to an ASPA. Visitor report forms[8] should be submitted to the appropriate national authority as soon as practicable.

Location-specific guidelines

Lakes and streams

Choose sampling equipment that is the least destructive to the aquatic or coastal environment. Sample carefully and avoid excessive and unnecessary sampling. Minimise cumulative impact if sampling repeatedly at a location over a long period or several field seasons. Use of dredges, trawls and box corers should be minimised.

Aquatic ecosystems in Antarctica are typically extremely poor in nutrients (except those with animal influence) and thus are sensitive to anthropogenic pollution. Measures should be put in place to minimise, as far as possible, release of human waste into the environment.

Avoid walking in streams and lake beds or too close to their margins as this may disturb biota and affect bank stability and water flow patterns. When a crossing must be made, use designated crossing points if available, otherwise walk on rocks if possible.

Minimise the use of vehicles on lake ice if possible. If access to the water body is required for scientific research, use non-motorised boats whenever possible.

Ensure that all sampling equipment is tethered or otherwise secured and does not contaminate the water body.

Clean all sampling equipment before using it in another water body in order to avoid cross-contamination. Alternatively, use separate equipment at different sites.

Wherever possible use flumes, not weirs, when monitoring streams to minimise any potential impacts of the study.

To the maximum extent practicable, avoid the use of stable isotope tracers at the complete ecosystem level, but rather use them in closed vessels. Consider the use of naturally occurring tracers in experiments. Radioactive isotope tracers should only be used in closed vessels or in *ex-situ* experiments. No stable or radioactive isotope tracer waste should be disposed into ecosystems. Document all tracer use (location, type of tracer, amount) and report this information to the appropriate national authority.

To avoid introduction of contaminants or disturbance of the stratification of the water body and its sediments:

[8] See Appendix 2 of the Committee for Environmental Protection Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas. Resolution 2 – ATCMXXXIV CEP XIV – Buenos Aires (2011)

i. Do not swim or dive in lakes, unless it is required for scientific purposes.
ii. Remove all unwanted water and sediment materials from the site, even on permanently ice-covered lakes, rather than discharging them back into the lake.
iii. Ensure that nothing is left frozen into the lake ice that may ablate out.
iv. Consider using a remotely operated underwater vehicle (ROV) as a tool for underwater and under-ice research in lakes and coastal/littoral habitats.

Ice-free environments

Terrestrial vegetation includes very slow growing species and fragile growth forms. Damage by trampling may remain visible for years or even decades and further impact upon the many terrestrial invertebrate species that live in soils and feed on soil algae.

In high use areas, use existing trails where possible in order to avoid disturbing large areas of vegetation and/or soil or surface material. In lower use areas, consider whether trails or a dispersed pattern of travel would have least impact and implement accordingly. Local knowledge will often be a useful guide.

Clean all equipment and footwear, as far as is feasible, between sites to avoid transfer of soil and propagules among sites.

When sampling in vegetated areas, ensure that the site is restored as far as is feasible without causing any further environmental impact.

Limit the use of mechanical equipment for sample collection, whenever possible.

When sampling soil in desert areas, use groundsheets to contain excavated material to minimise the extent of damage to the desert pavement. Backfill soil pits and, as far as feasible, replace the desert pavement materials at the soil surface to restore the site appearance.

Do not disturb or remove rocks, minerals, fossils, meteorites or ventifacts unless it is necessary for the permitted research.

For specific guidance on undertaking scientific activities in terrestrial geothermally heated areas, please consult the *SCAR Code of Conduct for Activity within Terrestrial Geothermal Environments in Antarctica*.

Glaciers and ice fields

Remember that the use of water in hot water drills, and the use of other drilling fluids, could contaminate the isotopic and chemical record within the glacier ice.

Given that the hydrological systems under glaciers and ice sheets are connected to the wider environment and downstream contamination could occur, exercise caution when using chemical-based fluids to drill to the base of an ice sheet. Similar caution is necessary when drilling is made through ice shelves to ocean beneath. For further information on activities in subglacial environments, please consult *SCAR's Code of Conduct for the Exploration and Research of Subglacial Aquatic Environments*.

Appendix 3. Annex II to the Protocol on Environmental Protection to the Antarctic Treaty

CONSERVATION OF ANTARCTIC FAUNA AND FLORA

(for full text see: https://documents.ats.aq/recatt/Att432_e.pdf)

Article 1

DEFINITIONS

For the purposes of this Annex:

a) "native mammal" means any member of any species belonging to the Class Mammalia, indigenous to the Antarctic Treaty area or occurring there naturally through migrations;
b) "native bird" means any member, at any stage of its life cycle (including eggs), of any species of the Class Aves indigenous to the Antarctic Treaty area or occurring there naturally through migrations;
c) "native plant" means any member of any species of terrestrial or freshwater vegetation, including bryophytes, lichens, fungi and algae, at any stage of its life cycle (including seeds, and other propagules), indigenous to the Antarctic Treaty area;
d) "native invertebrate" means any member of any species of terrestrial or freshwater invertebrate, at any stage of its life cycle, indigenous to the Antarctic Treaty area;
e) "appropriate authority" means any person or agency authorised by a Party to issue permits under this Annex;
f) "permit" means a formal permission in writing issued by an appropriate authority;
g) "take" or "taking" means to kill, injure, capture, handle or molest a native mammal or bird, or to remove or damage such quantities of native plants or invertebrates that their local distribution or abundance would be significantly affected;
h) "harmful interference" means:
    (i) flying or landing helicopters or other aircraft in a manner that disturbs concentrations of native birds or seals;
    (ii) using vehicles or vessels, including hovercraft and small boats, in a manner that disturbs concentrations of native birds or seals;
    (iii) using explosives or firearms in a manner that disturbs concentrations of native birds or seals;
    (iv) wilfully disturbing breeding or moulting native birds or concentrations of native birds or seals by persons on foot;
    (v) significantly damaging concentrations of native terrestrial plants by landing aircraft, driving vehicles, or walking on them, or by other means; and
    (vi) any activity that results in the significant adverse modification of habitats of any species or population of native mammal, bird, plant or invertebrate.
i) "International Convention for the Regulation of Whaling" means the Convention done at Washington on 2 December 1946.
j) "Agreement on the Conservation of Albatrosses and Petrels" means the Agreement done at Canberra on 19 June 2001.

Article 3

PROTECTION OF NATIVE FAUNA AND FLORA

1. Taking or harmful interference shall be prohibited, except in accordance with a permit.

2. Such permits shall specify the authorised activity, including when, where and by whom it is to be conducted and shall be issued only in the following circumstances

a) to provide specimens for scientific study or scientific information;
b) to provide specimens for museums, herbaria and botanical gardens, or other educational institutions or uses;
c) to provide specimens for zoological gardens but, in respect of native mammals or birds, only if such specimens cannot be obtained from existing captive collections elsewhere, or if there is a compelling conservation requirement; and
d) to provide for unavoidable consequences of scientific activities not otherwise authorised under sub-paragraphs (a), (b) or (c) above, or of the construction and operation of scientific support facilities.

3. The issue of such permits shall be limited so as to ensure that:

a) no more native mammals, birds, plants or invertebrates are taken than are strictly necessary to meet the purposes set forth in paragraph 2 above;
b) only small numbers of native mammals or birds are killed, and in no case more are killed from local populations than can, in combination with other permitted takings, normally be replaced by natural reproduction in the following season; and
c) the diversity of species, as well as the habitats essential to their existence, and the balance of the ecological systems existing within the Antarctic Treaty area are maintained.

4. Any species of native mammals, birds, plants and invertebrates listed in Appendix A to this Annex shall be designated “Specially Protected Species”, and shall be accorded special protection by the Parties.

5. Designation of a species as a Specially Protected Species shall be undertaken according to agreed procedures and criteria adopted by the ATCM.

6. The Committee shall review and provide advice on the criteria for proposing native mammals, birds, plants or invertebrates for designation as a Specially Protected Species.

7. Any Party, the Committee, the Scientific Committee on Antarctic Research or the Commission for the Conservation of Antarctic Marine Living Resources may propose a species for designation as a Specially Protected Species by submitting a proposal with justification to the ATCM.

8. A permit shall not be issued to a Specially Protected Species unless the taking:

a) is for a compelling scientific purpose; and
b) will not jeopardise the survival or recovery of that species or local population;

9. The use of lethal techniques on Specially Protected Species shall only be permitted where there is no suitable alternative technique.

10. Proposals for the designation of a species as a Specially Protected Species shall be forwarded to the Committee, the Scientific Committee on Antarctic Research and, for native mammals and birds, the Commission for the Conservation of Antarctic Marine Living Resources, and as appropriate, the Meeting of the Parties to the Agreement on the Conservation of Albatrosses and Petrels and other organisations. In formulating its advice to the ATCM on whether a species should be designated as a

Specially Protected Species, the Committee shall take into account any comments provided by the Scientific Committee on Antarctic Research, and, for native mammals and birds, the Commission for the Conservation of Antarctic Marine Living Resources, and as appropriate, the Meeting of the Parties to the Agreement on the Conservation of Albatrosses and Petrels and other organisations.

11. All taking of native mammals and birds shall be done in the manner that involves the least degree of pain and suffering practicable.

APPENDICES TO THE ANNEX

APPENDIX A: SPECIALLY PROTECTED SPECIES

Ommatophoca rossii, Ross seal.

Appendix 4. ATCM: General guidelines for visitors to the Antarctic

The General Guidelines apply to all visitors and all activities in the Antarctic Treaty area[9]. All visits to Antarctica should be conducted in accordance with the Antarctic Treaty, its Protocol on Environmental Protection, and relevant Measures, Decisions and Resolutions adopted at Antarctic Treaty Consultative Meetings (ATCM). All activities must be subject to an Environmental Impact Assessment and must have prior approval/permission or meet all the requirements of the relevant National Competent Authority.

These Guidelines provide general guidance for visiting any location, with the aim of ensuring that visits do not have adverse impacts on the Antarctic environment, including wildlife and ecosystems, or on its scientific, wilderness and aesthetic values. ATCM Site Guidelines for Visitors provide additional site-specific advice for some locations. Guidelines concerning particular risks such as aircraft use, or avoiding the introduction of non-native species may also apply.

Consult these Guidelines before you visit Antarctica and plan how to minimize your impact.
If you are part of a guided visitor group, abide by these guidelines, pay attention to your guides, and follow their instructions. If you are the organizer of your own visit or the visit of a group and respective activities, you are responsible for abiding by these guidelines. You are also responsible for identifying the features of the sites you visit that may be vulnerable to visitor impacts, and for complying with any specific requirements related to protected areas, historic sites and monuments, activities or risks. Specific requirements can be included within ATCM Site Guidelines, Antarctic Specially Protected Area (ASPA) and Antarctic Specially Managed Area (ASMA) management plans, or station visit guidelines.

PROTECT ANTARCTIC WILDLIFE

WILDLIFE

- The taking of, or harmful interference with, Antarctic wildlife is prohibited.
- When in the vicinity of wildlife – either on land or at sea, move or maneuver slowly and carefully and keep noise to a minimum.
- Maintain an appropriate distance from wildlife to avoid disturbance. While in many cases a greater distance may be necessary, in general keep at least 5 m from wildlife on land. Abide by any guidance on distances in species- or site-specific guidelines.
- Always give animals the right of way and do not block their access routes between the sea and land, nesting places or other destinations.
- Animals may alter their behavior if disturbed. Observe wildlife behaviour. If wildlife changes its behaviour (standing when it was sitting, moving its head around alerted, start vocalizing when it was silent, etc.) stop moving, or slowly increase your distance.
- Stay outside the margins of a colony and observe from a safe distance. Animals are particularly sensitive to disturbance when they are breeding (including nesting) or moulting.
- Every situation is different. Consider the topography and the individual circumstances of the site, as these may have an impact on the vulnerability of wildlife to disturbance.

[9] It is acknowledged that exceptions to the application of elements of these guidelines may be made for scientific and official governemental activities if the realization of these activities so require and if prior approval has been given by the national competent authority and the activity meets all requirements oft he relevant national authority.

- Watch your steps for eggs, chicks or nest materials of skuas, penguins or petrels.
- Unmanned aerial vehicles must not be used in the vicinity of wildlife.
- Do not feed wildlife or leave food or scraps lying around.

VEGETATION

- Vegetation, including mosses and lichens, is fragile and very slow growing. Do not walk, drive or land on any moss beds or lichen covered rocks, in order to avoid damage.
- When travelling on foot, stay on established tracks whenever possible to minimize disturbance or damage to the soil and vegetated surfaces. Where a track does not exist, choose your route carefully, taking the most direct route while avoiding vegetation, fragile terrain, scree slopes, and wildlife.

INTRODUCTION OF NON-NATIVE SPECIES AND PATHOGENS

- Do not introduce any plants or animals into the Antarctic.
- In order to prevent the introduction of non-native species and disease, carefully wash boots and clean all equipment including clothes, bags, tripods, tents and walking sticks before bringing them to Antarctica. Pay particular attention to boot treads, Velcro fastenings and pockets which could contain soil or seeds. Vehicles and aircraft should also be cleaned.
- In order to prevent the transfer of non-native species and disease between locations in Antarctica ensure all clothing, boots and equipment are cleaned thoroughly before moving between sites and regions.

RESPECT PROTECTED AREAS AND STRUCTURES

ANTARCTIC SPECIALLY MANAGED AREAS (ASMAs) AND ANTARCTIC SPECIALLY PROTECTED AREAS (ASPAs)

- Activities in ASPAs and ASMAs must comply with the provisions of the relevant Management Plan and abide by any restrictions regarding the conduct of activities in these areas.
- A permit from a National Competent Authority is required for entry into any ASPA. Carry the permit and obey any permit conditions at all times while visiting an ASPA.
- Check the locations and boundaries of ASPAs and ASMAs in advance and refer to the provisions of their Management Plans (all can be found at the Antarctic Treaty Secretariat-website (www.ats.aq).

HISTORIC SITES AND MONUMENTS (HSMs) AND OTHER STRUCTURES

- Some historic huts have been designated as ASPAs and require a permit to visit. Visits must follow the provisions laid out in the respective management plan.
- Historic huts and structures can, in some cases, be visited for touristic, recreational and educational purposes. Visitors should not use them for other purposes except in emergency circumstances.
- Do not damage, remove, destroy or change any historic site, monument, or artefact, or other building or emergency refuge (whether occupied or unoccupied).
- Consult relevant ATCM Site Guidelines for Visitors for specific rules concerning historic sites, monuments, items or buildings and other structures in the vicinity.
- Before entering any historic structure, clean your boots of snow and grit and remove snow and water from clothes, as these can cause damage to structures or artefacts.
- Take care not to tread on any artefacts which may be obscured by sediments or snow when moving around historic sites.

- If you come across an item that may be of historic value that authorities may not be aware of, do not touch or disturb it. Notify your expedition leader or NCAs.
- A list of the formally designated HSMs can be found at the ATS-Website.

RESPECT SCIENTIFIC RESEARCH

- Some Antarctic stations may accept visitors where prior arrangements have been made. Obtain permission before visiting Antarctic stations.
- Reconfirm scheduled visits well in advance, or according to guidance provided by the manager of a station before arriving.
- In addition to these general guidelines, comply with any site-specific rules or visitor guidelines in place when visiting Antarctic stations.
- Do not interfere with or remove scientific equipment or markers, and do not disturb experimental study sites, field camps or stored supplies

KEEP ANTARCTICA PRISTINE – LEAVE NO TRACE OF YOUR VISIT

WASTE

- Do not deposit any litter or garbage on land nor discard it into the sea.
- no smoking except in designated areas at stations or camps, to avoid litter and risk of fire to structures. Collect ash and litter for disposal outside Antarctica.
- Ensure that wastes are managed in accordance with Annexes III (waste disposal) and IV (marine pollution) of the Protocol on Environmental Protection to the Antarctic Treaty.
- Ensure that all belongings, equipment and waste is secured at all times in such a way as to prevent dispersal into the environment through high winds or wildlife foraging.

WILDERNESS VALUES

- Do not disturb or pollute lakes, streams, rivers or other water bodies (e.g. by walking, washing yourself or your equipment, throwing stones, etc.)
- Do not paint or engrave names or other graffiti on any man-made or natural surface in Antarctica.
- Do not take souvenirs, whether man-made, biological or geological items, including feathers, bones, eggs, vegetation, soil, rocks, meteorites or fossils.
- Place tents and equipment on snow or at previously used campsites where possible.

BE SAFE

SAFETY PRECAUTIONS/ PREPARATIONS

- Be prepared for severe and changeable weather. Ensure that your equipment and clothing meet Antarctic standards. Remember that the Antarctic environment is inhospitable, unpredictable and potentially dangerous.
- Know your capabilities, the dangers posed by the Antarctic environment, and act accordingly. Plan activities with safety in mind at all times.
- Keep a larger safety distance from potentially dangerous or territorial wildlife like fur seals, both on land and at sea. Keep at least 15-25 m away where practicable.
- Be careful where you walk as seals can lie camouflaged on and among rocks. Keep a safety distance from sea ice edge and be cautious when stepping over cracks in the sea ice.

- Skuas are very territorial birds and will attack anyone approaching their nests by plummeting down on intruders. If this happens, retreat away from the point when the attack started.
- Any wildlife, even penguins, can cause serious harm. Do not underestimate risks.

- If you are travelling in a group, act on the guidance and instructions of your leaders. Do not stray from your group as survival in Antarctica can be a matter of minutes (especially in case of acute hypothermia).
- Do not walk onto glaciers or large snow fields without proper equipment and experience. There is a real danger of falling into hidden crevasses.
- Be vigilant in the vicinity of calving glaciers. Breaking pieces of ice can generate dangerous waves.
- Pay special attention when climbing rocks and/or boulders, as melting permafrost with changing temperatures lead to an increase risk of avalanches.
- Do not expect a rescue service. Self-sufficiency is increased and risks reduced by sound planning, quality equipment, and trained personnel.
- Enter emergency refuges only in case of an actual emergency. If you use equipment or food from a refuge, inform the nearest research station or the National Competent Authority that has approved/permitted the visitors activity in Antarctica once the emergency is over.
- Respect any smoking restrictions. Use of combustion style lanterns and naked flames in or around historic structures is strictly discouraged. Take great care to safeguard against the danger of fire. This is a real hazard in the dry environment of Antarctica.

LANDING AND TRANSPORT REQUIREMENTS

TRANSPORT

- Do not use aircraft, vessels, small boats, hovercraft or other means of transport in ways that disturb wildlife, either at sea or on land.
- Avoid flying over concentrations of birds and mammals. Follow the advice in Resolution 2 (2004) *Guidelines for the operation of aircraft near concentrations of birds in Antarctica*.
- Refilling of fuel tanks for small boats should take place in a way that ensures any spills can be contained, for example onboard a vessel.
- Check small boats are free of any soil, plants or animals prior to the commencement of any ship-to-shore operations.
- Small boats must at all times regulate their course and speed so as to minimize disturbance to wildlife and to avoid any collisions with wildlife.

SHIPS[10]

- Only one ship may visit a site at any one time.
- Vessels with more than 500 passengers shall not make landings in Antarctica.

LANDING OF PASSENGERS FROM VESSELS

- A maximum of 100 passengers may be ashore from a vessel at any one time, unless site specific guidance requires fewer passengers.
- During landings from vessels, maintain a 1:20 guide to passenger ratio at all sites, unless site specific advice requires more guides.

[10] A ship is defined as a vessel which carries more than 12 passengers

Appendix 5. Territories of South Georgia and the South Sandwich Islands Wildlife and Protected Areas Ordinance 2011

(for full text see: https://www.gov.gs/docsarchive/Legislation/Wildlife%20and%20Protected%20Areas%20Ordinance%202011-1.pdf)

PART II PROTECTION OF WILDLIFE

6. Protection of wild birds and mammals

(1) Subject to this Part, and except as permitted under a permit granted under section 21(1), a person commits an offence who intentionally or recklessly —

a) kills, injures, captures, handles or molests a wild bird or mammal;
b) administers any noxious substance to a wild bird or mammal;
c) damages or destroys the breeding site or the nesting place or nest of a native bird;
d) takes, destroys or damages an egg of a native bird; or
e) disturbs a breeding or moulting wild bird, the dependent young of any native bird, mammal or a concentration of wild birds or mammals.

(2) Subject to this Part, a person commits an offence who —

a) uses a vehicle, vessel or aircraft in a manner that disturbs a concentration of wild birds or mammals, or which disturbs any marine mammal of the Order Cetacea;
b) uses firearms or explosives in a manner that disturbs any wild birds or mammals; or
c) does anything that is likely to cause significant damage to the habitat of any wild bird or mammal.

7. Supplementary to section 6
(1) Where a person is charged with an offence in respect of a contravention of section 6(1)(a) of killing, injuring or molesting a wild bird or mammal), it is a defence for him or her to show that the act in question was done for the relief of the suffering of the wild bird or mammal in question.

(2) It is a defence for a person charged with an offence under section 6(1)(a) of capturing or handling a wild bird or mammal if he or she shows that the wild bird or mammal —

a) was captured or handled by him or her for the purpose of attending to any injury or disease suffered by it and thereafter returned it to the wild without unreasonable delay; and
b) if it was injured, the injury was not caused by an unlawful act on his or her part.

(3) It is a defence for a person charged with an offence under section 6(1)(b) of administering a noxious substance to a wild bird or mammal to show that the noxious substance was reasonably used by him or her in providing treatment in relation to any injury or disease suffered by the wild bird or mammal. Protection of other native fauna

Other offences in relation to wildlife

10. Unlawful possession of live or dead wildlife
Subject to this Part and except as permitted under a permit granted under section 21(1), a person commits an offence if he or she knowingly has in his or her possession, transports, sells, exchanges or offers for sale or exchange —

(a) any live or dead wild bird, mammal, native invertebrate or native plant;

(b) any egg of a native bird; or
(c) any part of, or anything derived from, such a wild bird, mammal, native invertebrate, egg of a native bird or native plant.

Appendix 6. Government of South Georgia & the South Sandwich Islands 'Code of conduct whilst ashore' and 'Wildlife protection guidelines'

Code of Conduct Whilst Ashore

When ashore:

- Visitors must know their capabilities and also the dangers posed by South Georgia's environment, and act accordingly. Plan activities with safety in mind at all times.
- Visitors should take note of, and act on, the advice and instructions from leaders and staff. Do not stray from the group.
- Be prepared for severe and changeable weather. Ensure that equipment and clothing are of sufficient strength and quality to withstand Antarctic conditions. South Georgia's weather is unpredictable, when ashore be prepared for the worst, however pleasant it may seem when setting out.
- Do not walk on to glaciers or snowfields without proper equipment and experience. Surface conditions are constantly changing, particularly in the present period of glacial retreat.
- Avoid walking on fragile vegetation; A footprint on a moss bank may remain there a long time. Trampling of vegetation, especially in wet and peaty soils, can cause significant erosion over time. Moss beds and the margins of streams and lakes are particularly fragile.
- Do not collect anything. This includes shells, stones, plants, skulls, bones, teeth and eggs. No items or scientific specimens may be removed from South Georgia without an export permit from GSGSSI. Under the Wildlife and Protected Areas Ordinance the removal of any item without a permit is an offence.
- Be careful when taking photographs or filming. Never disturb plants or animals to get better pictures. Do not use flash photography for animal photographs. A respectful distance from wildlife should be maintained between you and the animal, including the use of 'selfie sticks' and other equipment.
- Always give wildlife the right of way (see wildlife protection guidelines).
- Firearms must not be brought into South Georgia.
- Remove all rubbish.
- Do not pollute lakes or streams.
- Do not remove, disturb or destroy any historical artefacts.
- Do not paint or engrave names or graffiti on rocks or buildings; or deface or vandalise any field huts or other structures.
- Avoid marked sites where scientific experiments are being conducted and do not disturb any scientific equipment.
- Do not smoke. Do not light camp fires.

Wildlife Protection Guidelines
It is the responsibility of everyone to minimise their personal impact on the environment by observing the following guidelines. The guidelines are legally enforced through the Wildlife and Protected Areas Ordinance (2011, as amended). In addition, IAATO staff must ensure that IAATO codes of conduct are adhered to.

- Do not disturb mammals or birds and always maintain a respectful distance.
- Do not use vessels, small boats, or other means of transport in ways that disturb wildlife, whether at sea or on land.
- Stay on the edge of animal groups, approaching slowly and quietly. Do not use flash photography. Avoid surrounding the groups. Back-off immediately if mammals or birds show any sign of being disturbed. If animals are responding to your presence, you are too close.
- Never disturb territorial seals, or seals in breeding colonies to affect a landing, or cause disturbance by cruising offshore in close proximity.
- Do not offer food to any animal. This avoids animals becoming dependent on un-natural food sources, prevents the spread of avian diseases and protects visitors from potential injury.
- Rigorously adhere to biosecurity measures (see separate Biosecurity Handbook).
- Be alert whilst ashore, particularly in tussac grass. Take care to avoid stumbling inadvertently upon a fur seal or a nesting bird, or causing damage to seabird burrows, both in tussac and on scree. Return to the shore if a high density of burrows is encountered.
- Do not touch animals. This may cause substantial stress and disturbance, and may jeopardize the bond between parent and offspring and lead to an aggressive response from the animal.
- The use of Unmanned Aerial Vehicles (UAVs), (also known as drones and quadcopters) for recreational purposes is not permitted. UAVs can only be operated, if permitted in advance by GSGSSI (Regulated Activity Permit for approved use in support of either science or media).

The Wildlife and Protected Areas Ordinance (2011) is available online at www.gov.gs. Failure to comply with Wildlife Protection Guidelines and Biosecurity Protocols could result in prosecution for the individual(s) involved.

It is important that we collect accurate and complete data on bird strike incidences. This information is used to will help us better understand the issue and to develop appropriate mitigation measures. All bird strikes (including birds released unharmed) must be recorded and reported in the GSGSSI Bird strike report form and emailed to the Government Officers whenever a bird strike occurs.

Appendix 7. Antarctic Treaty Consultative Meeting 'Guidelines for the operation of aircraft near concentrations of birds in Antarctica'. Annex to Resolution 2 (2004)

Fixed and rotary wing aircraft operations have the potential to cause disturbance leading to changes in the behaviour, physiology and the breeding success of wildlife. The level of impact will vary according to the intensity, duration and frequency of disturbance, the species involved and the phase in their breeding season. Most species are particularly sensitive to disturbance between late September and early May-the period when Antarctic helicopter and fixed wing operations usually occur.

There are many variables affecting noise levels received on the ground during aircraft operations, including: flight height; the type of aircraft and engine; the flight profile; the weather; and the geography of the location. Pilots have to make the final judgment regarding aircraft operations based on the aircraft type, task and safety considerations. Such judgments should also pay due consideration to potential wildlife impacts, noting that Annex II of the Protocol on Environmental Protection to the Antarctic Treaty defines that "harmful interference" means flying or landing helicopters or other aircraft in a manner that disturbs concentrations of birds and seals".

Minimum recommended separation distances for aircraft operations close to concentrations of birds are set out below. These recommended distances should be maintained to the greatest extent possible, unless greater separation distances are specified for the area of operation, for example by an ASPA or ASMA management plan or guidelines already developed by national operators to suit their own particular needs and circumstances. These distances are only a guide and if wildlife disturbance is observed at any separation distance, a greater distance should be maintained wherever practical:

- Penguin, albatross and other bird colonies are not to be over flown below 2000ft (~ 610 m) Above Ground Level, except when operationally necessary for scientific purposes.
- Landings within 1/2 nautical mile (~ 930 m) of penguin, albatross or other bird colonies should be avoided wherever possible.
- Never hover or make repeated passes over wildlife concentrations or fly lower than necessary.
- Maintain a vertical separation distance of 2000 ft (~ 610 m) AGL and a horizontal separation of 1/4 nautical mile (~ 460 m) from the coastline where possible.
- Cross the coastline at right angles and above 2000ft (~610 m) AGL where possible.

Location of aircraft operations (other considerations)

- Where practical, avoid overflying concentrations of birds.
- Be aware that concentrations of birds are most often found in coastal areas. Snow petrel and Antarctic petrel colonies are also frequently found inland on nunataks. Minimum vertical separation distances should be maintained in these areas.
- Where practical, landings near to concentrations of birds should be downwind and/or behind a prominent physical barrier (e.g. hill) to minimise disturbance.

- Avoid Antarctic Specially Protected Areas, unless authorised to over-fly and/or land by a permit issued by an appropriate national authority. For many ASPAs there are specific controls on aircraft operations, which are set out in the relevant Management Plans.
- Follow aircraft flight heights, preferred flight paths and approach paths contained in the Antarctic Flight Information Manual (AFIM), in station aircraft operation manuals and on relevant charts, maps and any Wildlife and Low Flying Avoidance Maps for the major airstrips in the Antarctic (e.g. Marsh, Marambio, Rothera, McMurdo).
- Particularly avoid flying toward concentrations of birds immediately after take-off and avoid steep banking turns in flight as these significantly increase the amount of noise generated.

Timing of aircraft operations

- Most native bird species breed at coastal locations in Antarctica between September and May each season. During the planning of aircraft operations near to concentrations of birds, consideration should be given to undertaking flying activities outside of the main breeding and/or moulting periods.
- Where aircraft operations are necessary close to concentrations of birds, then the duration of flights should be the minimum necessary.
- To minimise bird strikes, especially in coastal areas, avoid flying after dark between September and May. At this time of year, prions and petrels are active. These birds are nocturnal when breeding and are attracted by lights.
- Aircraft operations should be delayed or cancelled if weather conditions (e.g. cloud base, winds) are such that the suggested minimum vertical and horizontal separation distances given in these guidelines cannot be maintained.

Appendix 8. Environmental Guidelines for operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica. Annex to Resolution 4 (2018)

Introduction

Deployment of Remotely Piloted Aircraft Systems (RPAS) can, in some circumstances, reduce or avoid environmental impacts that might otherwise occur. Their use may also be safer and require less logistical support than other means of deployment for the same purpose.

These Environmental Guidelines for operation of RPAS in Antarctica aim to assist implementation of Environmental Impact Assessment (EIA) requirements and aid decision-making for use of RPAS through provision of guidance based on current best available knowledge.

System failures and/or RPA loss in Antarctica may release waste into the environment. The short and long-term impacts of RPAS, including of noise and visual intrusion on Antarctic wildlife, are presently not well understood, and there remain uncertainties about the extent to which RPAS have the potential to cause environmental impacts. As such, there is a recommendation to proceed with a precautionary approach to use of RPAS in Antarctica at the same time as seeking to maximise the many potential scientific, logistic and other benefits of RPAS technology.
It is recognised that in some cases it may be desirable deliberately to operate close to fauna or flora to meet specific scientific or other objectives that have been assessed in the EIA or permitting process. Scientific understanding of the impacts of RPAS on Antarctic wildlife is currently not well developed, with limited knowledge of physiological or long-term demographic effects. Species vary widely in the extent to which they appear to be affected by RPAS operations, and this may also vary by many other factors such as breeding stage, local conditions, etc. Behavioural displays, or their lack, are not necessarily clear indicators of the level of disturbance occurring to wildlife. RPAS operations over or near wildlife should be sufficiently justified taking into account potential for disturbance through the EIA or permitting process.

Guidelines to address aspects of RPAS in Antarctica are available from the Council of Managers of National Antarctic Programs (COMNAP), and a number of competent authorities have also prepared practical manuals for RPAS use within national programmes. RPAS users are referred to these guidelines for essential additional information, particularly related to operational and safety aspects (see Appendix 1).

Pre-deployment Planning and Environmental Impact Assessment (EIA)

1 Requirements of the Madrid Protocol and its Annexes

1.1 Any proposed activities undertaken in the Antarctic Treaty area shall be subject to the procedures set out in Annex I of the Madrid Protocol for prior assessment of the impacts of those activities on the Antarctic environment.
1.2 Flying or landing an aircraft in a manner that disturbs concentrations of birds and seals is prohibited in Antarctica, except in accordance with a permit issued by an appropriate authority under Annex II to the Madrid Protocol.
1.3 Removal of wastes from Antarctica, including electrical batteries, fuels, plastics, etc. is required by Annex III5, which should be considered in contingency plans for lost or damaged RPAS as part of the Environmental Impact Assessment (EIA).
1.4 A permit issued by an appropriate national authority is required to enter an Antarctic Specially

Protected Area (ASPA)6, and special requirements to operate RPAS may apply within an ASPA or an Antarctic Specially Managed Area (ASMA): any planned RPAS operation within ASPAs or ASMAs, including any overflight of these areas, must be in accordance with the respective ASPA or ASMA Management Plan.

2 General considerations

2.1 When planning RPAS use in Antarctica, the current approved versions of the documents listed in Appendix 1, which include, inter alia, recommendations, guidelines, Codes of Conduct and manuals prepared by the Antarctic Treaty Parties, SCAR and COMNAP and also recent published scientific papers such as those listed in Appendix 2 may be helpful additional considerations to these guidelines.

2.2 Consider the relative environmental advantages and disadvantages of RPAS and other alternatives, and consider the environmental characteristics of the RPAS and the values present at the proposed location(s) of operation, weighing up both the benefits and environmental impacts of RPAS use.

2.3 Undertake detailed pre-flight planning, including thoroughly assessing the particularities of the operational site in advance of deployment, to ensure an appropriate understanding of its topography, weather and any hazards that may impact upon an environmentally sound operation. Where possible, carry out simulated flights using software tools.

2.4 Map out flight plans, prepare contingency plans for incidents or malfunctions, including alternative landing sites and plans for RPA retrieval should there be a crash.

2.5 Assess the particularities and dynamics of the values that could be affected at the site, including the species of fauna and flora present, their numbers and/or extent, and where they are located to assess their concentrations, as part of the environmental impact assessment process and mission planning. Where appropriate, adjust flight plans, including the timing of the mission to avoid sensitive breeding periods (including for all species that may be present in addition to any study species), so that potential disturbance is minimised.

2.6 Identify any specially protected sites (eg, ASPAs, ASMAs, Historic Sites and Monuments (HSMs) and any special zones within these areas), or sites subject to Antarctic Treaty Visitor Site Guidelines, in the vicinity of planned RPAS operations and ensure any overflight restrictions specified in their management plans or site guidelines are followed.

2.7 Consider options and contingencies carefully in the EIA before planning to operate in and over potentially environmentally sensitive areas (eg, wildlife colony, or extensive vegetation cover that could be impacted by trampling), or where retrieval of a lost RPA would be difficult or impossible, while recognising that such areas may also be of particular interest for RPAS surveys.

2.8 If you plan to operate RPAS from boats or ships, be aware of elevated risks of collisions with flying birds that often follow ships.

2.9 Where multiple RPAS operations are anticipated to occur in the same area or repeatedly over time, consider in the EIA the potential for cumulative environmental impacts.

3 RPAS Characteristics

3.1 Carefully select the type of RPAS and sensors that will be most appropriate for fulfilling the objectives of planned air operations and where possible use Best Available Technology to minimise environmental impacts. Carry out test flights outside Antarctica to verify your choice (eg, testing sensor capabilities at different flight altitudes, and where practicable selecting sensors or lenses that allow greater separation distances from wildlife).

3.2 Consider selecting RPA models with the lowest practicable noise levels, and models with non-

threatening shapes, sizes and/or colours, for example that do not closely resemble aerial predators likely to be present at the site of operation to minimise stress on prey species and/or attacks by territorial species.
3.3 Ensure the RPAS is well-maintained and operates reliably before deployment to reduce risk of failure and loss. The use of RPAS equipped with a Return To Home (RTH) feature is recommended. Ensure sufficient power or fuel to accomplish missions. For electric RPAS closely monitor battery capacity and performance, which varies with conditions. For combustion RPAS, check there are no fuel leaks, that fuel caps are secure, use best practice when handling fuel and refuelling and ensure that fuel spillage counter-measures are in place.
3.4 To reduce the risk of non-native species introductions, ensure that the RPAS and all associated equipment and carrying cases are clean and free of soil, vegetation, seeds, propagules or invertebrates prior to shipment to Antarctica. To reduce the risk of species transfer within Antarctica, carefully clean RPAS and associated equipment after use and prior to use at another site.

4 Operator Characteristics
4.1 RPAS pilots should be well-trained and experienced before undertaking operations on-site in Antarctica.
4.2 Before operating in Antarctica, RPAS test flights should be undertaken in a variety of conditions by the pilot that will be operating in Antarctica with the specific type, model and payload of RPAS that will be deployed.
4.3 RPAS operations should comprise a pilot and, as appropriate, at least one observer. Pilots should have good knowledge of the environmental requirements as listed in Section 1, and all aspects of the planned site of operations before deployment to the field, including site sensitivities and potential hazards.

On-site and In-flight Operations
5 General considerations
5.1 Pilots and any designated observers should operate within Visual Line Of Sight (VLOS) with the RPA at all times, unless the operation is approved by a competent authority to operate "Beyond Visual Line Of Sight (BVLOS)".
5.2 Pilots and any designated observers should be vigilant during operations and maintain good communications with each other throughout operations, watching for wildlife moving into the area of operations.
5.3 Complete flight operations with number and duration of flights as practicable, while still achieving mission objectives.

6 Operations over or near wildlife
6.1 Select RPAS launch/landing site(s) carefully, considering topography and other factors (eg, prevailing wind direction) that may influence selection of the optimal distance from wildlife. Where practicable, consider locating RPAS launch/landing sites out of sight (bearing in mind any requirements to operate within VLOS) and downwind from concentrations of wildlife, and as far away from wildlife as possible.
6.2 Consider the noise level emitted by the RPA during launch and flight to inform decisions about the location of launch/landing site and flight altitude, taking into account the influence of wind conditions on noise at ground level.

6.3 Where practicable, consider attaining flight altitude while avoiding unnecessary overflight of wildlife.
6.4 Where practicable, consider operating RPAS at times of the day or year when the risk of disturbance to species present is minimised.
6.5 During VLOS operations, pilots and any designated observers should be aware of and monitor the proximity and behaviour of predators that could attack animals or their young within the area of RPAS operations, or attack the RPA to present significant risk of collision. Should proximity of predators be observed and if their behaviour is observed to exceed levels of disturbance deemed acceptable in approvals for the activity, RPAS operations should be modified or ceased.
6.6 To the extent practicable, consider avoiding unnecessary or sudden RPA manoeuvres over wildlife, or flying RPA directly at or from above wildlife, and if possible fly in a grid flight pattern while still achieving mission objectives.
6.7 Fly as high as practicable and not lower than necessary when operating near or over wildlife. Where operation of RPA near wildlife is necessary, exercise minimum wildlife disturbance flight practices, maintaining a precautionary distance from wildlife at all times during flight which ensures that no visible disturbance occurs. Wildlife reactions to RPA vary extensively, for example depending on the species, their breeding status, the flight altitude and whether flight approaches are either horizontal or vertical.
Where multiple species are present, follow the most precautionary approach and if wildlife disturbance is observed at any separation distance, a greater distance should be maintained.

6.8 Pilots and any designated observers should operate with special care near cliffs where birds may be nesting, and where practicable maintain the horizontal separation distance. During VLOS operations, pilots and any designated observers should watch for, and inform each other of, signs of wildlife disturbance. They should be mindful that outward behavioural displays may not be a good indicator of the actual level of stress being experienced by wildlife, which should also be taken into account in the EIA and planning phase. Should wildlife disturbance be observed to exceed levels deemed acceptable in approvals for the activity, pilots should adopt a precautionary approach by considering increasing RPA distances from animals if safe to do so, and considering ceasing operations if disturbance persists.
6.9 When BVLOS operations over or near wildlife concentrations are planned, consider the practicality of placing an observer nearby to note potential behavioural changes and inform the pilot.

7 Operations over terrestrial & freshwater ecosystems
7.1 Pilots and observers should take care to minimise disturbance to sensitive geological or geomorphological features (eg, geothermal environments, fragile surface features such as crusts or sedimentary deposits), soils, rivers, lakes and vegetation in the area of RPAS operations, and conduct their activities, including walking over the site, so as to avoid sensitive sites to the maximum extent practicable.
7.2 Should it be necessary to make an unplanned landing and/or retrieve an RPA from an unfamiliar area, the pilot and/or observer should be especially careful to minimise disturbance to site features that may be sensitive, such as wildlife, vegetation or soils.

8 Human considerations
8.1 To the extent practicable, avoid operating RPAS over Historic Sites or Monuments (HSMs) to minimise the risk of RPA loss at these sites. Should retrieval of a failed RPA within an HSM be

necessary, notify the appropriate authority and receive advice before undertaking any action.
8.2 RPAS operators should be aware that many people value Antarctica for its remoteness, isolation and aesthetic and wilderness values. Respect the rights of others to experience and appreciate these values, and where practicable adjust flight operations (eg, timing, duration, distance) to avoid or minimise intrusion.

Post-flight Actions and Reporting

9 Actions

9.1 In the event of an unplanned forced landing or crash, and mindful of the obligations for removal of waste from Antarctica in accordance with the Madrid Protocol (see Item 1.3), retrieve the RPA if:

- It is safe to do so;
- There is a risk that human life, wildlife or important environmental values are endangered, in which case notify the competent authority and as appropriate emergency procedures should be taken to neutralise the risk;
- The environmental impact of removal is not likely to be greater than that of leaving the RPA in situ;
- The RPA does not lie within an ASPA for which you do not have a Permit for entry, unless the RPA poses a significant threat to the values of the ASPA in which case notify the competent authority and as appropriate emergency procedures should be taken to neutralise the risk.

9.2 If a lost RPA cannot be retrieved, notify the competent authority, providing details of the last known position (GPS coordinates) and the potential for any environmental impacts.

10 Reporting and updating these Guidelines

10.1 Observe and record animal reactions before, during and after RPAS flights, preferably by a dedicated observer rather than the pilot who should be principally focused on RPA systems and control.

10.2 Post-activity reporting should be completed in accordance with the EIA and/or permitting associated with the activity. Consider including details of any environmental impacts and consider how such impacts may be avoided in the future. Where practicable, consider using a standard format to report this information (eg, see forms provided in the COMNAP RPAS Operator's Handbook), and consider making the information accessible in order to improve RPAS environmental best practices in the future.

10.3 RPAS operators are encouraged to carry out further research into the environmental impacts of RPAS to help minimise uncertainties, undertake regular reviews of the research, and publish observations in the literature to help refine and improve these Best Practice Environmental Guidelines for the operation of RPAS in Antarctica.

Appendix 1: Selected technical documents relevant to environmental guidelines for Remotely Piloted Aircraft Systems (RPAS) in Antarctica

- Antarctic Treaty Parties, Resolution 2 (2004) Guidelines for the Operation of Aircraft Near Concentrations of Birds in Antarctica.
- Antarctic Treaty Parties, Committee for Environmental Protection Non-Native Species Manual (Version 2017).
- COMNAP (Council of Managers of National Antarctic Programs) 2017. Antarctic Remotely Piloted Aircraft Systems (RPAS) Operator's Handbook. Version 7, 27 November 2017.
- IAATO (International Association of Antarctica Tour Operators) 2016. IAATO Policies on the use of Unmanned Aerial Vehicles (UAVs) in Antarctica: update for the 2016/17 season. Information Paper

120, XXXVIII ATCM held in Santiago, Chile, 23 May – 01 Jun 2016.
- ICAO (International Civil Aviation Organisation) 2015. Manual on Remotely Piloted Aircraft Systems (RPAS) First Edition. International Civil Aviation Organization Document 10019. Montréal, Canada.
- SCAR Code of Conduct for Terrestrial Scientific Field Research in Antarctica (2009).
- SCAR Code of Conduct for Activity within Terrestrial Geothermal Environments in Antarctica (2016).

Appendix 5
PREVIOUSLY APPROVED PEAs

Intended for
British Antarctic Survey (BAS)

Document type
Report

Date
August 2023

BRITISH ANTARCTIC SURVEY
AIMP (2023-2024) COMBINED PRELIMINARY ENVIRONMENTAL ASSESSMENT (PEA)

RAMBOLL Bright ideas. Sustainable change.

British Antarctic Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

BRITISH ANTARCTIC SURVEY
AIMP (2023 – 2024) COMBINED PRELIMINARY ENVIRONMENTAL ASSESSMENT (PEA)

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INTRODUCTION

The completion of an Environmental Impact Assessment (EIA) is a requirement of the Protocol on Environmental Protection to the Antarctic Treaty (1991)[1], the provisions of the Antarctic Act (1994, 2013)[2], and accompanying Antarctic Regulations 1995/490[3]. The minimum level of EIA required is the completion of a Preliminary Environmental Assessment (PEA). This document is a combined PEA for the Antarctic Infrastructure Modernisation Project (AIMP) 2023 to 2024 Season.

The combined PEA for AIMP 2023-2024 Season is derived from the PEA and specialist activity permit application forms for projects taking place within the Antarctic Treaty area, which encompasses the area south of latitude 60°S. The purpose of the combined PEA is to assess the environmental impact of activities in the Antarctic Treaty Area and to identify the need for and apply for any Specialist Activities Permits required. The projects included in this combined PEA are as follows:

- Rothera Temporary Wharf Projects – Mooring Weights;
- Rothera Temporary Wharf Projects – Cast Hydrolysis Resistant Polyurethane (C-HPU) Hydraulic Lines Removal;
- California Bearing Ratio (CBR) Measurements of the Runway at Rothera;
- CBR Measurements at Sky Blu;
- Runway Friction Testing at Rothera;
- Friction Testing at Sky Blu; and
- AIMP RUNSUR – Runway resurfacing works in the 2023- 2024 Season at Rothera.

Privacy Notice: The British Antarctic Survey (BAS), a constituent organisation of the Natural Environment Research Council (NERC), will retain the personal data provided as confirmation of agreement with the conditions in this PEA and Specialist Activity Permit Application Form. A copy of the completed form may be circulated to all or any of the named participants, internally to BAS colleagues and to the Foreign and Commonwealth Development Office (FCDO)/or other relevant permitting authority in accordance with the guidelines set out in the Antarctic Act, 1994 & 2013. No personal data will be supplied to any other third party without consent. The personal data on this form and all other information provided will be retained for long-term environmental monitoring purposes.

[1] BAS, 1991. Protocol on Environmental Protection to the Antarctic Treaty (1991). [Online] Available at: https://www.bas.ac.uk/about/antarctica/the-antarctic-treaty/environmental-protocol/protocol-on-environmental-protection-to-the-antarctic-treaty-1991/

[2] Legislation.gov.uk, 1994. Antarctic Act 1994. [Online] Available at: https://www.legislation.gov.uk/ukpga/1994/15

[3] Legislation.gov.uk, 1995. The Antarctic Regulations 1995. [Online] Available at: https://www.legislation.gov.uk/uksi/1995/490/made

1. PROJECT DESCRIPTION

This section sets out the details, including location and the personnel involved, of each of the projects included in this combined PEA.

1.1 Rothera Temporary Wharf Projects – Mooring Weights

1. OSPQ number *(where applicable[1]/ known)*		**2. Title of Project**	Rothera Temporary Wharf Projects – Mooring Weights
3. Personnel involved. *Please provide names, organisation and job titles of all personnel involved and identify their specific project role e.g., Principal Investigator/Project Lead, Field Leader, external collaborators/contractors etc.*			

4. Location Name each location to be visited with a description of the area, and state whether the site has been visited before.		
Location Name *(including depot sites)*	**Location Description** *(e.g. coastal, ice-free, glacier, open ocean etc.)*	**Has the location been visited previously?** *Please provide detail.*
Rothera Wharf	East, West and South face of Rothera wharf	Yes

5. Please provide a brief description of your project including:
1. *Proposed dates and duration of your project;*
The project will be undertaken during the 2023 to 2024 season.
2. *Summary of the main aims (scientific of otherwise) of your project;*
The aim is to install six weighted mooring lines on the East, South and West face of the Rothera Wharf (two weights at each site). These are intended to be used as a means of securing small boats to the wharf during the process of deploying and retrieving, to increase safety during this process. Currently, small boats attach to a steel wire running along the wharf which is bolted in under the top of the capping beam and ends about 1 foot above the water line. This causes issues as the angle is too steep at low water and there is rubbing, eating through the boat mooring lines. These were created as a short-term fix by a previous boating officer with rigging experience but are not fit for purpose.
3. *Outline of project plan (e.g., referring to locations as above, route and mode of travel, number of persons and time spent at each location);*
This project will reinstate a trusted methodology previously used to moor small boats on the old Biscoe Wharf.
4. *Details of methodology (including equipment required); and*
The mooring weights were cast in the 2021-22 season and consist of a cut drum (approximately 1 foot high), filled with concrete. Mooring weights left over from the Biscoe Wharf (four no., still in good condition) will also be used as part of this project, to minimise the need for additional concreting. Rebars have been encased in the concrete to provide an attachment point. A thick metal wire will be installed on the attachment point. This will provide the mooring line, running along the wharf, allowing boats to clip in. The top of the mooring line will be attached to existing structures on the wharf, either side of the pilot ladders., but not infringing on the use of the ladders. The installation of the concrete mooring weights will require support from the garage for securing to the wharf as well as lowering. The intent is to leave the weights permanently deployed. The weights will sit on the seabed. Boating support might be required to check whether the deployment was successful and fulfils its purpose.

5. *Brief justification of the environmental impact, as applicable*
No environmental impacts identified. The potential for marine entanglement has been considered and deemed of very low likelihood at this location. The main justification of this project is for safety reasons. The safe launching and landing of boats is essential for: - Safety cover for aircraft activities - Transport of scientists to local islands and for marine science support (diving etc.)

1.2 Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal

1. OSPQ number *(where applicable[1]/ known)*		**2. Title of Project**	Rothera Temporary Wharf Projects – Cast Hydrolysis Resistant Polyurethane (C-HPU) Hydraulic Lines Removal

3. Personnel involved. *Please provide names, organisation and job titles of all personnel involved and identify their specific project role e.g., Principal Investigator/Project Lead, Field Leader, external collaborators/contractors etc.*		
Full Name	**Organisation and Job Title**	**Project Role**

4. Location

Name each location to be visited with a description of the area, and state whether the site has been visited before.

Location Name *(including depot sites)*	**Location Description** *(e.g. coastal, ice-free, glacier, open ocean etc.)*	**Has the location been visited previously?** *Please provide detail.*
Rothera Wharf	Wharf edge	Yes – C-HPU installed previously by BAS

5. Please provide a brief description of your project including:

1) *Proposed dates and duration of your project;*

01/12/2023, One day duration. Remove old hydraulic lines from capping beam – fixed hydraulic pipes run North – South along the capping beams edge. These connect the Wharf Crane to the hydraulic power unit however they have not been operational for two years. During 2022/23 snow clearing they were hit and damaged, a small amount of oil (3L) was lost, and the decision was made to remove them.

2) *Summary of the main aims (scientific of otherwise) of your project;*

The aim is to remove the lines completely to avoid further oil spill and damage. They will be removed and then disposed of in line with the BAS waste management plan.

3) *Outline of project plan (e.g., referring to locations as above, route and mode of travel, number of persons and time spent at each location);*

Fixed lines will be removed from the Wharf capping beam the ends will be wrapped up with spill kits and zip bags to prevent oil loss on the wharf, they will then be transported to the garage and disposed of. Three people will be involved in this process. It is estimated the job should take around 2-3 hours maximum.

4) *Details of methodology (including equipment required); and*

Fixed lines are connected to the capping beam with 13 mm bolts, once these bolts have been removed the hydraulic lines can be removed. Depending on the lengths identified at the time of dismantling and removal, they may need to be disconnected at unions to make them smaller and manageable. The fixed lines have already been decommissioned, where lines are disconnected they will be sealed (using spill kit and zip bags as above), removed, and then disposed of in line with the BAS waste management plan.

5) *Brief justification of the environmental impact, as applicable*

Removing the lines in the proper manner reduces future risk of environmental impact caused by accidental collision. The methodology outlined is not considered to result in an environmental impact during removal.

1.3 CBR Measurements of the Runway at Rothera

1. OSPQ number *(where applicable[1]/ known)*		**2. Title of Project**	CBR Measurements of the Runway at Rothera

3. Personnel involved. *Please provide names, organisation and job titles of all personnel involved and identify their specific project role e.g., Principal Investigator/Project Lead, Field Leader, external collaborators/contractors etc.*

Full Name	Organisation and Job Title	Project Role

4. Location

Name each location to be visited with a description of the area, and state whether the site has been visited before.

Location Name *(including depot sites)*	Location Description *(e.g. coastal, ice-free, glacier, open ocean etc.)*	Has the location been visited previously? *Please provide detail.*
Rothera	900m gravel runway used for aircraft movements on wheels.	Yes. The runway was constructed in 1990 - 1991 and has been used continuously since then.

5. Please provide a brief description of your project including:

1. *Proposed dates and duration of your project*

The project will be undertaken during the 2023 to 2024 season, between October 2023 and May 2024.

2. *Summary of the main aims (scientific of otherwise) of your project*

The aim is to understand the CBR of the runway. The CBR is required to ensure that the Rothera runway meets the Future Aircraft Capability (FAC) DHC-8 minimum requirement of 30.

3. *Outline of project plan (e.g., referring to locations as above, route and mode of travel, number of persons and time spent at each location);*

BAS will want to undertake CBR measurements in future seasons. This will enable BAS to ensure the bearing strength of the runway remains consistent and doesn't change because of the AIMP Runway Resurfacing project. The CBR test is a completely non-destructive test and uses a force pushing a plate onto the runway.

4. *Details of methodology (including equipment required); and*

Each CBR test will take approximately 10 minutes and there will be a grid of up to 100 points during the testing process to provide full coverage of the length and width of the runway. The tests will be carried out at strategic points of the season to determine hardness at various points of the season (early season; melt; mid-season; onset of winter).

The device BAS will use is a Boeing high load penetrometer, which BAS has purchased. The penetrometer is a hand-operated, hydraulic pump connected to a shaft which drives a cone onto the runway surface. The hydraulic pressure on the gauge is considered to equate to the load-bearing strength of the runway surface. The penetrometer requires a reactionary force (i.e., something the push against) in order to provide CBR readings, the intention is to use the Volvo L180H wheeled loader.

During testing the vehicle will not be in motion and is present as a weight to push against, the Volvo will be moved to each testing location after the test is completed, around 10 minutes.

5. *Brief justification of the environmental impact, as applicable.*

The potential for oil leaks to occur from the wheeled loader could occur, although these are managed through appropriate spill response management and mitigation as identified in the Environmental Impact Matrix (Section 5).

1.4 CBR Measurements at Sky Blu

1. OSPQ number *(where applicable[1]/ known)*		**2. Title of Project**	CBR Measurements at Sky Blu

3. Personnel involved. *Please provide names, organisation and job titles of all personnel involved and identify their specific project role e.g., Principal Investigator/Project Lead, Field Leader, external collaborators/contractors etc.*

Full Name	Organisation and Job Title	Project Role

4. Location

Name each location to be visited with a description of the area, and state whether the site has been visited before.

Location Name *(including depot sites)*	Location Description *(e.g. coastal, ice-free, glacier, open ocean etc.)*	Has the location been visited previously? *Please provide detail.*
Sky Blu	Blue ice runway used for aircraft movements on wheels.	Yes, extensively used by aircraft

5. Please provide a brief description of your project including:

4. *Proposed dates and duration of your project;*

The tests will occur between October 2023 and March 2024.

5. *Summary of the main aims (scientific of otherwise) of your project;*

The main aim is to understand the CBR of the runway.

6. *Outline of project plan (e.g., referring to locations as above, route and mode of travel, number of persons and time spent at each location);*

The CBR is required to ensure that the Sky Blu runway meets the FAC DHC-8 minimum requirement of 30.

7. *Details of methodology (including equipment required); and*

Each CBR test will take approximately 10 minutes and there will be a grid of up to 100 points during the testing process to provide full coverage of the length and width of the Sky Blu runway. The tests will be carried out at strategic points of the season to determine hardness at various points of the season (early season; mid-season; end of season Sky Blu season).

The device BAS will use is a Boeing high load penetrometer, which BAS has purchased. The penetrometer is a hand-operated, hydraulic pump connected to a shaft which drives a cone onto the runway surface. The hydraulic pressure on the gauge is considered to equate to the load-bearing strength of the runway surface. The penetrometer requires a reactionary force (i.e., something the push against) in order to provide CBR readings, the intention is to use the CAT 247B.

During testing the vehicle will not be in motion and is present as a weight to push against, the CAT will be moved to each testing location after the test is completed, around 10 minutes.

8. *Brief justification of the environmental impact, as applicable*

The potential for oil leaks to occur from the wheeled loader could occur, although these are managed through appropriate spill response management and mitigation as identified in the Environmental Impact Matrix (Section 5).

1.5 Friction Testing at Rothera

1. OSPQ number *(where applicable[1]/ known)*		**2. Title of Project**	Friction Testing at Rothera

3. Personnel involved. *Please provide names, organisation and job titles of all personnel involved and identify their specific project role e.g., Principal Investigator/Project Lead, Field Leader, external collaborators/contractors etc.*		
Full Name	**Organisation and Job Title**	**Project Role**

4. Location Name each location to be visited with a description of the area, and state whether the site has been visited before.		
Location Name *(including depot sites)*	**Location Description** *(e.g. coastal, ice-free, glacier, open ocean etc.)*	**Has the location been visited previously?** *Please provide detail.*
Rothera	900m gravel runway used for aircraft movements on wheels.	Yes. The runway was constructed in 1990 – 1991 and has been used continuously since then.

5. Please provide a brief description of your project including:
1. *Proposed dates and duration of your project;*
The friction tests will occur between October 2023 and May 2024
2. *Summary of the main aims (scientific of otherwise) of your project;*
The aim of the project is to undertake friction measurements at Rothera to help assess Dash 8 aircraft performance at Rothera at various points throughout the season.
3. *Outline of project plan (e.g., referring to locations as above, route and mode of travel, number of persons and time spent at each location);*
The tests will be carried out at strategic points of the season to determine friction at various points of the season (early season; melt; mid-season; onset of winter)
4. *Details of methodology (including equipment required); and*
The friction tests are undertaken by driving a quad bike up to 40km/hour and then braking and locking the vehicle until it is in a skid (a risk assessment and procedure has been written specifically for this activity). The equipment on-board (small handheld device) fixed to the quad bike will then record average friction measurements at various locations along the runway. The friction measurements will be taken at various points in the season to determine early season, melt and mid-season, end of season surface coverage. Each series of friction test will take approximately 10 minutes and there will be a grid of up to 100 points during the testing process. Each run of friction tests could take a couple of hours as various points / skids will occur on the runway. The tests will be carried out at strategic points of the season to determine hardness at various points of the season (early season; melt; mid-season; onset of winter).
5. *Brief justification of the environmental impact, as applicable*
No environmental impacts identified. However, should any fluid leaks occur during testing, spill kits will be used from the nearest location such as vehicles or the Hangar.

1.6 Friction Testing at Sky Blu

1. OSPQ number *(where applicable[1]/ known)*		**2. Title of Project**	Friction Testing at Sky Blu

3. Personnel involved. *Please provide names, organisation and job titles of all personnel involved and identify their specific project role e.g., Principal Investigator/Project Lead, Field Leader, external collaborators/contractors etc.*		
Full Name	**Organisation and Job Title**	**Project Role**

4. Location Name each location to be visited with a description of the area, and state whether the site has been visited before.		
Location Name *(including depot sites)*	**Location Description** *(e.g. coastal, ice-free, glacier, open ocean etc.)*	**Has the location been visited previously?** *Please provide detail.*
Sky Blu	Blue ice runway used for aircraft movements on wheels.	Yes, extensively used by aircraft

5. Please provide a brief description of your project including:
1. *Proposed dates and duration of your project;*
The friction tests will occur between October 2023 and March 2024.
2. *Summary of the main aims (scientific of otherwise) of your project;*
The aim of the project is to undertake friction measurements at Sky Blu to assess when/ whether the Dash 8 aircraft can be used at Sky Blu along with whether BAS needs to adapt the way they operate at Sky Blu. For example, actively improving friction on the runway through means of driving vehicles and creating friction (as per Troll method).
3. *Outline of project plan (e.g., referring to locations as above, route and mode of travel, number of persons and time spent at each location);*
The tests will be carried out at strategic points of the season to determine friction at various points of the season (early season; mid-season; end of Sky Blu season)
4. *Details of methodology (including equipment required); and*
The friction tests are undertaken by driving a quad bike up to 40km/hour and then braking and locking the vehicle until it is in a skid (a risk assessment and procedure has been written specifically for this activity). The equipment on-board (small handheld device) fixed to the quad bike will then record average friction measurements at various locations along the runway. The friction measurements will be taken at various points in the season to determine early season, melt and mid-season, end of season surface coverage. Each series of friction test will take approx. 10 mins and there will be a grid of up to 100 points during the testing process. Each run of friction tests could take a couple of hours as various points / skids will occur on the runway. The friction measurements will be taken at various points in the season to ascertain whether the friction at Sky Blu is affected by temperature and melting etc.
5. *Brief justification of the environmental impact, as applicable*
No environmental impacts identified. However, should any fluid leaks occur during testing, spill kits will be used from the nearest location such as vehicles or the garage.

1.7 AIMP RUNSUR – Runway resurfacing works in the 23/24 season

1. OSPQ number *(where applicable[1]/ known)*		**2. Title of Project**	AIMP RUNSUR – Runway resurfacing works in the 23/24 season

3. Personnel involved. *Please provide names, organisation and job titles of all personnel involved and identify their specific project role e.g., Principal Investigator/Project Lead, Field Leader, external collaborators/contractors etc.*

Full Name	Organisation and Job Title	Project Role

4. Location

Name each location to be visited with a description of the area, and state whether the site has been visited before.

Location Name *(including depot sites)*	Location Description *(e.g. coastal, ice-free, glacier, open ocean etc.)*	Has the location been visited previously? *Please provide detail.*
Rothera Research Station	Runway, Runway Exclusion zones, West of the Hangar, Laydown area south of hangar, Area around the fuel farm, East station. Between OBH and runway and old wharf quarry, West station near weather haven boat sheds. These areas are all within the Rothera Research Station footprint.	Yes

5. Please provide a brief description of your project including:

1. *Proposed dates and duration of your project;*

Activities included in the RUNSUR 2022 IEE

Runway Resurfacing

The runway resurfacing works will commence upon the delivery of the runway resurfacing plant and equipment on the RRS SDA between September 2023 and December 2023. Once mobilised, the anticipated duration of works is 6 weeks.

Runway Lighting

Installed during the 22/23 season.

<u>New Activity not included in the IEE</u>

Rescreening rock to reduce moisture content.

The rescreening of rock for use in the runway resurfacing works will be undertaken during the 23/24 season near the old wharf quarry, this is the same area that was used for rock screening in the 22/23 season .

Removal of processed aggregate from the area to the south of the Hangar

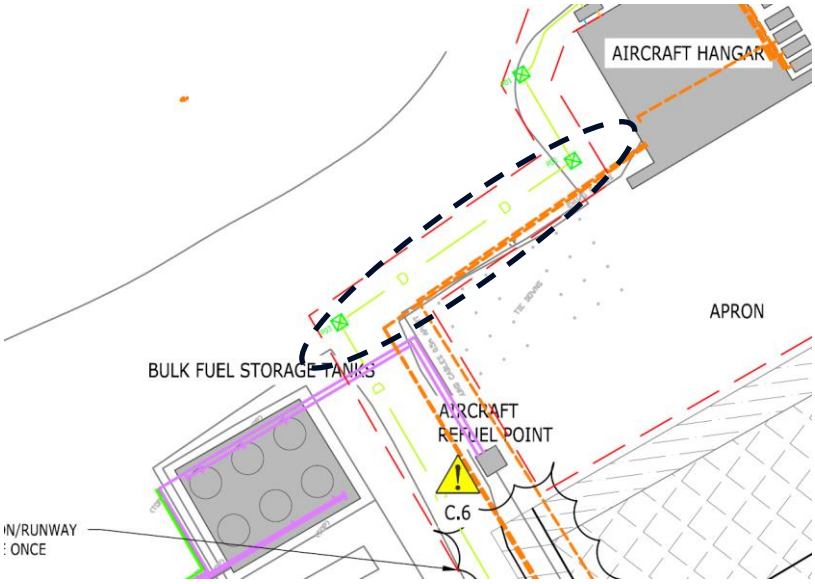
The removal of processed aggregate from the area to the south of the Hangar will be undertaken during the 23/24 season. This rock was laid in this area during the 19/20 season. The material was produced by crushing the rock blasted from the quarry adjacent to the wharf. The majority of the material is 0-80mm (Discovery backfill material), with the top 100mm layer being 0-30mm material (waste product from the crushing of the Wharf backfill). This would have been covered by the permit for the Discovery Building blasting undertaken in 2019 (12/2019-20), and under the original quarry permit for the wharf (07/2018).

Replacement of flooded ducts

Eight (8) new ducts were installed during the 22/23 season from the western side of the runway to the south of the hangar. During the 22/23 season four of the ducts flooded. These four ducts will be replaced during the 23/24 season. approx. A 70m trench will be excavated between chambers P03 and P02 and the four flooded ducts will be removed and replaced with new ducting, that has

improved seals to prevent further flooding. Thick dashed line on image below indicates the area between chambers P03 and P02 (chambers shown by green squares).

Figure 1: Duct locations



2. *Summary of the main aims (scientific of otherwise) of your project;*

Activities included in the RUNSUR 2022 IEE
Runway Resurfacing
This form covers works already covered by the RUNSUR 2022 IEE which require a Section 6 permit and some additional new works relating to RUNSUR which may require a Section 6 permit.

Runway Lighting New efficient runway lighting was installed during the 22/23 season, this season there will only be minor electrical works to fix defects. This will include fixing the sounder on the western side of the runway, installing the Northern REIL lights (all infrastructure is already installed) and some electrical work in the kiosk and the tower changing the control system (software changes).

New Activity not included in the IEE
Re-screening rock to reduce moisture content.
It is anticipated that the rock processed and stockpiled during the 22/23 season (under permit number 14/2022-23) will have frozen and therefore had an increased moisture content making it unsuitable for immediate use in the runway resurfacing works. Rescreening will allow for the material to be screened and sorted to reduce moisture content.

Removal of processed aggregate from the area to the south of the Hangar
Previously processed aggregate (under permit number 12/2019-2020 & 07/2018) was used to provide a temporary laydown area to the South of the Hangar for materials related to the Modernisation Project. This area has caused some flooding issues which impact the buildings and infrastructure. This material is to be removed to reduce the risk of further flooding. Remaining material will be reused for future maintenance of the runway . It has not yet been agreed with BAS Estates where this material will be stockpiled, but it will be tracked in stockpile management documentation,

3. *Outline of project plan (e.g., referring to locations as above, route and mode of travel, number of persons and time spent at each location);*

Activities included in the RUNSUR 2022 IEE
Runway Resurfacing
The proposed works include the complete resurfacing of the existing runway and increasing the usable runway length through the provision of an extension to the gravel surface at 0 m to -17 m chainage at the southern end of the runway and 1 m at the northern end. A turning circle will be added for aircraft to the east side at the southern end of the runway. These works will remain within the existing footprint of the runway and do not extend into the water, maximising the useable surface area of the existing runway footprint.

Runway Lighting
This consists of, Runway Entrance Lights (REL), Runway End Identifier Lighting (REIL), and (Abbreviated) Precision Approach Path Indicator ((A)PAPI). Installation of the new lights was completed in the 2022/23 season, removal of the old lights and their foundations, and minor electrical works will continue in the 2023/24 season.

New Activity not included in the IEE
Re- screening rock to reduce moisture content

The aggregate in the processed stockpiles (shown below in Figure 2 and processed under permit number 14/2022-23) will need to be transported to the wharf rock processing area and processed through a screener, which will sort the rock into various sizes and reduce the moisture content in the aggregate.

Removal of processed aggregate from the area to the south of the Hangar
The material is to be moved to the processing area near the Wharf. The material removed from the south of the Hangar will be screened and stockpiled to the west of the runway with the rest of the processed material. The material may also be re-processed i.e. undergo further crushing. It will not be known whether the material needs to be re-processed or if it can just be screened, until the material has been removed from the area and the size of the material has been assessed. This worked in planned for late January. Stockpiled material locations and quantities will be tracked in the stockpile management documentation.

Figure 2: Stockpile locations (end of 22/23 season):

The above image shows the material processed and stockpiled in the 22/23 season, this was processed under permit No. 14/2022-23.

Relocating of processed aggregate for runway verges

Approximately 500m^3 of material will be moved from the locations identified and relocated to the edges of the runway, this will be spread by a grader and compacted by a roller to provide a stop-end to minimise runway material wastage.
The material along the edges of the runway was originally processed as part of the runway construction in 1990/1991 under CEE Proposed Construction of a Crushed Rock Airstrip at Rothera Point, Adelaide Island, British Antarctic Territory (ISBN 01-85531-003-1).

4. *Details of methodology (including equipment required); and*

Activities included in the RUNSUR 2022 IEE
Runway Resurfacing

To provide sufficient material for the resurfacing, existing stockpiles of aggregate, obtained from the old wharf quarry, was processed in the 22/23 season (permit number 14/2022-23). This processed material will be used for the resurfacing works in the 23/24 season.

Current stockpile locations are described in the Post Season EIA Review for the 22/23 season. It is assumed that only the amount of rock required for the resurfacing works will be transported from the stockpiles to be used; therefore, any unused material will remain in the current stockpile location.

In-situ California Bearing Ratio (CBR)/plate bearing tests will be carried out on the exposed surface to determine the strength of the underlying soils; CBR testing can be applied to soils with a maximum particle size of 20 mm. For soils with bigger particles, plate bearing tests will be undertaken. These tests will confirm that material strength is adequate for the purposes of the runway operations by ensuring the test results are not less than 30%. Ten CBR tests will be carried out along the runway.

The existing runway top surface layer is required to be scarified to a depth of 100 mm to 350 mm (average depth of 200 mm) to get a suitable surface for the new material to bind to. Prior to starting scarifying works the top surface a stockpile of material will be transported to the construction area to ensure that in the event of an unscheduled flight landing, BAM are able to restore the runway to the required condition at short notice.

The aggregate will be placed in a series of layers, of between 20 mm to 150 mm of compacted thickness. This thickness will be controlled using a robotic dozer which will be calibrated at intervals specified by the supplier. Compaction equipment will be used then to compact the material recently laid. A Dozer/Grader will trim any excess of material and level the area, then final compaction will take place following trimming of surface. At the same time, testing of the material will be happening, as well as watering of material by bowser tractor as required.

Further details can be found in the 2022 IEE 'Initial Environmental Evaluation for Rothera Runway Resurfacing and Lighting, Site Investigation and Condition Survey Works', EIA-RAM-ZZ-ZZ-L-R-0001.

Runway Lighting
The old runway lights will be removed during the 23/24 season, this will include the REIL, PAPI lights and the old sounder and lights at the crossing point. Before removal the electrical components will be disconnected and made safe. The lights will be removed from their foundations and disposed of back in the UK, any foundations for the lights will be lifted out of place and repurposed by BAS Estates. BAS Estates will store them on station if there is no immediate use for them.
The existing vehicle crossing point will be reinstated after the runway has been resurfaced. There will be a new sounder and traffic lights positioned either side of the runway near the crossing point.

Further details can be found in the 2022 IEE 'Initial Environmental Evaluation for Rothera Runway Resurfacing and Lighting, Site Investigation and Condition Survey Works', EIA-RAM-ZZ-ZZ-L-R-0001.docx.

New Activity not included in the IEE
Re- screening rock to reduce moisture content.
During the 22/23 season it was found that the stockpiles of rock had frozen so that ice was binding the rocks together and the rocks had a high moisture content. It is anticipated that over the winter of 2023 the rock processed and stockpiled in the 22/23 season (under permit number 14/2022-23) will have frozen and will as a result also have a high moisture content, which will make it unsuitable for immediate use in the runway resurfacing works. To address this, the aggregate in the processed stockpiles will need to be transported to the wharf rock processing area and processed through a screener, which will sort the rock into various sizes and reduce the moisture content in the aggregate. This is a process that was undertaken as part of the processing work in the 22/23 season before the processed rock was stockpiled, and so mitigations for the activity are the same as those outlined in the IEE.

Removal of processed aggregate from the area to the south of the Hangar
Some previously processed aggregate was used to provide a temporary laydown area to the south of the Hangar in the 2019/2020 season for materials related to the Modernisation project. This rock was originally from the quarry adjacent to the wharf, the majority of it is 0-80 mm (Discovery backfill material) with the top 100 mm layer being 0-30 mm, material which was a waste product from crushing the wharf backfill rock (under permit number 12/2019-2020 & 07/2018).

This area is approximately 1-1.5 m above the surrounding ground level near the Hangar and the apron and has caused some flooding issues which impact on the buildings and infrastructure. Approximately 1,500m^3 of aggregate will be removed from this area and rescreened and possibly reprocessed for use on the runway as part of the runway resurfacing works, some of this material will be stockpiled for future use. This will involve an excavator digging and then grading the rock to the same level as the surrounding area, so any water naturally drains away from critical infrastructure.

The material for use on the runway will be moved to the processing area near the wharf. After screening and reprocessing, it will be stockpiled to the west of the runway with the rest of the processed material.

5. *Brief justification of the environmental impact, as applicable*

The potential for atmospheric, noise and vibration, dust, fuel/hazardous substance release, and disturbance to wildlife during the screening and removal of aggregate was identified in the 2022 IEE. These potential impacts are managed through appropriate mitigation measures as identified in the Environmental Impact Matrix (Section 5) and in the 2022 IEE.

This project will address current flooding issues on the runway by reintroducing a crossfall on the runway so that water drains away either side of the runway.

Relocating of processed aggregate for runway verges

Material will be obtained from locations identified in purple in the below image.
Approximately 500m^3 of material will be moved from the locations identified and relocated to the edges of the runway, this will be spread by a grader and compacted by a roller to provide a stop-end to minimise runway material wastage.
The material along the edges of the runway was originally processed as part of the runway construction in 1990/1991 under CEE Proposed Construction of a Crushed Rock Airstrip at Rothera Point, Adelaide Island, British Antarctic Territory (ISBN 01-85531-003-1).

Image shown the proposed locations of the sources of aggregate for the runway verges.

2. IDENTIFICATION OF POTENTIAL IMPACTS

2.1. Chemicals and Hazardous Substances

If you intend to use any chemicals, hazardous substances, radioactive material or stable isotopes you must submit a CAR form (with the associated RAs, COSHH assessments & SOPs) to the BAS Laboratory Manager for review and approval (Station/Field projects: emfi@bas.ac.uk; SDA projects: SDALabManager@bas.ac.uk).

Please also contact Kath Nicholson for advice on how to package hazardous goods and hazardous waste for shipping - kani@bas.ac.uk

2.1.1.	Do you intend to use any chemicals, radioactive material or stable isotopes likely to interact with the environment outside of the laboratory/ in the field? If so, please provide detail here (or attach a copy of your CAR form for our information only) explaining how you intend to use them and list the mitigation measures you intend to use to safeguard the environment.	**Rothera Temporary Wharf Projects – Mooring Weights**	
		No	
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal	
		No	
		CBR Measurements of the Runway at Rothera	
		No	
		CBR Measurements at Sky Blu	
		No	
		Friction Testing at Rothera	
		No	
		Friction Testing at Sky Blu	
		No	
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season	
		No	
2.1.2.	Do you intend to use any other hazardous substances e.g. paints, batteries etc.?	**Rothera Temporary Wharf Projects – Mooring Weights**	
		YES ☐	NO ☒
		Rothera Temporary Wharf Projects - CHPU Hydraulic Lines Removal	
		YES ☐	NO ☒
		CBR Measurements of the Runway at Rothera	
		YES ☐	NO ☒
		CBR Measurements at Sky Blu	
		YES ☐	NO ☒
		Friction Testing at Rothera	
		YES ☒	NO ☐
		Friction Testing at Sky Blu	

	YES ☒	NO ☐
	AIMP RUNSUR – Runway resurfacing works in the 23/24 season	
	YES ☐	NO ☒
2.1.3. If so, please list substances likely to interact with the environment here and provide detail on how you intend to use them listing the mitigation measures you intend to use to safeguard the environment.	**Rothera Temporary Wharf Projects – Mooring Weights**	
	N/A	
	Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal	
	N/A	
	CBR Measurements of the Runway at Rothera	
	N/A	
	CBR Measurements at Sky Blu	
	N/A	
	Friction Testing at Rothera	
	Device has a lead acid battery built in. In the event of a spill, the on site spill kit will be used.	
	Friction Testing at Sky Blu	
	Device has a lead acid battery built in. In the event of a spill, the on site spill kit will be used.	
	AIMP RUNSUR – Runway resurfacing works in the 23/24 season	
	N/A	

2.2 Waste Management

Please refer to the BAS Waste Management Handbook for further information on waste packaging and consignment.

2.2.1. How much waste (hazardous, radioactive and/or non-hazardous) will the project produce? ▪ *Please include approximate weights/volumes (and radioactive levels where applicable) by waste type anticipated.*	**Rothera Temporary Wharf Projects – Mooring Weights**	
	None	
	Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal	
	The removed pipes and any spill kit waste will be disposed of in line with BAS waste management procedures. The waste pipes will be ~20m of C-HPU pipe.	
	CBR Measurements of the Runway at Rothera	
	None	
	CBR Measurements at Sky Blu	
	None	
	Friction Testing at Rothera	
	None	
	Friction Testing at Sky Blu	
	None	

<table>
<tr><td></td><td colspan="2">AIMP RUNSUR – Runway resurfacing works in the 23/24 season</td></tr>
<tr><td></td><td colspan="2">The additional activities involve moving and rescreening rock, no waste packaging is anticipated. Any surplus processed material will be added to existing stockpiles as it states in section 6.3 of the 2022 IEE ‘All unused excavated material (except any hazardous materials) will be added to existing stockpiles for use in future projects or general station maintenance’.

The activities already included in the IEE have already been evaluated for waste (see section 6.3 of the 2022 IEE).</td></tr>
<tr><td>2.2.2. Is your project taking place on a BAS station or supported by BAS in the field?</td><td colspan="2">Rothera Temporary Wharf Projects – Mooring Weights</td></tr>
<tr><td></td><td>YES ☒ Please go to 2.2.3</td><td>NO ☐ Please go to 2.2.4</td></tr>
<tr><td></td><td colspan="2">Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal</td></tr>
<tr><td></td><td>YES ☒ Please go to 2.2.3</td><td>NO ☐ Please go to 2.2.4</td></tr>
<tr><td></td><td colspan="2">CBR Measurements of the Runway at Rothera</td></tr>
<tr><td></td><td>YES ☒ Please go to 2.2.3</td><td>NO ☐ Please go to 2.2.4</td></tr>
<tr><td></td><td colspan="2">CBR Measurements at Sky Blu</td></tr>
<tr><td></td><td>YES ☒ Please go to 2.2.3</td><td>NO ☐ Please go to 2.2.4</td></tr>
<tr><td></td><td colspan="2">Friction Testing at Rothera</td></tr>
<tr><td></td><td>YES ☒ Please go to 2.2.3</td><td>NO ☐ Please go to 2.2.4</td></tr>
<tr><td></td><td colspan="2">Friction Testing at Sky Blu</td></tr>
<tr><td></td><td>YES ☒ Please go to 2.2.3</td><td>NO ☐ Please go to 2.2.4</td></tr>
<tr><td></td><td colspan="2">AIMP RUNSUR – Runway resurfacing works in the 23/24 season</td></tr>
<tr><td></td><td>YES ☒ Please go to 2.2.3</td><td>NO ☐ Please go to 2.2.4</td></tr>
<tr><td>2.2.3. Please indicate the anticipated quantities and type(s) of waste packaging required, in particular for hazardous waste.

▪ Environment Office will review this against the standard station supply and advise whether additional waste packaging for your project is required.</td><td colspan="2">Rothera Temporary Wharf Projects – Mooring Weights</td></tr>
<tr><td></td><td colspan="2">None</td></tr>
<tr><td></td><td colspan="2">Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal</td></tr>
<tr><td></td><td colspan="2">Waste will be ~20m of C-HPU pipe.</td></tr>
<tr><td></td><td colspan="2">CBR Measurements of the Runway at Rothera</td></tr>
<tr><td></td><td colspan="2">No waste will be generated.</td></tr>
<tr><td></td><td colspan="2">CBR Measurements at Sky Blu</td></tr>
<tr><td></td><td colspan="2">No waste will be generated.</td></tr>
<tr><td></td><td colspan="2">Friction Testing at Rothera</td></tr>
<tr><td></td><td colspan="2">No waste will be generated.</td></tr>
</table>

	Friction Testing at Sky Blu	
	No waste will be generated.	
	AIMP RUNSUR – Runway resurfacing works in the 23/24 season	
	No waste packaging will be required for the new activities.	
2.2.4. Is your project taking place on the *Sir David Attenborough or other NERC vessel*?	**Rothera Temporary Wharf Projects – Mooring Weights**	
	YES ☐ *Please go to 2.2.5*	NO ☒ *Please go to 2.2.6*
	Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal	
	YES ☐ *Please go to 2.2.5*	NO ☒ *Please go to 2.2.6*
	CBR Measurements of the Runway at Rothera	
	YES ☐ *Please go to 2.2.5*	NO ☒ *Please go to 2.2.6*
	CBR Measurements at Sky Blu	
	YES ☐ *Please go to 2.2.5*	NO ☒ *Please go to 2.2.6*
	Friction Testing at Rothera	
	YES ☐ *Please go to 2.2.5*	NO ☒ *Please go to 2.2.6*
	Friction Testing at Sky Blu	
	YES ☐ *Please go to 2.2.5*	NO ☒ *Please go to 2.2.6*
	AIMP RUNSUR – Runway resurfacing works in the 23/24 season	
	YES ☐ *Please go to 2.2.5*	NO ☒ *Please go to 2.2.6*
2.2.5. Please provide the quantities and type(s) of waste packaging required, in particular for hazardous waste. • *BAS Environment Office will procure and provide the necessary waste packaging materials and ensure they are delivered to the vessel. If you do not provide any details here, you will be responsible for organising your own compliant packaging prior to boarding the ship.* • *All project waste produced on the SDA (or NERC vessels supporting BAS science) within the Antarctic should be consigned to the BAS Environmental Manager in the UK for disposal. BAS Environment Office will then organise and pay for the disposal of this waste. However, please note that radioactive waste transport and disposal costs will be charged back to the responsible project.*	**Rothera Temporary Wharf Projects – Mooring Weights**	
	N/A	
	Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal	
	N/A	
	CBR Measurements of the Runway at Rothera	
	N/A	
	CBR Measurements at Sky Blu	
	N/A	
	Friction Testing at Rothera	
	N/A	
	Friction Testing at Sky Blu	
	N/A	
	AIMP RUNSUR – Runway resurfacing works in the 23/24 season	
	N/A	
2.2.6. If your project is logistically supported by a non-BAS Antarctic	**Rothera Temporary Wharf Projects – Mooring Weights**	

operator or non-BAS/NERC vessel, please provide further details. • *BAS Environment Office will not supply waste packaging or provide waste disposal. Please confirm that the project/operator/vessel will provide appropriate and compliant waste packaging and confirm how the waste will be disposed of in accordance with all relevant waste legislation*[4].	No
	Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
	No
	CBR Measurements of the Runway at Rothera
	No
	CBR Measurements at Sky Blu
	No
	Friction Testing at Rothera
	No
	Friction Testing at Sky Blu
	No
	AIMP RUNSUR – Runway resurfacing works in the 23/24 season
	BAM handles construction waste separately from the general BAS station Waste. Waste will be handled in accordance to the Site Waste Management Plan (SWMP, Appendix 1 in 2022 IEE).
2.3. Oil Spill Response (for field activities only)	
2.3.1. Please confirm the type and quantity of fuel that will be taken into, used, and stored in the field.	**Rothera Temporary Wharf Projects – Mooring Weights**
	N/A
	Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
	N/A
	CBR Measurements of the Runway at Rothera
	N/A
	CBR Measurements at Sky Blu
	The project will use AVTUR fuel currently located at Sky Blu. All Oil Spill Response procedures take place in accordance with the Oil Spill Contingency Plan for Sky Blu.
	Friction Testing at Rothera
	N/A
	Friction Testing at Sky Blu
	The project will use Petrol currently located at Sky Blu. All Oil Spill Response procedures take place in accordance with the Oil Spill Contingency Plan for Sky Blu.
	AIMP RUNSUR – Runway resurfacing works in the 23/24 season
	N/A

[4] Waste (England and Wales) (Amendment) Regulations 2012, The Duty of Care Regulations 1991, and the Hazardous Waste (England and Wales) (Amendment) Regulations 2009. These regulations affect the packaging, containment, storage, transportation and disposal of waste from source to final disposal. This includes transportation from the UK port, where the waste is offloaded from the ship, and to the waste disposal site.

2.3.2.	Please confirm that you have discussed your field fuel needs and requirement for spill kits with the BAS Field Operations Manager. All field parties must be familiar with the BAS fuel spill protocols.	**Rothera Temporary Wharf Projects – Mooring Weights**
		YES ☐
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
		YES ☐
		CBR Measurements of the Runway at Rothera
		YES ☐
		CBR Measurements at Sky Blu
		YES ☒
		Friction Testing at Rothera
		YES ☐
		Friction Testing at Sky Blu
		YES ☒
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season
		YES ☐

2.3 Deployment and Installation of Equipment

2.4.1.	Do you intend to install or deploy any equipment in the field or ocean (including data loggers/markers on animals, moorings, gliders, etc.)?	**Rothera Temporary Wharf Projects – Mooring Weights**	
		YES ☒ *Please complete questions 3.4.2 – 3.4.6.*	NO ☐ *Please go to 2.5*
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal	
		YES ☐ *Please complete questions 3.4.2 – 3.4.6.*	NO ☒ *Please go to 2.5*
		CBR Measurements of the Runway at Rothera	
		YES ☐ *Please complete questions 3.4.2 – 3.4.6.*	NO ☒ *Please go to 2.5*
		CBR Measurements at Sky Blu	
		YES ☐ *Please complete questions 3.4.2 – 3.4.6.*	NO ☒ *Please go to 2.5*
		Friction Testing at Rothera	
		YES ☐ *Please complete questions 3.4.2 – 3.4.6.*	NO ☒ *Please go to 2.5*
		Friction Testing at Sky Blu	
		YES ☐ *Please complete questions 3.4.2 – 3.4.6.*	NO ☒ *Please go to 3.5*
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season	

		YES ☐ *Please complete questions 3.4.2 – 3.4.6.*	NO ☒ *Please go to 3.5*
2.4.2.	Provide a brief description of the equipment including details of the materials, dimensions, weight, and any hazardous substances such as batteries or oils.	**Rothera Temporary Wharf Projects – Mooring Weights**	
		6x cut-off drums (~1/3), filled with concrete, encased in this are steel rebar struts, providing and anchor point for mooring line. Thick metal wire running up from the rebar. This will be connected to the existing wharf structure. The drums will hang under the water, but they will not be fixed to anything under the water. The weights will sit on the seabed. Estimated volume of mooring weight: 70L Estimated weight: <200 kg	
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal	
		N/A	
		CBR Measurements of the Runway at Rothera	
		N/A	
		CBR Measurements at Sky Blu	
		N/A	
		Friction Testing at Rothera	
		N/A	
		Friction Testing at Sky Blu	
		N/A	
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season	
		N/A	
2.4.3.	Provide a brief summary of the location where equipment will be installed or deployed (including coordinates).	**Rothera Temporary Wharf Projects – Mooring Weights**	
		East, South, and West face of the Rothera Wharf, adjacent to the pilot ladders. Two mooring weights for each launching point.	
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal	
		N/A	
		CBR Measurements of the Runway at Rothera	
		N/A	
		CBR Measurements at Sky Blu	
		N/A	
		Friction Testing at Rothera	
		N/A	
		Friction Testing at Sky Blu	
		N/A	
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season	
		N/A	

2.4.4.	Provide details of how the equipment will be labelled and referenced (equipment should be easily identifiable as science instrumentation and be able to be traced back to the organisation or project).	**Rothera Temporary Wharf Projects – Mooring Weights**
		N/A
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
		N/A
		CBR Measurements of the Runway at Rothera
		N/A
		CBR Measurements at Sky Blu
		N/A
		Friction Testing at Rothera
		N/A
		Friction Testing at Sky Blu
		N/A
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season
		N/A
2.4.5.	Describe how and when the equipment is to be maintained and removed. Confirm if funding and operational support is in place for your retrieval plans. *If any of the equipment you deploy in the field or ocean is lost or cannot be retrieved as planned you will need to report this at the time of the incident on Maximo[5] and to the Environment Office on the EIA Post Season Questionnaire.*	**Rothera Temporary Wharf Projects – Mooring Weights**
		The aim is to permanently deploy the equipment as it serves an operational purpose. The weights and lines will be checked regularly by the boating team and maintained as needed (replacement of strops etc.). If the weights are deemed to have reached the end of their life (likely after at least 10 years) they will be recovered (assisted by divers if needed) and disposed of in accordance with the waste management handbook.
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
		N/A
		CBR Measurements of the Runway at Rothera
		N/A
		CBR Measurements at Sky Blu
		N/A
		Friction Testing at Rothera
		N/A
		Friction Testing at Sky Blu
		N/A

[5] Maximo is the BAS Incident Reporting System

		AIMP RUNSUR – Runway resurfacing works in the 23/24 season
		N/A
2.4.6.	Is the intention for any of your equipment to remain in the field/ocean permanently (e.g. mooring anchors, buried seismic conduits, etc.)? If, so please detail the equipment to be left behind intentionally and explain why it cannot be retrieved.	**Rothera Temporary Wharf Projects – Mooring Weights**
		Yes. The weights will be used as mooring weights with the aim to leave them deployed permanently. This increases safety when launching and retrieving small boats at Rothera. It is not feasible or meaningful to retrieve the weights regularly. The aim is to maintain the cables running up from the weights as and when needed.
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
		N/A
		CBR Measurements of the Runway at Rothera
		N/A
		CBR Measurements at Sky Blu
		N/A
		Friction Testing at Rothera
		N/A
		Friction Testing at Sky Blu
		N/A
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season
		N/A
2.5. Remotely Piloted Aircraft Systems (RPAS) or other remotely operated marine or terrestrial vehicles (ROVs) RPAS includes drones, quadcopters or any remotely operated or autonomous aircraft whether rotary or fixed wing. If you are operating RPAS contact Carl Robinson for further advice – carob@bas.ac.uk.		
2.5.1.	Does the project intend to utilise RPAS or other remotely operated marine or terrestrial vehicles? If so, please provide detail including the size, make, model and operating capacity (e.g. maximum wind resilience, flight time, fail safes, etc.)	**Rothera Temporary Wharf Projects – Mooring Weights**
		No
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
		No
		CBR Measurements of the Runway at Rothera
		No
		CBR Measurements at Sky Blu
		No
		Friction Testing at Rothera
		No
		Friction Testing at Sky Blu
		No
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season
		No

2.5.2.	Does the project involve Beyond Visual Line of Sight (BVLOS) operations for RPAS? If so, please provide details. **This will require review by the Air Unit.**	**Rothera Temporary Wharf Projects – Mooring Weights**
		N/A
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
		N/A
		CBR Measurements of the Runway at Rothera
		N/A
		CBR Measurements at Sky Blu
		N/A
		Friction Testing at Rothera
		N/A
		Friction Testing at Sky Blu
		N/A
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season
		N/A
2.5.3.	Describe the location in which the RPAS/ ROV will be operated (e.g. off a ship, deep field, near a station, over wildlife, etc.)	**Rothera Temporary Wharf Projects – Mooring Weights**
		N/A
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
		N/A
		CBR Measurements of the Runway at Rothera
		N/A
		CBR Measurements at Sky Blu
		N/A
		Friction Testing at Rothera
		N/A
		Friction Testing at Sky Blu
		N/A
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season
		N/A
2.5.4.	Do you require BAS Ops to provide the RPAS/ ROV and/or pilot? If so, contact Carl Robinson to coordinate the request and confirm here that you have done so.	**Rothera Temporary Wharf Projects – Mooring Weights**
		N/A
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
		N/A
		CBR Measurements of the Runway at Rothera
		N/A
		CBR Measurements at Sky Blu

		N/A
		Friction Testing at Rothera
		N/A
		Friction Testing at Sky Blu
		N/A
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season
		N/A
2.5.5.	Do you intend to provide your own RPAS/ ROV and/or pilot?	**Rothera Temporary Wharf Projects – Mooring Weights**
		N/A
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
		N/A
		CBR Measurements of the Runway at Rothera
		N/A
		CBR Measurements at Sky Blu
		N/A
		Friction Testing at Rothera
		N/A
		Friction Testing at Sky Blu
		N/A
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season
		N/A
2.5.6.	Confirm the names of all the pilots/vehicle operators.	**Rothera Temporary Wharf Projects – Mooring Weights**
		N/A
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
		N/A
		CBR Measurements of the Runway at Rothera
		N/A
		CBR Measurements at Sky Blu
		N/A
		Friction Testing at Rothera
		N/A
		Friction Testing at Sky Blu
		N/A
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season
		N/A

2.5.7.	Detail number of hours flown in the last 3 months and number of hours in total flown on proposed platform.	**Rothera Temporary Wharf Projects – Mooring Weights**
		N/A
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
		N/A
		CBR Measurements of the Runway at Rothera
		N/A
		CBR Measurements at Sky Blu
		N/A
		Friction Testing at Rothera
		N/A
		Friction Testing at Sky Blu
		N/A
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season
		N/A
2.5.8.	Do the pilots hold a General Visual Line of Sight Certificate (GVC) or equivalent? Please provide details of qualifications held.	**Rothera Temporary Wharf Projects – Mooring Weights**
		N/A
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
		N/A
		CBR Measurements of the Runway at Rothera
		N/A
		CBR Measurements at Sky Blu
		N/A
		Friction Testing at Rothera
		N/A
		Friction Testing at Sky Blu
		N/A
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season
		N/A
2.5.9.	Please confirm you have read and will commit to follow the BAS Regulations on RPAS use in Antarctica.	**Rothera Temporary Wharf Projects – Mooring Weights**
		YES ☐
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
		YES ☐
		CBR Measurements of the Runway at Rothera
		YES ☐
		CBR Measurements at Sky Blu

	YES ☐
	Friction Testing at Rothera
	YES ☐
	Friction Testing at Sky Blu
	YES ☐
	AIMP RUNSUR – Runway resurfacing works in the 23/24 season
	YES ☐
2.6 Construction and Maintenance Work	
2.6.1. Do you intend to import natural materials to Antarctica (e.g. untreated wood, aggregate, sand etc.)? Provide details of type, quantity and from where the materials will be sourced. Please refer to Section 4.4 of the BAS Biosecurity Regulations and discuss with Environment Office as appropriate.	**Rothera Temporary Wharf Projects – Mooring Weights**
	No
	Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
	No
	CBR Measurements of the Runway at Rothera
	No
	CBR Measurements at Sky Blu
	No
	Friction Testing at Rothera
	No
	Friction Testing at Sky Blu
	No
	AIMP RUNSUR – Runway resurfacing works in the 23/24 season
	No
2.6.2. Will the work require concrete mixing on site? Provide details of the expected quantity and working methods.	**Rothera Temporary Wharf Projects – Mooring Weights**
	No, the concreting already took place in the 22/23 season and some old mooring weights are being reused.
	Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
	N/A
	CBR Measurements of the Runway at Rothera
	N/A
	CBR Measurements at Sky Blu
	N/A
	Friction Testing at Rothera
	N/A
	Friction Testing at Sky Blu
	N/A

		AIMP RUNSUR – Runway resurfacing works in the 23/24 season
		Grouting around some of the precast concrete chambers will be required. Mixing of grout will be undertaken in a designated enclosed container by the BAM fitters workshop. Waters will be captured and neutralised with citric acid, before being discharged to the west of the BAM Fitters Workshop. This is as described in the 2022 IEE (Section 10.4.4).
2.6.3.	Will the project require the removal of any asbestos? Provide details of the expected quantity.	**Rothera Temporary Wharf Projects – Mooring Weights**
		No
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
		No
		CBR Measurements of the Runway at Rothera
		No
		CBR Measurements at Sky Blu
		No
		Friction Testing at Rothera
		No
		Friction Testing at Sky Blu
		No
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season
		No
2.6.4.	Do you anticipate the alteration, removal or destruction of equipment, buildings or structures (or parts of buildings or structures) that may be considered to have heritage value?	**Rothera Temporary Wharf Projects – Mooring Weights**
		No
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
		No
		CBR Measurements of the Runway at Rothera
		No
		CBR Measurements at Sky Blu
		No
		Friction Testing at Rothera
		No
		Friction Testing at Sky Blu
		No
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season
		No
2.7	**Biosecurity**	
		Rothera Temporary Wharf Projects – Mooring Weights

2.7.1.	Please confirm that you have familiarised yourself with the biosecurity guidance provided by BAS in the Biosecurity Regulations and by SCAR in the Environmental code of conduct for terrestrial scientific field research in Antarctica.	YES ☒ **Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal** YES ☒ **CBR Measurements of the Runway at Rothera** YES ☒ **CBR Measurements at Sky Blu** YES ☒ **Friction Testing at Rothera** YES ☒ **Friction Testing at Sky Blu** YES ☒ **AIMP RUNSUR – Runway resurfacing works in the 23/24 season** YES ☒
2.7.2.	Do you intend to move terrestrial or marine specimens, including unfixed biological samples, soils, sediments, rocks, or other mineral resources between different areas of Antarctica (including returning materials to research stations)? If 'yes', please describe the precautions you will take to prevent the transfer/release of indigenous species between distinct Antarctic Conservation Biogeographic Regions[6] (ACBRs) or between Antarctic and sub-Antarctic locations.	**Rothera Temporary Wharf Projects – Mooring Weights** No **Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal** No **CBR Measurements of the Runway at Rothera** No **CBR Measurements at Sky Blu** No **Friction Testing at Rothera** No **Friction Testing at Sky Blu** No **AIMP RUNSUR – Runway resurfacing works in the 23/24 season** No, processed rock which was stockpiled in the 22/23 season (under permit number 14/2022-23) will be rescreened, which will require the rock to be moved from the stockpiles on the western side of the runway to the screener near the wharf. The aggregate will then be used for resurfacing the runway. This movement of rock will all be within Rothera Research Station. No material will enter or leave the station.
2.8. Sensitive sites with restrictions or guidelines		

[6] Note: On 'Antarctic Conservation Biogeographic Regions' select 'Antarctic conservation biogeographic areas' from the 'Layer List' at the top right hand corner symbol, to see the ACBRs displayed.

2.8.1.	Do you intend to visit any CCAMLR registered Vulnerable Marine Ecosystems (VMEs), CCAMLR Ecosystem Monitoring Programme (CEMP) Site(s) or Marine Protected Areas (MPAs)[7]? Please provide details.	**Rothera Temporary Wharf Projects – Mooring Weights** No **Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal** No **CBR Measurements of the Runway at Rothera** No **CBR Measurements at Sky Blu** No **Friction Testing at Rothera** No **Friction Testing at Sky Blu** No **AIMP RUNSUR – Runway resurfacing works in the 23/24 season** **No**
2.8.2.	Do you intend to visit any Important Bird Areas (IBAs)? Please provide details.	**Rothera Temporary Wharf Projects – Mooring Weights** No **Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal** No **CBR Measurements of the Runway at Rothera** No **CBR Measurements at Sky Blu** No **Friction Testing at Rothera** No **Friction Testing at Sky Blu** No **AIMP RUNSUR – Runway resurfacing works in the 23/24 season** No
2.8.3.	Do you intend to visit any Antarctic Specially Managed Areas (ASMAs)? Please provide details.	**Rothera Temporary Wharf Projects – Mooring Weights** No **Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal**

[7] Geographic details (positions, area) of these sites can be viewed in the CCAMLR GIS (select the appropriate designation(s) from the layers list on the left-hand side.

		No
		CBR Measurements of the Runway at Rothera
		No
		CBR Measurements at Sky Blu
		No
		Friction Testing at Rothera
		No
		Friction Testing at Sky Blu
		No
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season
		No
2.8.4.	Do you intend to visit any of the most visited locations in Antarctica (excluding research stations) as identified by the Antarctic Treaty System? Please confirm which locations you will visit and that you have read and understood the associated Visitor Site Guidelines.	**Rothera Temporary Wharf Projects – Mooring Weights**
		No
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal
		No
		CBR Measurements of the Runway at Rothera
		No
		CBR Measurements at Sky Blu
		No
		Friction Testing at Rothera
		No
		Friction Testing at Sky Blu
		No
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season
		No

3. IDENTIFICATION OF SPECIALIST ACTIVITIES IN ANTARCTICA

Specialist activities in Antarctica are prohibited without issue of a specialist activity permit under the Antarctic Act 1994; 2013 (Sections 6-10):

- Mineral resource activities (Section 6 permit)
- Disturbance/harmful interaction with fauna and damage to flora (Section 7 permit)
- Introduction of non-native species (Section 8 permit)
- Entry into protected areas (Section 9 permit)
- Damage or disturbance of Historic Sites and Monuments (Section 10 permit)

Specialist Activity Permits may be issued by the UK Foreign, Commonwealth and Development Office or by the BAS Director under delegated authority in accordance with the UK Antarctic Act (1994; 2013) or by another competent authority. The BAS Environment Office will advise you upon review of your application.

3.1. Do you intend to undertake any of the following specialist activities in Antarctica? If you answer 'yes' to any of the below questions please also complete parts 4, 5 and 6 of this form. If you answered 'no' to all of the below questions, you only need to complete parts 4 and 6.

3.1.1. Do you intend to undertake any of the following mineral resource activities? a. Drill, dredge or excavate for mineral resources; or b. Collect/use any samples of mineral resources; or c. Do anything else for the purpose of identifying specific mineral resource occurrences or deposits.	**Rothera Temporary Wharf Projects – Mooring Weights**		
	YES ☐	NO ☒	
	Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal		
	YES ☐	NO ☒	
	CBR Measurements of the Runway at Rothera		
	YES ☐	NO ☒	
	CBR Measurements at Sky Blu		
	YES ☐	NO ☒	
	Friction Testing at Rothera		
	YES ☐	NO ☒	
	Friction Testing at Sky Blu		
	YES ☐	NO ☒	
	AIMP RUNSUR – Runway resurfacing works in the 23/24 season		
	YES ☒	NO ☐	
3.1.2. Do you intend to sample, capture, kill or harmfully interfere with any marine or terrestrial flora or fauna (including invertebrates)?	**Rothera Temporary Wharf Projects – Mooring Weights**		
	YES ☐	NO ☒	
	Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal		
	YES ☐	NO ☒	
	CBR Measurements of the Runway at Rothera		
	YES ☐	NO ☒	
	CBR Measurements at Sky Blu		
	YES ☐	NO ☒	

		Friction Testing at Rothera	
		YES ☐	NO ☒
		Friction Testing at Sky Blu	
		YES ☐	NO ☒
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season	
		YES ☐	NO ☒
3.1.3.	Do you intend to take to the Antarctic any non-sterile soil or non-native marine or terrestrial animal, plant, microorganism, seed or other propagule?	**Rothera Temporary Wharf Projects – Mooring Weights**	
		YES ☐	NO ☒
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal	
		YES ☐	NO ☒
		CBR Measurements of the Runway at Rothera	
		YES ☐	NO ☒
		CBR Measurements at Sky Blu	
		YES ☐	NO ☒
		Friction Testing at Rothera	
		YES ☐	NO ☒
		Friction Testing at Sky Blu	
		YES ☐	NO ☒
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season	
		YES ☐	NO ☒
3.1.4.	Do you intend to visit any Antarctic Specially Protected Areas (ASPAs)?	**Rothera Temporary Wharf Projects – Mooring Weights**	
		YES ☐	NO ☒
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal	
		YES ☐	NO ☒
		CBR Measurements of the Runway at Rothera	
		YES ☐	NO ☒
		CBR Measurements at Sky Blu	
		YES ☐	NO ☒
		Friction Testing at Rothera	
		YES ☐	NO ☒
		Friction Testing at Sky Blu	
		YES ☐	NO ☒
		AIMP RUNSUR – Runway resurfacing works in the 23/24 season	
		YES ☐	NO ☒
3.1.5.	Do you intend to damage or disturb Historic Sites and Monuments and/or their artefacts?	**Rothera Temporary Wharf Projects – Mooring Weights**	
		YES ☐	NO ☒
		Rothera Temporary Wharf Projects – C-HPU Hydraulic Lines Removal	
		YES ☐	NO ☒
		CBR Measurements of the Runway at Rothera	
		YES ☐	NO ☒
		CBR Measurements at Sky Blu	

	YES ☐	NO ☒
	Friction Testing at Rothera	
	YES ☐	NO ☒
	Friction Testing at Sky Blu	
	YES ☐	NO ☒
	AIMP RUNSUR – Runway resurfacing works in the 23/24 season	
	YES ☐	NO ☒

4. ENVIRONMENTAL IMPACT MATRIX

Science and Logistical Activities Undertaken as Part of the Project. *e.g. collection of samples, deployment of monitoring equipment, storage/ handling of fuels and chemicals, waste production and camping*	**Identify Possible Impacts - Direct, Residual and/or Cumulative**[8]	**Mitigating Measures** *Please provide details of the mitigation measures you intend to implement to ensure that **negative impacts are minimised or avoided**.*
Weighted Moorings - Deployment of Mooring Weights	*Direct/Indirect/Cumulative* - Introduction of foreign material to the sea, corrosion of rebar struts, degradation of concrete, critical failure of mooring weight and loss to sea.	The structure will be regularly checked for integrity when deploying and retrieving boats. Should it be suspected that the structure is damaged, a dive/ROV survey can be carried out to check the underwater part of the structure. The structure will be deployed carefully to mitigate any early damage that might cause early degradation. Anticipated lifetime is around 10 years, regular inspections will ensure useful life is monitored. The weights will only be used for small boats, to minimise wear and tear and avoid improper use. The loss/failure of any equipment will be reported in Maximo. Consideration for entanglement of marine life: The area is regularly scoured by icebergs and therefore does not host much sessile life. The mooring line would sit within less than 1 foot distance of the wharf wall and so it is not anticipated that large marine mammals would swim in this area and become trapped. If any animals were found to be compromised by the lines, trained people would follow the animal interaction handbook and this would be reported to the environment office.
	Direct/Cumulative – The generation of noise and vibration during transportation of mooring weights.	*Noise and vibration during the transportation of the mooring weights will be managed using the following mitigation measures:* • *Vehicles and equipment are to be well maintained;* • *Consideration of noise and vibration impact on all wildlife will be considered;* • *Mooring weights are to be stored appropriately in any vehicle; and* • *The site speed limit of 10mph will be adhered to.*
	Direct – The generation of vibration on placement of the mooring weights on the seabed.	*Vibration generated during the placement of mooring weights will be managed using the following mitigation measures:* • Should vibration exceed limits identified in the IEE, the activity will be suspended until an assessment of the impacts on sensitive receptors can be made.

[8] Direct impacts of your activities on flora, fauna, air quality, water quality (fresh and marine), geology, soils, permanent ice, noise levels or cultural heritage. Residual impacts once your project is complete such as leaving equipment in the field longer term, permanent removal of samples from the field, and impacts on the value of the locality for future science. Cumulative impacts: If you are aware of any other projects or activities in the past, present or foreseeable future then these could, combined with your proposed project, result in a significant environmental impact.

Science and Logistical Activities Undertaken as Part of the Project. *e.g. collection of samples, deployment of monitoring equipment, storage/ handling of fuels and chemicals, waste production and camping*	**Identify Possible Impacts - Direct, Residual and/or Cumulative[8]**	**Mitigating Measures** *Please provide details of the mitigation measures you intend to implement to ensure that **negative impacts are minimised or avoided**.*
		• The area will be assessed for the presence of vibration-sensitive marine life prior to the deployment of the weights
	Indirect/Cumulative - Non-native species introduction	The project will use equipment already at Rothera. This equipment would have been subject to the compliance with the BAS Biosecurity Regulations (2021) when it was shipped to the continent.
CHPU Fixed Lines Replacement - Removing pipes – potential handling of a very minimal amount of waste oil but this will be easily collected and disposed of correctly	*Direct/Cumulative* - Very small chance of an Oil Spill occurring.	Oil Spill Kits on hand and ready to deploy if necessary. Spill kits are kept in every vehicle and the Oil Spill container is positioned on the wharf. *Potential oil spills will be managed using the following mitigation measures:* • Equipment and vehicles will be well maintained; and • All plant will be inspected daily for potential leaks.
	Direct/Cumulative – Physical or Mechanical Disturbance on land.	• Piping is above ground, so ground disturbance is not anticipated. However, if contamination to the ground is observed, spill procedures will be followed in accordance with the BAS Oil Spill Contingency Plan. • Waste to be stored in the appropriate storage method; and • The BAS Waste Management Handbook will be followed.
	Indirect/Cumulative - Non-native species introduction	The project will use equipment already at Rothera. This equipment would have been subject to the compliance with the BAS Biosecurity Regulations (2021) when it was shipped to the continent.
CBR Testing at Rothera - Driving a vehicle up and down the Rothera gravel runway.	*Direct/Cumulative* - Fuel spill associated with vehicle.	Refuelling of Volvo L180H wheeled loader will be undertaken by trained staff who have been briefed on the locations and contents of the oil spill response kits at Rothera by the staff stationed at Rothera. Oil spill response will be undertaken in accordance with the OSCP for Rothera. A small spill kit consisting of a spill mat, pig putty and nitrile gloves in a zip lock bag will be carried in the Volvo.
	Direct/Cumulative – Atmospheric Emissions from Vehicle.	*Atmospheric Emissions will be managed using the following mitigation measures:* • Ensure that all operations will be as efficient as possible to reduce excess fuel use; and • Where practical, all drivers will be instructed to turn off engines during periods of waiting for 15 minutes or more.
	Direct/Cumulative – The potential to impact local wildlife.	*Potential to impact local wildlife will be managed using the following mitigation measure:*

Science and Logistical Activities Undertaken as Part of the Project. *e.g. collection of samples, deployment of monitoring equipment, storage/ handling of fuels and chemicals, waste production and camping*	**Identify Possible Impacts - Direct, Residual and/or Cumulative[8]**	**Mitigating Measures** *Please provide details of the mitigation measures you intend to implement to ensure that **negative impacts are minimised or avoided**.*
		All vehicles will be inspected, and wheels checked for the presence of seals and penguins before engines are started. If animals have to be moved, only trained people will do this in accordance with the Wildlife Interaction Manual, any animal interactions will be recorded.
	Indirect/Cumulative - Non-native species introduction	The project will use equipment already at Rothera. This equipment would have been subject to the compliance with the BAS Biosecurity Regulations (2021) when it was shipped to the continent.
CBR testing at Sky Blu - Driving a vehicle up and down the Sky Blu ice runway.	*Direct/Cumulative* - Fuel spill associated with vehicle.	Refuelling of CAT 247B will be undertaken by trained staff who have been briefed on the locations and contents of the oil spill response kits at Sky Blu by the staff stationed at Sky Blu. Oil spill response will be undertaken in accordance with the OSCP for Sky Blu. Any waste will be handled according to the BAS Waste Management Handbook. A small spill kit consisting of a spill mat, pig putty and nitrile gloves in a zip lock bag will be carried in the CAT 247B.
	Direct/Cumulative – Atmospheric Emissions from Vehicle.	*Atmospheric Emissions will be managed using the following mitigation measures:* • Ensure that all operations at will be as efficient as possible to reduce excess fuel use; and • Where practical, all drivers will be instructed to turn off engines during periods of waiting for 15 minutes or more.
	Direct/Cumulative – The potential to impact local wildlife.	*Potential to impact local wildlife will be managed using the following mitigation measure:* • All vehicles will be inspected, and wheels checked for the presence of seals and penguins before engines are started. If animals have to be moved, only trained people will do this in accordance with the Wildlife Interaction Manual, any animal interactions will be recorded.
	Indirect/Cumulative - Non-native species introduction	The project will use equipment already at Rothera or Sky-Blu. This equipment would have been subject to the compliance with the BAS Biosecurity Regulations (2021) when it was shipped to the continent. If vehicles and equipment are being moved between Rothera and Sky Blu, appropriate biosecurity checks will be completed prior to moving, to reduce the risk of inter-site transfer.
Friction Testing at Rothera - Driving a vehicle up and down the Rothera gravel runway.	*Direct/Cumulative* - Fuel spill associated with vehicle.	Refuelling of quad bike will be undertaken by trained staff who have been briefed on the locations and contents of the oil spill response kits at Rothera by the staff stationed at Rothera. Oil spill response will be undertaken in accordance with the OSCP for Rothera. Any waste will be handled in accordance with the BAS Waste Management Handbook.
	Direct/Cumulative – Atmospheric Emissions from Vehicle.	*Atmospheric Emissions will be managed using the following mitigation measures:* • Ensure that all operations at will be as efficient as possible to reduce excess fuel use; and

Science and Logistical Activities Undertaken as Part of the Project. *e.g. collection of samples, deployment of monitoring equipment, storage/ handling of fuels and chemicals, waste production and camping*	**Identify Possible Impacts - Direct, Residual and/or Cumulative**[8]	**Mitigating Measures** *Please provide details of the mitigation measures you intend to implement to ensure that **negative impacts are minimised or avoided**.*
		• Where practical, all drivers will be instructed to turn off engines during periods of waiting for 15 minutes or more.
	Direct/Cumulative – The potential to impact local wildlife.	*Potential to impact local wildlife will be managed using the following mitigation measure:* • All vehicles will be inspected, and wheels checked for the presence of seals and penguins before engines are started. If animals have to be moved, only trained people will do this in accordance with the Wildlife Interaction Manual, any animal interactions will be recorded.
	Indirect/Cumulative - Non-native species introduction	The project will use equipment already at Rothera. This equipment would have been subject to the compliance with the BAS Biosecurity Regulations (2021) when it was shipped to the continent.
Friction Testing at Sky Blu - Driving a vehicle up and down the Sky Blu ice runway.	Fuel spill associated with vehicle.	Refuelling of quad bike will be undertaken by trained staff who have been briefed on the locations and contents of the oil spill response kits at Sky Blu by the staff stationed at Sky Blu. Oil spill response will be undertaken in accordance with the OSCP for Sky Blu. Any waste will be handled in accordance with the BAS Waste Management Handbook. In the event of a spill, spill kit from a nearby vehicle or from the garage will be used.
	Direct/Cumulative – Atmospheric Emissions from Vehicle.	*Atmospheric Emissions will be managed using the following mitigation measures:* • Ensure that all operations at will be as efficient as possible to reduce excess fuel use; and • Where practical, all drivers will be instructed to turn off engines during periods of waiting for 15 minutes or more.
	Direct/Cumulative – The potential to impact local wildlife.	*Potential to impact local wildlife will be managed using the following mitigation measure:* • All vehicles will be inspected, and wheels checked for the presence of seals and penguins before engines are started. If animals have to be moved, only trained people will do this in accordance with the Wildlife Interaction Manual, any animal interactions will be recorded.
	Indirect/Cumulative - Non-native species introduction	The project will use equipment already at Rothera or Sky-Blu. This equipment would have been subject to the compliance with the BAS Biosecurity Regulations (2021) when it was shipped to the continent. However, if vehicles or equipment are being moved between Rothera and Sky-Blu appropriate biosecurity checks will be made prior to moving, to reduce the risk of inter-site transfer.
AIMP RUNSUR – Runway resurfacing works in the 23/24 season **- Moving of aggregate**	*Direct/Indirect/Cumulative* – Atmospheric	*Atmospheric emissions will be managed using the following mitigation measures:* • Ensure that all operations at Rothera are as efficient as possible to reduce excess fuel use;

Science and Logistical Activities Undertaken as Part of the Project. *e.g. collection of samples, deployment of monitoring equipment, storage/ handling of fuels and chemicals, waste production and camping*	**Identify Possible Impacts - Direct, Residual and/or Cumulative**[8]	**Mitigating Measures** *Please provide details of the mitigation measures you intend to implement to ensure that **negative impacts are minimised or avoided**.*
from stockpiles, Screening and processing existing aggregate, layering aggregate on runway, and preparing runway surface.		• Generators and plant will be selected which balance efficiency and reduced emissions, with reliability, serviceability, and available fuel at Rothera; • Regular inspection and maintenance will be carried out to ensure all vehicles, plant and generators operate efficiently, as per the BAM Plant Management Plan; • Where practical, all drivers will be instructed to turn off engines during periods of waiting for 15 minutes or more; • No mitigation has been provided for the emissions associated with the production of any construction materials required for the proposed activities. However, the AIMP Sustainability Strategy encourages the selection of materials with a lower embodied carbon; • Due to the limited number of beds and environmental impacts of transport to Rothera, only staff essential to the proposed works will be deployed to Rothera; • 10 mph speed limit maintained and enforced on site, as is standard procedure for all vehicles at Rothera; • Plant items will be positioned to ensure exhaust outlets point away from sensitive receptors; • Weather forecasting and planning activities; • Changes to the locations used for any activities are to be agreed with BAS Operations, the BAS Environment Office and FCDO; • Grout mixing will be undertaken in an enclosed designated container next to the BAM Fitters Workshop. Wash waters will be collected and neutralised with citric acid, before being disposed of to the west of the BAM Fitters Workshop.
	Direct/Indirect/Cumulative – Noise	*Noise will be managed using the following mitigation measures:* • Regular maintenance of all plant and vehicles to ensure they are working efficiently and generating as little noise as possible; • Minimise double handling of materials to reduce the overall number of tipping actions; • 10 mph speed limit maintained and enforced on site, as is standard procedure for all vehicles at Rothera; • Regular inspection and maintenance will be carried out to ensure all vehicles, plant and generators operate efficiently, as per the BAM Plant Management Plan; and • Where practical, all drivers will be instructed to turn off engines during periods of waiting for 15 minutes or more. • Noise will be monitored at the environmental monitoring stations in accordance with the 2022 IEE. If a threshold is exceeded the environment office will be notified, the activity stopped, and a mitigation put in place to reduce the noise impact.

Science and Logistical Activities Undertaken as Part of the Project. *e.g. collection of samples, deployment of monitoring equipment, storage/ handling of fuels and chemicals, waste production and camping*	**Identify Possible Impacts - Direct, Residual and/or Cumulative[8]**	**Mitigating Measures** *Please provide details of the mitigation measures you intend to implement to ensure that **negative impacts are minimised or avoided**.*
	Direct/Indirect/Cumulative – Dust	*Dust will be managed using the following mitigation measures:* • Where practicable, keep activities which create dust downwind of sensitive receptors and avoid close proximity to known vegetation and ice locations; • All routes used by vehicles and plant will be well maintained and have compacted surfaces; • Limit the drop height of materials during stockpiling, processing, and loading operations; • Minimise double handling of materials to reduce the overall number of tipping actions; • 10 mph speed limit maintained and enforced on site, as is standard procedure for all vehicles at Rothera; and • Weather forecasting and planning activities. • Dust will be monitored at the environmental monitoring stations in accordance with the 2022 IEE. If a threshold is exceeded the environment office will be notified, the activity stopped, and a mitigation put in place to reduce the dust generated.
	Direct/Indirect/Cumulative – Light	*Light will be managed using the following mitigation measure:* • Undertake works during daylight hours as far as reasonably possible, and minimise the use and intensity of lighting during low light hours as far as reasonably possible; • If required, lighting rigs to be angled towards the ground, not horizontally; • In the event of a bird strike, as per the BAS Wildlife Interaction Manual (Appendix 4), a suitably trained bird strike response staff member will take charge of the bird's care; and • Lights will be switched off immediately if more than five bird strikes occur in one period of works; • All bird strikes will be recorded on Maximo for monitoring and management purposes.
	Direct/Indirect/Cumulative - Physical Presence, Physical or Mechanical Disturbance on land, e.g wildlife.	*Physical Presence, Physical or Mechanical Disturbance on land will be managed using the following mitigation measures:* • Changes to the locations used for any activities are to be agreed with BAS Operations, the BAS Environment Office and FCDO; and • All staff will receive pre-deployment and on-station briefings regarding wildlife viewing and working close to wildlife.

Science and Logistical Activities Undertaken as Part of the Project. *e.g. collection of samples, deployment of monitoring equipment, storage/ handling of fuels and chemicals, waste production and camping*	**Identify Possible Impacts - Direct, Residual and/or Cumulative**[8]	**Mitigating Measures** *Please provide details of the mitigation measures you intend to implement to ensure that **negative impacts are minimised or avoided**.*
	Direct/Indirect/Cumulative - Fuel or Hazardous substance release	*Fuel or Hazardous substance release will be managed using the following mitigation measures:* • All routes used by vehicles and plant will be well maintained; and • Regular inspection and maintenance will be carried out to ensure all vehicles, plant and generators operate efficiently, as per the BAM Plant Management Plan.
	Direct/Indirect/Cumulative - Waste	*Waste will be managed using the following mitigation measure:* • Minimise double handling of materials. i.e. every time rock is moved from one place to another, a small amount of rock is likely to be lost/not able to be picked up (becoming waste).
	Indirect/Cumulative - Non-native species introduction	The project will use equipment already on site at Rothera from previous seasons. All equipment shipped to Rothera as part of this project will have been subject to compliance with the biosecurity measures outlined in Appendix 2: Runway Resurfacing and Lighting Project-Specific Biosecurity Plan and the BAS Biosecurity Regulations (2021).
AIMP RUNSUR – Runway resurfacing works in the 23/24 season - Re- screening rock to reduce moisture content.	*Direct/Cumulative - Atmospheric Emissions*	*The potential atmospheric emissions of the rescreening of rock to reduce moisture content will be mitigated using the following mitigation measures:* • Ensure that all operations using generators, plant, and equipment (such as the screener) are as efficient as possible to reduce excess fuel use; and • Where practical, all drivers will be instructed to turn off engines during periods of waiting for 15 minutes or more.
	Direct/Cumulative - Noise and Vibration	*The potential noise and vibration generated during the rescreening of rock to reduce moisture content will be mitigated using the following mitigation measures:* • Regular maintenance of all equipment and vehicles to ensure it is working efficiently; • The speed limit of 10 mph will be adhered to; • Regular maintenance of all plant and vehicles to ensure they are working efficiently and generating as little noise as possible.
	Direct/Cumulative - Dust Emissions	*The potential dust emissions generation during the rescreening of rock to reduce moisture content will be mitigated using the following mitigation measures:* • Where practicable, keep activities which create dust downwind of sensitive receptors and avoid close proximity to known vegetation and ice locations; • All routes used by vehicles and plant will be well maintained;

Science and Logistical Activities Undertaken as Part of the Project. *e.g. collection of samples, deployment of monitoring equipment, storage/ handling of fuels and chemicals, waste production and camping*	**Identify Possible Impacts - Direct, Residual and/or Cumulative[8]**	**Mitigating Measures** *Please provide details of the mitigation measures you intend to implement to ensure that **negative impacts are minimised or avoided**.*
		• The speed limit of 10 mph will be adhered to; • All plant and equipment will be maintained on a regular basis; and • Dust suppression measures will be implemented if deemed necessary.
	Direct/Indirect/Cumulative - Fuel or hazardous substance release	*The potential for fuel or hazardous substance release during the rescreening of rock to reduce moisture content will be mitigated using the following mitigation measures:* • Spill kits will be in all vehicles and in key easily accessible locations on site; • Plant nappies will be used for all static plant; and • Vehicles and equipment will be properly maintained and checked for any potential leaks. It should be noted that there is no waste associated with the material to be screened as this is being reused from another location within Rothera.
	Direct/Cumulative - Disturbance to native flora and fauna	*The potential for disturbance to native flora and fauna during the rescreening of rock to reduce moisture content will be mitigated using the following mitigation measures:* • *All vehicles will be inspected, and wheels checked for the presence of seals and penguins before engines are started;* • *The area will be checked for any fauna in close proximity to the stockpiles.* If animals have to be moved, only trained people will do this in accordance with the Wildlife Interaction Manual, any animal interactions will be recorded. • *A soft start may be implemented if deemed necessary.*
AIMP RUNSUR – Runway resurfacing works in the 23/24 season - Removal of processed aggregate from to the south of the Hangar.	*Direct/Cumulative - Atmospheric emissions*	*The potential for atmospheric emissions during the removal of processed aggregate to the south of the Hangar will be mitigated using the following mitigation measures:* • Ensure that all operations using generators, plant, and equipment (such as the screener) are as efficient as possible to reduce excess fuel use; and • Where practical, all drivers will be instructed to turn off engines during periods of waiting for 15 minutes or more.
	Direct/Cumulative - Noise and Vibration	*The potential for noise and vibration impacts during the removal of processed aggregate to the south of the Hangar will be mitigated using the following mitigation measures:* • Regular maintenance of all equipment and vehicles to ensure it is working efficiently;

Science and Logistical Activities Undertaken as Part of the Project. *e.g. collection of samples, deployment of monitoring equipment, storage/ handling of fuels and chemicals, waste production and camping*	**Identify Possible Impacts - Direct, Residual and/or Cumulative[8]**	**Mitigating Measures** *Please provide details of the mitigation measures you intend to implement to ensure that **negative impacts are minimised or avoided**.*
		• The speed limit of 10 mph will be adhered to; • Regular maintenance of all plant and vehicles to ensure they are working efficiently and generating as little noise as possible; and • A soft-start procedure will be implemented if necessary.
	Direct/Cumulative - Dust Emissions	*The potential for dust emissions during the removal of processed aggregate to the south of the Hangar will be mitigated using the following mitigation measures:* • Where practicable, keep activities which create dust downwind of sensitive receptors and avoid close proximity to known vegetation and ice locations; • All routes used by vehicles and plant will be well maintained; • The speed limit of 10 mph will be adhered to; • All plant and equipment will be maintained on a regular basis; and • Dust suppression measures will be implemented if deemed necessary.
	Direct/Indirect/ Cumulative - Fuel or hazardous substance release	*The potential for fuel or hazardous substance release during the removal of processed aggregate to the south of the Hangar will be mitigated using the following mitigation measures:* • Spill kits will be in all vehicles and in key easily accessible locations on site; • Plant nappies will be used for all static plant; and • Vehicles and equipment will be properly maintained and checked for any potential leaks. It should be noted that there is no waste, such as plastic, associated with the material to be relocated was originally quarried adjacent to the Wharf.
	Direct/Cumulative - Disturbance to native flora and fauna	*The potential for disturbance to native flora and fauna during the removal of processed aggregate to the south of the Hangar will be mitigated using the following mitigation measures:* • All vehicles will be inspected, and wheels checked for the presence of seals and penguins before engines are started. If animals have to be moved, only trained people will do this in accordance with the Wildlife Interaction Manual, any animal interactions will be recorded. • The area will be checked for any fauna in close proximity to the stockpiles. If animals have to be moved, only trained people will do this in accordance with the Wildlife Interaction Manual, any animal interactions will be recorded. • A soft start may be implemented if deemed necessary.

Science and Logistical Activities Undertaken as Part of the Project. *e.g. collection of samples, deployment of monitoring equipment, storage/ handling of fuels and chemicals, waste production and camping*	**Identify Possible Impacts - Direct, Residual and/or Cumulative[8]**	**Mitigating Measures** *Please provide details of the mitigation measures you intend to implement to ensure that **negative impacts are minimised or avoided**.*
	Indirect/Cumulative - Non-native species introduction	The project will use equipment already on site at Rothera from previous seasons. All equipment shipped to Rothera as part of this project will have been subject to compliance with the biosecurity measures outlined in Appendix 2: Runway Resurfacing and Lighting Project-Specific Biosecurity Plan and the BAS Biosecurity Regulations (2021).
Examples		
E.g. Travel on foot between ice-free areas	*E.g. Possible introduction or intra-regional spread of non–native species (vegetation and/or invertebrates, including those in soil)*	*E.g. Biosecurity briefing provided to all team members prior to departure* *Boots, clothing and equipment to be cleaned thoroughly before departure from the UK.* *Visual checks/cleaning between sites to check no soil is stuck to boots or equipment.* *Follow guidelines in Scar Code of Conduct for Terrestrial Scientific Field Research and BAS Biosecurity Regulations.*
E.g. Camping on ice sheet	*E.g. Generation of domestic waste and human waste*	*E.g. All team members to read and be briefed on the 'Field Operations Manual' relating to Environmental Management and the BAS Waste Management Handbook.* *Waste bags and poo bins to be issued by Field Ops Manager. All domestic waste will be segregated in the field and returned to Rothera prior to final disposal outside of the Antarctic. Human waste will be incinerated at Rothera.*
E.g. Deploying retrievable sensors in the field	*E.g. Impact to wilderness and aesthetic value of the region.* *Risk of equipment becoming waste if not recovered.*	*E.g. Design phase of project has identified low toxic materials to be used in the construction of the sensors.* *The Environment Office will be informed of sensor deployment locations if equipment is not retrieved, and the details will be added to the 'lost equipment' log.*
Reference guidance documents *Please review the guidance documents provided below (please note that this is not an exhaustive list) and where applicable, reference these and any other environmental guidance relevant to your activities in the mitigation measures in the Environmental Matrix above.* • SCAR Codes of Conduct for Antarctic field work and the use of animals in Antarctica • BAS Wildlife Interaction Manual • BAS Waste Management Handbook for guidance and advice on waste management in Antarctica • BAS Biosecurity Regulations for guidance and advice on appropriate biosecurity measures		

5. SPECIALIST ACTIVITY PERMIT APPLICATION

If you have answered 'yes' to any of the questions in part 3 you may require a Specialist Activity Permit to carry out your planned activities. You must complete this Specialist Activity Permit application and confirm the details of all personnel involved in the proposed permitted activities.

Note: The only activity in the above combined PEA which answered yes to section 3.1.1 is the RUNSUR – Resurfacing works in the 23/24 season. The below permit application relates to this work.

4.1. Application Details

		Full Name	Job Title and Organisation/Employer	Nationality (as listed on passport)
4.1.1.	Permit applicant/holder (this is usually the PI/Project Lead)			
4.1.2.	Full list of people actively participating in sampling/specialist activities			

4.2. Mineral Resource Activities (Section 6 Specialist Activity)

- *Mineral resources include (but not exclusively) rock, soil, peat, sediment, seabed nodules, fossils, meteorites, and coal.*

4.2.1.	Do you intend to undertake any of the following activities: drilling, dredging, or excavating for mineral resources? If so, please describe the activity you plan to undertake, the type of mineral resource and the purpose of the activity.	Approximately 1500m^3 of previously processed aggregate will be moved from the laydown area south of the Hangar and reprocessed and rescreened for use on the runway. 12000m^3 of aggregate was processed and screened in the 22/23 season. This was stockpiled in locations on the western side of the runway (stockpile 4 – Figure 2) and south of Admirals building (stockpile 2 – Figure 2). This will be transported to the screener and rescreened then it will be spread across the runway in specific layers and then graded and compacted. All material is rock previously quarried at Rothera. No new quarrying will occur. The existing runway top surface layer is required to be scarified to a depth of between 100 mm to 350 mm to get a suitable surface for new material to bind to. Approximately 500m^3 of material will be moved from the sides of the runway and relocated to the edges of the runway, this will be spread by a grader and compacted by a roller to provide a stop-end to minimise runway material wastage.
4.2.2.	Do you intend to collect and or use any mineral resources? If so, please provide a description of the mineral resource type and the collection/use activities you intend to undertake.	The processed material will be used to resurface the runway as outlined in the 2022 IEE. The material along the edges of the runway was originally processed as part of the runway construction in 1990/1991 under CEE Proposed Construction of a Crushed Rock Airstrip at Rothera Point, Adelaide Island, British Antarctic Territory (ISBN 01-85531-003-1).

4.2.3. Do you intend to undertake any other activity for the purpose of identifying mineral resource occurrences or deposits? *e.g. assessing suitability of ground for use as construction site or suitability of soil or rock as construction material?* Please provide a description.	A topographic survey of the runway surface will be completed after the runway resurfacing is complete. In-situ California Bearing Ratio (CBR)/plate bearing tests will be carried out on the exposed runway surface to determine the strength of the underlying soils to ensure it is suitable for the runway resurfacing work.
4.2.4. Do you intend to sample mumiyo (solidified, waxy deposit produced when snow petrels vomit up their stomach oils) during your activities?	No

4.2.5. Provide information on estimated quantities and volumes or mass of mineral resource samples and the number and location of sampling sites:

Mineral resource	**Estimated number and volume/mass of individual samples to be collected**	**Total quantity of mineral resource to be collected**	**Number and locations of sampling sites** *(please also provide coordinates)*	**Method of extraction/collection**
e.g. soil	e.g., 50 x 20 g samples of soil	e.g., total of 1000 g of soil)	e.g., 5 sampling locations at Rothera station, specifically around the STP (10 samples per location)	e.g., by hand using a spatula and storing in a glass jar/ tube
Rock (already processed) and not removed from site	1500m^3 of previously processed aggregate will be moved from the laydown area south of the Hangar (rock produced originally under the Discovery Building Blasting permit and the quarry permit for the wharf 07/2018 & 12/2019-20) 12000m^3 of aggregate was processed and screened in the 22/23 season (under permit No.14/ 2022-23). This was stockpiled in locations on the western side of the runway and south of Admirals building.	14000m^3	Processed rock will be taken from: ● Laydown areas south of the Hangar ● Stockpile 2 (south of Admirals Building) ● Stockpile 4 (west of runway) A map/aerial image of stockpile locations can be seen in the 22/23 Post Season EIA Review, and Figure 2 of this PEA. All stockpiles are at Rothera Research Station.	An excavator will scoop up the material and load it into a dump truck, the material will then be screened (up to 1500m^3 will be reprocessed) and then be stockpiled, it will then be used to resurface the runway. Any excess will be used for future runway repairs.

	500m^3 of material along the sides of the runway will be relocated to edges of the runway was originally this was processed as part of the runway construction in 1990/1991 under CEE Proposed Construction of a Crushed Rock Airstrip at Rothera Point, Adelaide Island, British Antarctic Territory (ISBN 01-85531-003-1).			
Rock – Runway surface scarified	Surface will be scarified to a maximum depth of 350 mm. The average depth of scarification will be 200mm, which equates to a volume of 12,000m3.	12000m3 (volume scarified)	The area scarified will be the whole of the runway and part of the apron.	Using a scarifying attachment on existing large plant. This breaks up the surface, and material remains in the same location.

4.2.6.	Provide a brief justification for the requested quantities of samples.	All aggregate will stay on station, no samples will be removed. It will be used to resurface the runway. It is essential to resurface the runway so that aircraft can use the runway safely.
4.2.7.	Are the mineral resources being requested available, in an appropriate form, from publicly accessible collections outside of the Antarctic Treaty area?	N/A
4.2.8.	Do you intend to import any biological samples (soil) to the UK?	YES ☐ NO ☒
If you answered 'yes' to the above question, please take note: You must ensure you have read and understood the separate import licence requirements detailed in point 5.3.5.		
4.3. Disturbance/harmful interaction with fauna and damage to flora (Section 7 Specialist Activity)		
4.3.1.	Do you intend to sample, capture, kill or harmfully interfere with any marine or terrestrial flora or fauna (including invertebrates)? Please provide detail of the activities you intend to undertake which involve interaction with flora and fauna.	No
4.3.2. Complete the table below detailing the species that would be affected by the activity. • Provide information on estimated quantities and volumes or mass of biological samples and the number and location of sampling sites:		

Species (including sex/life stage, where appropriate)	**Estimated: (i) numbers of individuals to be handled or collected and/or (ii) total volume/mass of samples**	**Individual sample size/mass/volume**	**Total number of samples to be collected.**	**Sampling location** *(please also provide coordinates)*
e.g. female breeding adult Gentoo penguin	e.g. 12 x penguins/12ml blood, 12 feathers	e.g. 1 x 1ml blood sample and 1 feather from each penguin handled	e.g. 12 x 1ml blood samples (12ml of blood) and no more than 12 feathers	e.g. Gourlay Peninsula, Signy Island
e.g. colobanthus quitensis	e.g. 10 x plants/c. 50 g total dry weight	e.g. each plant sample is ~ 5g (dry weight)	e.g. 10 x 5g plant samples	e.g. Bernsten Point, Signy Island

4.3.3.	If your project involves working with vertebrates and/or cephalopods, has it been subject to Animal Welfare and Ethics Review? If so, please include details of the reviewing body, date of review and a copy the approval document.	Reviewing body and date of review: N/A Copy of approval document attached YES ☐ NO☐
4.3.4.	Do you consider any of your activities as 'biological prospecting'? Do you intend to utilise the requested samples for commercial applications?	N/A
4.3.5.	Do you intend to import any biological specimens (animals or plants) to the UK?	YES ☐ NO ☒

- If you answered 'yes' to the above question, please take note:
  - (1) Importation of biological or soil samples to the UK requires a relevant DEFRA/CITES import/export licence which is not covered by this 'Specialist Activities Permit application'.
  - (2) How and where your fauna/flora samples will be stored and curated may have an impact on the import/export licences required.
  - (3) If you require storage at BAS Cambridge, please agree this in advance with the Cambridge Laboratory Team.
  - (4) If samples are to be transferred to another institute, you must ensure you have any required site registration/import permissions in advance of collection.

Please contact Elaine Fitzcharles in the first instance: emfi@bas.ac.uk. For details on the protocols and procedures for consigning biological samples from all Antarctic stations and ships please refer to https://www.bas.ac.uk/for-staff/polar-predeployment-prep/intro-guidelines-and-forms/importing-biological-samples-into-the-uk/

4.4. Introduction of non-native species (Section 8 Specialist Activity)

4.4.1.	Do you intend to take to the Antarctic any non-sterile soil or non-native marine or terrestrial animal, plant, microorganism, seed, or other propagule? *Importation of non-sterile soil into Antarctica is prohibited under the Protocol on Environmental Protection to the Antarctic Treaty.*	No
4.4.2.	Provide a species list and estimate of quantity and volume.	N/A
4.4.3.	Provide an outline of the scientific purpose of the proposed introduction and why it is considered essential.	N/A
4.4.4.	Outline the measures you will take to prevent escape or spread of the introduced species or their contact with native fauna or flora.	N/A
4.4.5.	Describe the method of removal of the introduced species or its/ their disposal.	N/A

4.5. Entry into Protected Areas (Section 9 Specialist Activity)		
4.5.1.	Do you intend to visit any Antarctic Specially Protected Areas (ASPAs)? Please provide detail.	No
4.5.2.	Is the reason for your visit to the ASPA(s) for scientific research or for environmental management/conservation activities?	N/A
4.5.3.	What activities do you intend to undertake in the ASPA(s)? Please explain why these activities cannot be carried out outside the protected area.	N/A
4.5.4.	Provide a short justification of how your project meets the requirements of the protected area Management Plan.	N/A
4.6. Damage or Disturbance to Historic Sites and Monuments (Section 10 Specialist Activity)		
4.6.1.	Do you intend to visit any Historic Sites and Monuments (HSMs)? Please provide details and explain the purpose of your visit. Please note that HSMs are protected and any damage to sites or removal of objects is prohibited.	No

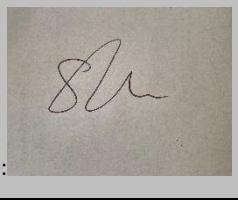
Statement of Agreement

In signing this form, you the PI/Project Lead (or other designated deputy) are confirming the following:

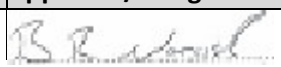
- I have read and agree with the 'Privacy Notice'.
- The information provided in this form is accurate and up to date. Any deviation from the information provided in this form will be communicated to the BAS Environment Office at the earliest opportunity.
- The information I have provided in this form, and the mitigation measures including those relating to biosecurity to which I have committed, will be communicated to all members of the project team.
- Should any environmental incidents occur, I will report these on the Maximo.
- I understand that this Preliminary Environmental Assessment (once agreed) and any associated Specialist Activity Permits (once issued) are activity/ person/time specific and are not transferrable to other locations in Antarctica, or to another person and are only valid for the period specified.
- I agree to provide feedback and a retrospective review of my activities by submitting the BAS EIA Post-Season Questionnaire to the Environment Office upon completion of my project or by the 30th of April (whichever is soonest).
- In accordance with Regulation 2 of the Antarctic (Amendment) Regulations 2008/3066, brief details (applicant name and job title, description of project and planned dates) of all permit applications (issued by the FCDO or the BAS Director) will be published on the FCDO website. My signature below will be taken as consent to publish this information.

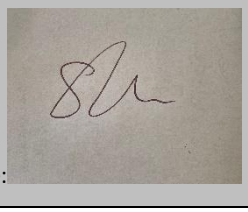
Rothera Temporary Wharf Projects – Mooring Weights

Applicant/PI Name	Applicant/PI Signature	Date
AR		25.09.2023
		Revision date (s)

This section to be completed by the BAS Environment Office only.		
Project to proceed with mitigating measures in place	☒	
An Initial Environmental Evaluation is required	☐	
Project requires Specialist Activity Permit to proceed. The BAS Environment Office will advise.	Section 6 ☐	
	Section 6 BAS authorisation letter ☐	
	Section 7 ☐	
	Section 8 ☐	
	Section 9 ☐	
	Section 10 ☐	
	Project requires permit from another national authority ☐	
Signature: 	Date: 3rd November 2023 Revision Date(s):	

Rothera Temporary Wharf Projects – Cast Hydrolysis Resistant Polyurethane (C-HPU) Hydraulic Lines Removal

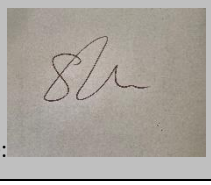
Applicant/PI Name	Applicant/PI Signature	Date
BN		22/09/2023
		Revision date (s)

This section to be completed by the BAS Environment Office only.		
Project to proceed with mitigating measures in place	☒	
An Initial Environmental Evaluation is required	☐	
Project requires Specialist Activity Permit to proceed. The BAS Environment Office will advise.	Section 6 ☐	
	Section 6 BAS authorisation letter ☐	
	Section 7 ☐	
	Section 8 ☐	
	Section 9 ☐	
	Section 10 ☐	
	Project requires permit from another national authority ☐	
Signature: 	Date: 3rd November 2023 Revision Date(s):	

California Bearing Ratio (CBR) Measurements of the Runway at Rothera

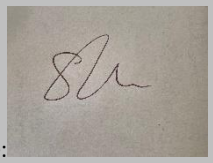
Applicant/PI Name	Applicant/PI Signature	Date
AB		26/09/23
		Revision date (s)

This section to be completed by the BAS Environment Office only.	
Project to proceed with mitigating measures in place	☒
An Initial Environmental Evaluation is required	☐

Project requires Specialist Activity Permit to proceed. The BAS Environment Office will advise.	Section 6 ☐	
	Section 6 BAS authorisation letter ☐	
	Section 7 ☐	
	Section 8 ☐	
	Section 9 ☐	
	Section 10 ☐	
	Project requires permit from another national authority ☐	
Signature: 	Date: 3rd November 2023 Revision Date(s):	

CBR Measurements at Sky Blu

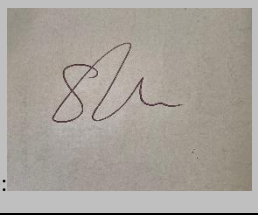
Applicant/PI Name	Applicant/PI Signature	Date
AB		26/09/2023
		Revision date (s)

This section to be completed by the BAS Environment Office only.		
Project to proceed with mitigating measures in place	☒	
An Initial Environmental Evaluation is required	☐	
Project requires Specialist Activity Permit to proceed. The BAS Environment Office will advise.	Section 6 ☐	
	Section 6 BAS authorisation letter ☐	
	Section 7 ☐	
	Section 8 ☐	
	Section 9 ☐	
	Section 10 ☐	
	Project requires permit from another national authority ☐	
Signature: 	Date: 3rd November 2023 Revision Date(s):	

Runway Friction Testing at Rothera

Applicant/PI Name	Applicant/PI Signature	Date

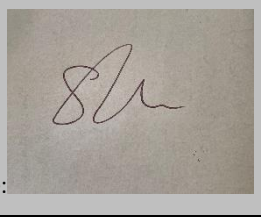
AB		26/09/2023
		Revision date (s)

This section to be completed by the BAS Environment Office only.		
Project to proceed with mitigating measures in place	☒	
An Initial Environmental Evaluation is required	☐	
Project requires Specialist Activity Permit to proceed. The BAS Environment Office will advise.	Section 6 ☐	
	Section 6 BAS authorisation letter ☐	
	Section 7 ☐	
	Section 8 ☐	
	Section 9 ☐	
	Section 10 ☐	
	Project requires permit from another national authority ☐	
Signature: 	Date: 3rd November 2023 Revision Date(s):	

Friction Testing at Sky Blu

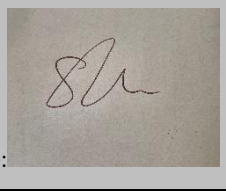
Applicant/PI Name	**Applicant/PI Signature**	**Date**
AB		26/09/2023
		Revision date (s)

This section to be completed by the BAS Environment Office only.		
Project to proceed with mitigating measures in place	☒	
An Initial Environmental Evaluation is required	☐	
Project requires Specialist Activity Permit to proceed. The BAS Environment Office will advise.	Section 6 ☐	
	Section 6 BAS authorisation letter ☐	
	Section 7 ☐	
	Section 8 ☐	
	Section 9 ☐	
	Section 10 ☐	

	Project requires permit from another national authority ☐	
Signature: 	Date: 3rd November 2023 Revision Date(s):	

AIMP RUNSUR – Runway resurfacing works in the 2023- 2024 Season

Applicant/PI Name	Applicant/PI Signature	Date
BC		22/09/2023
		Revision date (s)

This section to be completed by the BAS Environment Office only.		
Project to proceed with mitigating measures in place	☐	
An Initial Environmental Evaluation is required	☐	
Project requires Specialist Activity Permit to proceed. The BAS Environment Office will advise.	Section 6 ☒	
	Section 6 BAS authorisation letter ☐	
	Section 7 ☐	
	Section 8 ☐	
	Section 9 ☐	
	Section 10 ☐	
	Project requires permit from another national authority ☐	
Signature: 	Date: 3rd November 2023 Revision Date(s):	

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BRITISH ANTARCTIC SURVEY
ROTHERA MODERNISATION PHASE 1 – RMP SITEWIDE SERVICES 2023-2024 SEASON PRELIMINARY ENVIRONMENTAL ASSESSMENT (PEA)

RAMBOLL Bright ideas. Sustainable change.

British Antarctic Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

BRITISH ANTARCTIC SURVEY
ROTHERA MODERNISATION PHASE 1 – RMP SITEWIDE SERVICES 2023-2024 SEASON PRELIMINARY ENVIRONMENTAL ASSESSMENT (PEA)

Project name	**Rothera Modernisation Phase 1 – RMP Sitewide Services 23-24 Season**
Project no.	**1620013003-001**
Client	**British Antarctic Survey**
Version	**P01**
Prepared by	**LJ**
Checked by	**JT**
Approved by	**JTu**

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Suitability	Revision Code	Date	Purpose / Suitability Description	Approved By	Comments
S3	P01	16/08/2023	Suitable/Issued for review and comment	AP	First Issue to BAS for comment

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INTRODUCTION

The completion of an Environmental Impact Assessment (EIA) is a requirement of the Protocol on Environmental Protection to the Antarctic Treaty (1991)[1], the provisions of the Antarctic Act (1994, 2013)[2], and accompanying Antarctic Regulations 1995/490[3]. The minimum level of EIA required is the completion of a Preliminary Environmental Assessment (PEA). This document is a review of Rothera Modernisation Phase 1 – RMP Sitewide Services 23-24 Season PEA.

Privacy Notice: The British Antarctic Survey (BAS), a constituent organisation of the Natural Environment Research Council (NERC), will retain the personal data provided as confirmation of agreement with the conditions in this PEA and Specialist Activity Permit Application Form. A copy of the completed form may be circulated to all or any of the named participants, internally to BAS colleagues and to the Foreign and Commonwealth Development Office (FCDO)/or other relevant permitting authority in accordance with the guidelines set out in the Antarctic Act, 1994 & 2013. No personal data will be supplied to any other third party without consent. The personal data on this form and all other information provided will be retained for long-term environmental monitoring purposes.

[1] BAS, 1991. Protocol on Environmental Protection to the Antarctic Treaty (1991). [Online] Available at: https://www.bas.ac.uk/about/antarctica/the-antarctic-treaty/environmental-protocol/protocol-on-environmental-protection-to-the-antarctic-treaty-1991/

[2] Legislation.gov.uk, 1994. Antarctic Act 1994. [Online] Available at: https://www.legislation.gov.uk/ukpga/1994/15

[3] Legislation.gov.uk, 1995. The Antarctic Regulations 1995. [Online] Available at: https://www.legislation.gov.uk/uksi/1995/490/made

1. PROJECT DESCRIPTION

1.1. OSPQ number *(where applicable[1]/ known)*		**1.2. Title of Project**	Rothera Modernisation Phase 1 – RMP Sitewide Services 23-24 Season

1.3. Personnel involved. *Please provide names, organisation and job titles of all personnel involved and identify their specific project role e.g., Principal Investigator/Project Lead, Field Leader, external collaborators/contractors etc.*

Full Name	Organisation and Job Title	Project Role

1.4. Location

- Name each location to be visited with a description of the area, and state whether the site has been visited before.

Location Name *(including depot sites)*	**Location Description** *(e.g. coastal, ice-free, glacier, open ocean etc.)*	**Has the location been visited previously?** *Please provide detail.*
Rothera Station	New underground services installation between STP and BAM Fitter's Workshop	Yes – Rothera Station
Rothera Station	Repairs to Sitewide Services routing (North and South Station)	Yes – Rothera Station

1.5. **Please provide a brief description of your project including:**

(1) Proposed dates and duration of your project;

1st Nov – 1st May. To be scheduled around other Rothera Modernisation Phase (RMP) project and Rothera Station priorities.

(2) Summary of the main aims (scientific of otherwise) of your project;

To provide new sitewide services (SWS) infrastructure (power, water, sewage, fuel, data) to Rothera Station in support of Rothera Modernisation Project and delivery of Net Zero commitments.

(3) Outline of project plan (e.g., referring to locations as above, route and mode of travel, number of persons and time spent at each location);

Works being conducted by BAM and GA Barnies (BAM sub-contractor) as part of the RMP (Phase 1). 4-6 persons will be allocated to SWS construction in support of this task. These personnel will be part of the wider construction team and would be on station anyway to deliver other RMP works (covered by project EIA).

(4) Details of methodology (including equipment required); and

Underground Services Between STP and BAM Fitter's Workshop

Excavator to dig trench between STP and BAM Fitter's Workshop (around 10m in length and 3m across up to 2m deep) for the laying of ductwork for power, fuel, water electrical and data services to support Admirals House and to connect fuel services up to the fuel farm. All material removed will be screened alongside material excavated from the south of the hangar under the RunSur Project and reused in the backfill of the trench. Any excess excavated material will be stored in the existing stockpile west of the runway near the balloon launch containers. A wacker plate or roller to then be used to compact the base of the trench, prior to a layer of Type 1 gravel fill (0-30mm particle size). This material will be taken from the screened material on the western runway stockpile which have been quarried from Rothera Point in previous seasons and has been screened and stockpiled under 14/2022-23 . Expected amount of Type 1 fill is to be 1-2 loader buckets worth. Pipes and cable ducts will then be laid in the trench on top of the Type 1 fill. The trench will then be partially backfilled and sections of steel sheet pile laid horizontally across the trench to provide load protection to the services below in order to allow heavy vehicles to drive above. The remainder of the trench will then be backfilled and compacted using a roller and/or wacker plate. Back filling of the trench will be using the original material that was excavated and stockpiled adjacent. There may be a requirement to provide a cement footing for the sheet pile sections, subject to site assessment during the works. Total volume of cement footings is not expected to exceed 1 cubic metre. The mixing of cement will follow the process articulated in the EIA and Activity Plan risk assessments for grouting operations (BAA4008-BAM-ZZ-YYY-MS-WA-0034) whereby cementitious wash waters will be neutralised prior to discharge. Discharge quantities will be recorded and reported to BAS. Cement will be mixed in a dedicated area with sheeting to control wind on the BAM yard next to the BAM Workshop.

Sitewide Services Structural Repairs

Structural repairs are required to a number of areas of the new Sitewide Services installation following damage by excessive snow loading over the previous 2 winters. All works will be carried out in accordance with the original project methodologies outlined in the RMP 1 IEE (Section 4.5.2).

(5)	*Brief justification of the environmental impact, as applicable*

Underground Services Between STP and BAM Fitter's Workshop

This is a revised piece of work due to a change in the original design/project works outlined in the RMP Phase 1 EIA. The original proposal for Sitewide Services installation in this area was for the services to run above ground on a metal framework. The decision was taken to run the services in the area outlined in this PEA underground in order to facilitate essential vehicle access to the Waste Handling Facility, STP and also provide an alternate access to North Cove and NBH, which was deemed essential by BAS Operations. As conveyed in the EIA, all services will have leak detection, whether above or below ground. The risk of leaks is very low given that fluid services are protected by a multiple sheath pipework, housed within underground ducts and protected by a sheet pile. Nonetheless, the methodology for installation of the sheet pile allows for it to be removed following re-excavation of material lying above so that remedial work could be completed if a leak was detected. if remedial works are required following detection of a leak.

Sitewide Services Structural Repairs

Essential repairs required following structural damage from previous winters. This work must be completed to achieve project completion and handover of new Discovery Building as planned in March 2025. The repair work includes addition of a steel sheath that fits over the existing steel upright and steel branches to increase the universal loading of the existing infrastructure. There is no wastage or removal of existing steel from the structure.

2. IDENTIFICATION OF POTENTIAL IMPACTS

2.1. Chemicals and Hazardous Substances If you intend to use any chemicals, hazardous substances, radioactive material or stable isotopes you must submit a CAR form (with the associated RAs, COSHH assessments & SOPs) to the BAS Laboratory Manager for review and approval (Station/Field projects: emfi@bas.ac.uk; SDA projects: SDALabManager@bas.ac.uk). Please also contact Kath Nicholson for advice on how to package hazardous goods and hazardous waste for shipping - kani@bas.ac.uk			
2.1.1.	Do you intend to use any chemicals, radioactive material or stable isotopes likely to interact with the environment outside of the laboratory/ in the field? If so, please provide detail here (or attach a copy of your CAR form for our information only) explaining how you intend to use them and list the mitigation measures you intend to use to safeguard the environment.	No	
2.1.2.	Do you intend to use any other hazardous substances e.g. paints, batteries etc.?	YES ☐	NO ☒
2.1.3.	If so, please list substances likely to interact with the environment here and provide detail on how you intend to use them listing the mitigation measures you intend to use to safeguard the environment.		
2.2. Waste Management Please refer to the BAS Waste Management Handbook for further information on waste packaging and consignment.			
2.2.1.	How much waste (hazardous, radioactive and/or non-hazardous) will the project produce? ▪ *Please include approximate weights/volumes (and radioactive levels where applicable) by waste type anticipated.*	Some additional steel framework waste will be created from the sitewide services repairs, following removal of damages sections. This waste will be processed and removed by BAM in accordance with the existing RMP 1 IEE.	
2.2.2.	Is your project taking place on a BAS station or supported by BAS in the field?	YES ☒ *Please go to 2.2.3*	NO ☐ *Please go to 2.2.4*
2.2.3.	Please indicate the anticipated quantities and type(s) of waste packaging required, in particular for hazardous waste. ▪ *Environment Office will review this against the standard station supply and advise whether additional waste packaging for your project is required.*	No additional packaging required	
2.2.4.	Is your project taking place on the *Sir David Attenborough or other NERC vessel*?	YES ☐ *Please go to 2.2.5*	NO ☒ *Please go to 2.2.6*
2.2.5.	Please provide the quantities and type(s) of waste packaging required, in particular for hazardous waste. ▪ *BAS Environment Office will procure and provide the necessary waste packaging materials and ensure they are delivered to the vessel. If you do not provide any details here, you will be responsible for organising your own compliant packaging prior to boarding the ship.* ▪ *All project waste produced on the SDA (or NERC vessels supporting BAS science) within the Antarctic should be consigned to the BAS Environmental Manager in the UK for disposal. BAS Environment Office will then organise and pay for the disposal of this waste. However, please note that radioactive waste transport and disposal costs will be charged back to the responsible project.*	N/A	
2.2.6.	If your project is logistically supported by a non-BAS Antarctic operator or non-BAS/NERC vessel, please provide further details. ▪ *BAS Environment Office will not supply waste packaging or provide waste disposal. Please confirm that the project/operator/vessel will provide appropriate and compliant waste packaging and*	Logistics and waste processing/removal remains in accordance with current Rothera Modernisation Phase 1 IEE	

	confirm how the waste will be disposed of in accordance with all relevant waste legislation[4].		
2.3. Oil Spill Response (for field activities only)			
2.3.1.	Please confirm the type and quantity of fuel that will be taken into, used, and stored in the field.	N/A	
2.3.2.	Please confirm that you have discussed your field fuel needs and requirement for spill kits with the BAS Field Operations Manager. All field parties must be familiar with the BAS fuel spill protocols.		
2.4. Deployment and Installation of Equipment			
2.4.1.	Do you intend to install or deploy any equipment in the field or ocean (including data loggers/markers on animals, moorings, gliders, etc.)?	YES ☐ *Please complete questions 2.4.2 – 2.4.6.*	NO ☒ *Please go to 2.5*
2.4.2.	Provide a brief description of the equipment including details of the materials, dimensions, weight, and any hazardous substances such as batteries or oils.	N/A	
2.4.3.	Provide a brief summary of the location where equipment will be installed or deployed (including coordinates).	N/A	
2.4.4.	Provide details of how the equipment will be labelled and referenced (equipment should be easily identifiable as science instrumentation and be able to be traced back to the organisation or project).	N/A	
2.4.5.	Describe how and when the equipment is to be maintained and removed. Confirm if funding and operational support is in place for your retrieval plans. *If any of the equipment you deploy in the field or ocean is lost or cannot be retrieved as planned you will need to report this at the time of the incident on Maximo[5] and to the Environment Office on the EIA Post Season Questionnaire.*	N/A	
2.4.6.	Is the intention for any of your equipment to remain in the field/ocean permanently (e.g. mooring anchors, buried seismic conduits, etc.)? If, so please detail the equipment to be left behind intentionally and explain why it cannot be retrieved.	N/A	
2.5. Remotely Piloted Aircraft Systems (RPAS) or other remotely operated marine or terrestrial vehicles (ROVs) RPAS includes drones, quadcopters or any remotely operated or autonomous aircraft whether rotary or fixed wing. If you are operating RPAS contact Carl Robinson for further advice – carob@bas.ac.uk.			
2.5.1.	Does the project intend to utilise RPAS or other remotely operated marine or terrestrial vehicles? If so, please provide detail including the size, make, model and operating capacity (e.g. maximum wind resilience, flight time, fail safes, etc.)	No	
2.5.2.	Does the project involve Beyond Visual Line of Sight (BVLOS) operations for RPAS? If so, please provide details. **If yes, this will require review by the Air Unit.**	No	
2.5.3.	Describe the location in which the RPAS/ ROV will be operated (e.g. off a ship, deep field, near a station, over wildlife, etc.)	N/A	
2.5.4.	Do you require BAS Ops to provide the RPAS/ ROV and/or pilot?	N/A	

[4] Waste (England and Wales) (Amendment) Regulations 2012, The Duty of Care Regulations 1991, and the Hazardous Waste (England and Wales) (Amendment) Regulations 2009. These regulations affect the packaging, containment, storage, transportation and disposal of waste from source to final disposal. This includes transportation from the UK port, where the waste is offloaded from the ship, and to the waste disposal site.

[5] Maximo is the BAS Incident Reporting System

	▪ If yes, contact Carl Robinson to coordinate the request and confirm here that you have done so.	
2.5.5.	Do you intend to provide your own RPAS/ ROV and/or pilot?	N/A
2.5.6.	Confirm the names of all the pilots/vehicle operators.	N/A
2.5.7.	Detail number of hours flown in the last 3 months and number of hours in total flown on proposed platform.	N/A
2.5.8.	Do the pilots hold a General Visual Line of Sight Certificate (GVC) or equivalent? Please provide details of qualifications held.	N/A
2.5.9.	Please confirm you have read and will commit to follow the BAS Regulations on RPAS use in Antarctica.	YES ☒
2.6. Construction and Maintenance Work		
2.6.1.	Do you intend to import natural materials to Antarctica (e.g. untreated wood, aggregate, sand etc.)? Provide details of type, quantity and from where the materials will be sourced. Please refer to Section 4.4 of the BAS Biosecurity Regulations and discuss with Environment Office as appropriate.	If cement footings are required for the sheet piles as described in Section 1.5 then the intention would be to use pre-mixed grout (bagged) which has already passed bio-security checks and is currently held at Rothera. This material has been used previously in Discovery Building construction.
2.6.2.	Will the work require concrete mixing on site? Provide details of the expected quantity and working methods.	As above, may require on-site mixing using dry bagged grout mix. All procedures will be in accordance with general BAS/RMP/BAM biosecurity and site procedures. Total quantity not expected to exceed 1 cubic metre. Risk Assessment completed for mixing of materials and discharge of cementitious wash waters in a controlled area.
2.6.3.	Will the project require the removal of any asbestos? Provide details of the expected quantity.	No
2.6.4.	Do you anticipate the alteration, removal or destruction of equipment, buildings or structures (or parts of buildings or structures) that may be considered to have heritage value?	No
2.7. Biosecurity		
2.7.1.	Please confirm that you have familiarised yourself with the biosecurity guidance provided by BAS in the Biosecurity Regulations and by SCAR in the Environmental code of conduct for terrestrial scientific field research in Antarctica.	YES ☒
2.7.2.	Do you intend to move terrestrial or marine specimens, including unfixed biological samples, soils, sediments, rocks, or other mineral resources between different areas of Antarctica (including returning materials to research stations)? If 'yes', please describe the precautions you will take to prevent the transfer/release of indigenous species between distinct Antarctic Conservation Biogeographic Regions[6] (ACBRs) or between Antarctic and sub-Antarctic locations.	No
2.8. Sensitive sites with restrictions or guidelines		
2.8.1.	Do you intend to visit any CCAMLR registered Vulnerable Marine Ecosystems (VMEs), CCAMLR Ecosystem Monitoring Programme (CEMP) Site(s) or	No

[6] Note: On 'Antarctic Conservation Biogeographic Regions' select 'Antarctic conservation biogeographic areas' from the 'Layer List' at the top right hand corner symbol, to see the ACBRs displayed.

	Marine Protected Areas (MPAs)[7]? Please provide details.	
2.8.2.	Do you intend to visit any Important Bird Areas (IBAs)? Please provide details.	No
2.8.3.	Do you intend to visit any Antarctic Specially Managed Areas (ASMAs)? Please provide details.	No
2.8.4.	Do you intend to visit any of the most visited locations in Antarctica (excluding research stations) as identified by the Antarctic Treaty System? Please confirm which locations you will visit and that you have read and understood the associated Visitor Site Guidelines.	N/A

[7] Geographic details (positions, area) of these sites can be viewed in the CCAMLR GIS (select the appropriate designation(s) from the layers list on the left-hand side.

3. IDENTIFICATION OF SPECIALIST ACTIVITIES IN ANTARCTICA

Specialist activities in Antarctica are prohibited without issue of a specialist activity permit under the Antarctic Act 1994; 2013 (Sections 6-10):

- Mineral resource activities (Section 6 permit)
- Disturbance/harmful interaction with fauna and damage to flora (Section 7 permit)
- Introduction of non-native species (Section 8 permit)
- Entry into protected areas (Section 9 permit)
- Damage or disturbance of Historic Sites and Monuments (Section 10 permit)

Specialist Activity Permits may be issued by the UK Foreign, Commonwealth and Development Office or by the BAS Director under delegated authority in accordance with the UK Antarctic Act (1994; 2013) or by another competent authority. The BAS Environment Office will advise you upon review of your application.

3.1. Do you intend to undertake any of the following specialist activities in Antarctica? If you answer 'yes' to any of the below questions please also complete parts 4, 5 and 6 of this form. If you answered 'no' to all of the below questions, you only need to complete parts 4 and 6.

3.1.1.	Do you intend to undertake any of the following mineral resource activities? a. Drill, dredge or excavate for mineral resources; or b. Collect/use any samples of mineral resources; or c. Do anything else for the purpose of identifying specific mineral resource occurrences or deposits.	YES ☒	NO ☐
3.1.2.	Do you intend to sample, capture, kill or harmfully interfere with any marine or terrestrial flora or fauna (including invertebrates)?	YES ☐	NO ☒
3.1.3.	Do you intend to take to the Antarctic any non-sterile soil or non-native marine or terrestrial animal, plant, microorganism, seed or other propagule?	YES ☐	NO ☒
3.1.4.	Do you intend to visit any Antarctic Specially Protected Areas (ASPAs)?	YES ☐	NO ☒
3.1.5.	Do you intend to damage or disturb Historic Sites and Monuments and/or their artefacts?	YES ☐	NO ☒

4. ENVIRONMENTAL IMPACT MATRIX

4.1. Environmental Matrix (please complete as per guidance and examples provided in the table below)

Science and logistical activities undertaken as part of your project *e.g. collection of samples, deployment of monitoring equipment, storage/ handling of fuels and chemicals, waste production and camping*	**Identify possible impacts - direct, residual and/or cumulative**[8]	**Mitigating measures** *Please provide details of the mitigation measures you intend to implement to ensure that **negative impacts are minimised or avoided**.*
Installation of new underground fuel pipework	*Direct/Cumulative -* Possibility of future fuel leakages from new pipework	All new pipework will be pressure tested (dry) to ensure quality of jointing prior to any commissioning and operation with fuel. New fuel pipe system is double-walled with in-built leak detection, which will raise an alarm to the station maintenance team if any leak is detected. This will allow fuel pumps to be switched off immediately to minimise any leakage volume until the issue can be investigated and repaired as necessary. There is no change to BAS operational procedure in addressing a leak underground in which BAS Estates teams on Station immediately attend to a leaking pipe to contain spillage. The underground services are close to the surface as the sheet pile provides structural support. All cover material will be excavated and the sheet pile lifted to gain access. Any spills are then contained at source, contaminated material removed and the leak is fixed. *Fuel leakages will be managed by the following mitigation measures:* • *A trained core oil spill response team of a minimum of 24 station staff will be formed at the start of each working season. Pre-deployment oil spill response training led by the BAS Environment Office and delivered by BAS and Oil Spill Response Ltd.;* • *Oil Spill Kits to be on hand and ready to deploy if necessary. Spill kits to be kept in every vehicle; and* • *All spills will be reported to Rothera Station Lead and BAS Environment Office.*
Excavation/Trenching Works	*Direct/Cumulative* – Noise. Digging and trenching activities will create noise emissions which could disturb wildlife. *Direct/Cumulative – Vibration*	Works will only take place between 0800-1800. Area of works is within main station activity zone and is not within proximity to sensitive bird nest sites. Every plant move whereby visibility is restricted includes a banksman who is responsible for ensuring a safe zone around the vehicle, checking to ensure that personnel and animals are not within the operation of the plant. Only trained individuals will move animals from the work area and in accordance with wildlife interaction guidelines. All incidents of interaction are reported.

[8] Direct impacts of your activities on flora, fauna, air quality, water quality (fresh and marine), geology, soils, permanent ice, noise levels or cultural heritage. Residual impacts once your project is complete such as leaving equipment in the field longer term, permanent removal of samples from the field, and impacts on the value of the locality for future science. Cumulative impacts: If you are aware of any other projects or activities in the past, present or foreseeable future then these could, combined with your proposed project, result in a significant environmental impact.

Science and logistical activities undertaken as part of your project *e.g. collection of samples, deployment of monitoring equipment, storage/ handling of fuels and chemicals, waste production and camping*	**Identify possible impacts - direct, residual and/or cumulative**[8]	**Mitigating measures** *Please provide details of the mitigation measures you intend to implement to ensure that **negative impacts are minimised or avoided**.*
	Direct/Cumulative - Removal/relocation of rock/mineral material	All material removed during excavation will be stockpiled local to the works area and replaced by backfilling into the trench on completion. Excess material will be screened and stockpiled west of the runway in an existing stockpile under extant work permits.
		Noise and Vibration will be managed by the following mitigation measures: • *10 mph speed limit maintained and enforced on site;* • *Plant items will be positioned to ensure exhaust outlets point away from sensitive receptors;* • *Regular maintenance of all plant and vehicles to ensure they are working efficiently and generating as little noise as possible; and* • *A soft-start procedure , outlined in the IEE, will be implemented if necessary as detailed in the IEE. Consideration of the impact of noisy activities to all wildlife in the vicinity will be given.* *The removal/relocation of rock/mineral material is a physical or mechanical disturbance on land and will be managed by the following mitigation measures:* • *Minimise the footprint of works;* • *Where possible, trenches/excavations will be backfilled at the end of a shift, however if this is not feasible, trenches/ excavations will be suitably covered, fenced, and signed and not be left open for longer than necessary; and* • *If contamination is encountered during the trenching/excavation, all equipment will be cleaned between trial pitss to prevent cross contamination. Any occurrences of contamination to be reported.*
Installation of underground pipework and cabling (general)	*Direct/Indirect/Cumulative* - Man-made materials will have been introduced underground and will require removal and disposal when they reach end-of-life. Design life planned for 60 years, with first major works 25 years after the Project Completion Date.	Details and locations of all materials installed below ground will be provided to BAS by the Contractor,, BAM as part of the as-built drawings, allowing BAS to identify and locate all elements for future removal when they reach end of life, no earlier than 25 years from handover (Mar 2025)
		The potential for hazardous man-made materials to enter the environment will be managed by the following mitigation measure: • *During replacement or decommissioning, material will be over-excavated to compensate for any potential degraded plastic in the surrounding material.*

Science and logistical activities undertaken as part of your project *e.g. collection of samples, deployment of monitoring equipment, storage/ handling of fuels and chemicals, waste production and camping*	**Identify possible impacts - direct, residual and/or cumulative**[8]	**Mitigating measures** *Please provide details of the mitigation measures you intend to implement to ensure that **negative impacts are minimised or avoided**.*
Laying of fine grade gravel/rock bed for pipework and cable ducts within trench	*Direct/Cumulative -* Cables and pipes will be bedded on a fine grade gravel. This will be taken from stockpiles already quarried from the Rothera point location and processed on site. This rock will have been moved from Rothera Point to the Sitewide Services Run A location between the STP and BAM Fitter's Workshop.	Fine grade gravel will have been taken from within Rothera Station footprint (processed under permit 14/2022-23) and has been quarried from a nearby area, the location it is to be infilled. Volumes will be kept to the minimum required to meet construction specification. Remainder of trench will be infilled with original material that was removed during excavation. Excess material is stockpiled west of the runway.
Construction and Maintenance Work	*Direct – Cement footings.* *Direct – The generation of Dust*	*Construction and maintenance works will be managed by the following mitigation measures:* • *Pre-mixed cement will be stored inside a building or within a container.* • *As far as possible, all unused pre-mixed cement should be returned to the UK on completion of project works.* *All material to be used must have passed all biosecurity checks.* *Dust will be managed in by the following mitigation measures:* • *If required dust suppression should be used;* • *Where practicable, keep activities which create dust downwind of sensitive receptors and avoid close proximity to known vegetation and ice locations;* • *All routes used by vehicles and plant will be well maintained and have compacted surfaces;* • *10 mph speed limit maintained and enforced on site;* • *All plant and equipment will be maintained on a regular basis; and* • *Any cementitious wash waters produced during construction will be neutralised to a pH of 7.0 using citric acid prior to discharge to ground. Cementitious materials will be mixed in a designated container next to the BAM Fitters Workshop and the wash water, once neutralised, will be discharged away from sensitive receptors to the west of the BAM Fitters Workshop.* *Dust will be monitored using environmental monitors, positioned across the construction site. Any exceedances are recorded and reported to the BAS Environment Team and updated on the Project Variation Register. On immediately being notified by the monitors of an exceedance, the BAM Environmental Manager will investigate, and stop activity creating dust. The BAM Environmental Manager will develop the Activity Plan, with appending Risk Assessment, to include actions to mitigate further excess production of dust. The Activity Plan will be signed off by the BAS Contract Administrator.*

Science and logistical activities undertaken as part of your project *e.g. collection of samples, deployment of monitoring equipment, storage/ handling of fuels and chemicals, waste production and camping*	**Identify possible impacts - direct, residual and/or cumulative[8]**	**Mitigating measures** *Please provide details of the mitigation measures you intend to implement to ensure that **negative impacts are minimised or avoided**.*
Site Wide Services	*Direct - The creation of additional steel framework waste following the removal of damaged sections.* *Direct - Logistics and waste processing/removal.* *Direct/Indirect/Cumulative - Atmospheric emissions.* *Direct/Cumulative – Potential disturbance to biodiversity*	*The damaged sections of SWS are behind Vikings accommodation and between Giants and the Bonner Laboratory along Giants Road. These areas do not have any sensitive flora and are away from known locations of fauna. The moss bank is not in the immediate vicinity but will be photographed monthly and included in the BAM environmental monitoring spreadsheet as per standard procedures. The BAS site supervisor will also regularly check the area during daily site visits.* *Additional waste will be segregated and managed by the following mitigation measures:* • *Metal/carbon steel waste generated will be managed, segregated and stored in accordance with the BAS Waste Management Handbook and the SWMP;* • *Packaging to be minimised where possible;* • *A dedicated BAM staff member will ensure that all waste is managed appropriately; and* • *Daily checks to ensure waste is contained to avoid being blown around site.* *Atmospheric emissions will be managed by the following mitigation measures:* • *Regular inspection and maintenance will be carried out to ensure all vehicles, plant and generators operate efficiently; and* • *Where practical, all drivers will be instructed to turn off engines during periods of waiting for 15 minutes or more.* *Potential disturbance to biodiversity will be managed by the following mitigation measures:* • *In the unlikely circumstance of the displacement of any species, only trained personnel will be involved – the BAS Wildlife Interaction Manual will be referred to for any contact with wildlife; and* • *All vehicles will be inspected, and wheels checked for the presence of seals and penguins before engines are started.*
Working in Low Light Conditions	*Direct – Light Emissions*	• Minimise use of lighting rigs during low light or darkness • Rigs to be angled towards the ground, not horizontal. • Lights to be turned off when not in use. • Lights switched off immediately if more than 5 strikes in one period of works. • SL and BAS Environment Office to be informed should there be any bird strikes. • Continued use of lighting rigs will only be allowed after consultation with the BAS Environment Office.

Science and logistical activities undertaken as part of your project *e.g. collection of samples, deployment of monitoring equipment, storage/ handling of fuels and chemicals, waste production and camping*	**Identify possible impacts - direct, residual and/or cumulative**[8]	**Mitigating measures** *Please provide details of the mitigation measures you intend to implement to ensure that **negative impacts are minimised or avoided**.*
Examples		
E.g. Travel on foot between ice-free areas	*E.g. Possible introduction or intra-regional spread of non–native species (vegetation and/or invertebrates, including those in soil)*	*E.g. Biosecurity briefing provided to all team members prior to departure* *Boots, clothing and equipment to be cleaned thoroughly before departure from the UK.* *Visual checks/cleaning between sites to check no soil is stuck to boots or equipment.* *Follow guidelines in Scar Code of Conduct for Terrestrial Scientific Field Research and BAS Biosecurity Regulations.*
E.g. Camping on ice sheet	*E.g. Generation of domestic waste and human waste*	*E.g. All team members to read and be briefed on the 'Field Operations Manual' relating to Environmental Management and the BAS Waste Management Handbook.* *Waste bags and poo bins to be issued by Field Ops Manager. All domestic waste will be segregated in the field and returned to Rothera prior to final disposal outside of the Antarctic. Human waste will be incinerated at Rothera.*
E.g. Deploying retrievable sensors in the field	*E.g. Impact to wilderness and aesthetic value of the region.* *Risk of equipment becoming waste if not recovered.*	*E.g. Design phase of project has identified low toxic materials to be used in the construction of the sensors.* *The Environment Office will be informed of sensor deployment locations if equipment is not retrieved, and the details will be added to the 'lost equipment' log.*

Reference guidance documents

Please review the guidance documents provided below (please note that this is not an exhaustive list) and where applicable, reference these and any other environmental guidance relevant to your activities in the mitigation measures in the Environmental Matrix above.

- SCAR Codes of Conduct for Antarctic field work and the use of animals in Antarctica
- BAS Wildlife Interaction Manual
- BAS Waste Management Handbook for guidance and advice on waste management in Antarctica
- BAS Biosecurity Regulations for guidance and advice on appropriate biosecurity measures

5. SPECIALIST ACTIVITY PERMIT APPLICATION

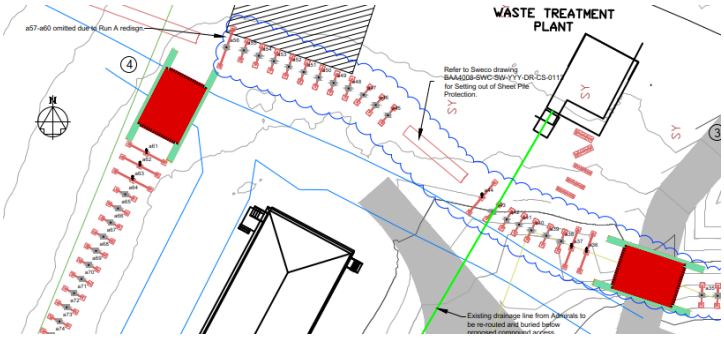
If you have answered 'yes' to any of the questions in part 3 you may require a Specialist Activity Permit to carry out your planned activities. You must complete this Specialist Activity Permit application and confirm the details of all personnel involved in the proposed permitted activities.

4.2. Application Details

		Full Name	Job Title and Organisation/Employer	Nationality (as listed on passport)
4.2.1.	Permit applicant/holder (this is usually the PI/Project Lead)			
4.2.2.	Full list of people actively participating in sampling/specialist activities			

4.3. Mineral Resource Activities (Section 6 Specialist Activity)

Mineral resources include (but not exclusively) rock, soil, peat, sediment, seabed nodules, fossils, meteorites and coal.

4.3.1.	Do you intend to undertake any of the following activities: drilling, dredging or excavating for mineral resources? If so, please describe the activity you plan to undertake, the type of mineral resource and the purpose of the activity.	Excavating of rock to form new underground service trench between the STP and BAM Fitter's Workshop next to road immediately north of Admirals, to place services below a road. Area indicated outlined by red rectangle in the centre of the image below.  New trench maximum dimensions: L: 10m W: 3m Depth: 2m All material will be locally stockpiled and replaced to backfill trench on completion of new services installation. Any excess material, although unlikely Will be thinly spread in the vicinity of the trench.
4.3.2.	Do you intend to collect and or use any mineral resources? If so, please provide a description of the mineral resource type and the collection/use activities you intend to undertake.	Fine grade gravel (up to 2 loader buckets of 0-30mm grade) will be collected from existing Rothera stockpiles located on the west side of the Runway (processed under permit 14/2022-23). Area and used within new trench as a peas shingle bed for new underground pipes and cable installations.
4.3.3.	Do you intend to undertake any other activity for the purpose of identifying mineral resource occurrences or deposits? *e.g. assessing suitability of ground for use as construction site or suitability of soil or rock as construction material?* Please provide a description.	No
4.3.4.	Do you intend to sample mumiyo (solidified, waxy deposit produced when snow petrels vomit up their stomach oils) during your activities?	No

4.3.5. Provide information on estimated quantities and volumes or mass of mineral resource samples and the number and location of sampling sites:

Mineral resource	**Estimated number and**	**Total quantity of mineral**	**Number and locations of sampling sites** *(please also provide coordinates)*	**Method of extraction/collection**

	volume/mass of individual samples to be collected	**resource to be collected**		
Rothera shale/loose rock top layer between STP and BAM Fitter's workshop	1 trench, total volume to be excavated up to 60 cubic metres	1	1 – Trench between STP and BAM Fitter's Workshop	Mechanical Excavator

4.3.6.	Provide a brief justification for the requested quantities of samples.	Rock excavation required following changes to the Rothera Modernisation Phase 1 Sitewide Services design. This work is essential in order to complete the project and deliver the planned handover of the new Discovery building as planned in March 2025
4.3.7.	Are the mineral resources being requested available, in an appropriate form, from publicly accessible collections outside of the Antarctic Treaty area?	N/A
4.3.8.	Do you intend to import any biological samples (soil) to the UK?	YES ☐ NO ☒

If you answered 'yes' to the above question, please take note:
You must ensure you have read and understood the separate import licence requirements detailed in point 5.3.5.

4.4. Disturbance/harmful interaction with fauna and damage to flora (Section 7 Specialist Activity)

4.4.1.	Do you intend to sample, capture, kill or harmfully interfere with any marine or terrestrial flora or fauna (including invertebrates)? Please provide detail of the activities you intend to undertake which involve interaction with flora and fauna.	

4.4.2. Complete the table below detailing the species that would be affected by the activity.
Provide information on estimated quantities and volumes or mass of biological samples and the number and location of sampling sites:

Species (including sex/life stage, where appropriate)	**Estimated: (i) numbers of individuals to be handled or collected and/or (ii) total volume/mass of samples**	**Individual sample size/mass/volume**	**Total number of samples to be collected.**	**Sampling location** *(please also provide coordinates)*
e.g. female breeding adult Gentoo penguin	e.g. 12 x penguins/12ml blood, 12 feathers	e.g. 1 x 1ml blood sample and 1 feather from each penguin handled	e.g. 12 x 1ml blood samples (12ml of blood) and no more than 12 feathers	e.g. Gourlay Peninsula, Signy Island
e.g. colobanthus quitensis	e.g. 10 x plants/c. 50 g total dry weight	e.g. each plant sample is ~ 5g (dry weight)	e.g. 10 x 5g plant samples	e.g. Bernsten Point, Signy Island

4.4.3.	If your project involves working with vertebrates and/or cephalopods, has it been subject to Animal Welfare and Ethics Review? If so, please include details of the reviewing body, date of review and a copy the approval document.	Reviewing body and date of review: Copy of approval document attached YES ☐ NO☐
4.4.4.	Do you consider any of your activities as 'biological prospecting'? Do you intend to utilise the requested samples for commercial applications?	
4.4.5.	Do you intend to import any biological specimens (animals or plants) to the UK?	YES ☐ NO ☐

If you answered 'yes' to the above question, please take note:

(1) Importation of biological or soil samples to the UK requires a relevant DEFRA/CITES import/export licence which is not covered by this 'Specialist Activities Permit application'.

(2) How and where your fauna/flora samples will be stored and curated may have an impact on the import/export licences required.

(3) If you require storage at BAS Cambridge, please agree this in advance with the Cambridge Laboratory Team.

(4) If samples are to be transferred to another institute, you must ensure you have any required site registration/import permissions in advance of collection.

Please contact Elaine Fitzcharles in the first instance: emfi@bas.ac.uk. For details on the protocols and procedures for consigning biological samples from all Antarctic stations and ships please refer to https://www.bas.ac.uk/for-staff/polar-predeployment-prep/intro-guidelines-and-forms/importing-biological-samples-into-the-uk/

4.5. Introduction of non-native species (Section 8 Specialist Activity)

4.5.1.	Do you intend to take to the Antarctic any non-sterile soil or non-native marine or terrestrial animal, plant, microorganism, seed or other propagule? *Importation of non-sterile soil into Antarctica is prohibited under the Protocol on Environmental Protection to the Antarctic Treaty.*	No
4.5.2.	Provide a species list and estimate of quantity and volume.	
4.5.3.	Provide an outline of the scientific purpose of the proposed introduction and why it is considered essential.	
4.5.4.	Outline the measures you will take to prevent escape or spread of the introduced species or their contact with native fauna or flora.	
4.5.5.	Describe the method of removal of the introduced species or its/ their disposal.	

4.6. Entry into Protected Areas (Section 9 Specialist Activity)

4.6.1.	Do you intend to visit any Antarctic Specially Protected Areas (ASPAs)? Please provide detail.	No
4.6.2.	Is the reason for your visit to the ASPA(s) for scientific research or for environmental management/conservation activities?	
4.6.3.	What activities do you intend to undertake in the ASPA(s)? Please explain why these activities cannot be carried out outside the protected area.	
4.6.4.	Provide a short justification of how your project meets the requirements of the protected area Management Plan.	

4.7. Damage or Disturbance to Historic Sites and Monuments (Section 10 Specialist Activity)

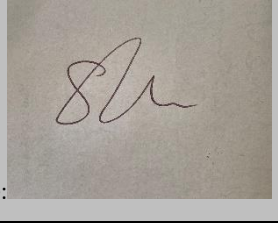
4.7.1.	Do you intend to visit any Historic Sites and Monuments (HSMs)? Please provide details and explain the purpose of your visit. Please note that HSMs are protected and any damage to sites or removal of objects is prohibited.	No

6. STATEMENT OF AGREEMENT

In signing this form, you the PI/Project Lead (or other designated deputy) are confirming the following:

- I have read and agree with the 'Privacy Notice'.
- The information provided in this form is accurate and up to date. Any deviation from the information provided in this form will be communicated to the BAS Environment Office at the earliest opportunity.
- The information I have provided in this form, and the mitigation measures including those relating to biosecurity to which I have committed, will be communicated to all members of the project team.
- Should any environmental incidents occur, I will report these on the Maximo.
- I understand that this Preliminary Environmental Assessment (once agreed) and any associated Specialist Activity Permits (once issued) are activity/ person/time specific and are not transferrable to other locations in Antarctica, or to another person and are only valid for the period specified.
- I agree to provide feedback and a retrospective review of my activities by submitting the BAS EIA Post-Season Questionnaire to the Environment Office upon completion of my project or by the 30th of April (whichever is soonest).
- In accordance with Regulation 2 of the Antarctic (Amendment) Regulations 2008/3066, brief details (applicant name and job title, description of project and planned dates) of all permit applications (issued by the FCDO or the BAS Director) will be published on the FCDO website. My signature below will be taken as consent to publish this information.

Applicant/PI Name	**Applicant/PI Signature**	**Date**
MI (on behalf of DB)		03/07/2023 **Revision date (s)**

This section to be completed by the BAS Environment Office only.		
Project to proceed with mitigating measures in place	☒	
An Initial Environmental Evaluation is required	☐	
Project requires Specialist Activity Permit to proceed. The BAS Environment Office will advise.	Section 6 ☒	
	Section 6 BAS authorisation letter ☐	
	Section 7 ☐	
	Section 8 ☐	
	Section 9 ☐	
	Section 10 ☐	
	Project requires permit from another national authority ☐	
Signature: 	Date: 6th December 2023 Revision Date(s):	

Intended for
British Antarctic Survey (BAS)

Document type
Report

Date
26th March 2024

BRITISH ANTARCTIC SURVEY
ROTHERA MODERNISATION PHASE 1 – RMP/ SITEWIDE SERVICES MARCH 2024 PRELIMINARY ENVIRONMENTAL ASSESSMENT (PEA)

British Antarctic Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

BRITISH ANTARCTIC SURVEY
ROTHERA MODERNISATION PHASE 1 – RMP/ SITEWIDE SERVICES MARCH 2024 PRELIMINARY ENVIRONMENTAL ASSESSMENT (PEA)

Project name	**Rothera Modernisation Phase 1 – Discovery Earthing and Vehicles Fuel Tank Installation 23-24 Season**
Project no.	**1620013003-001**
Client	**British Antarctic Survey**
Version	**P01**
Prepared by	
Checked by	
Approved by	

Suitability	Revision Code	Date	Purpose / Suitability Description	Approved By	Comments

INTRODUCTION

The completion of an Environmental Impact Assessment (EIA) is a requirement of the Protocol on Environmental Protection to the Antarctic Treaty (1991)[1], the provisions of the Antarctic Act (1994, 2013)[2], and accompanying Antarctic Regulations 1995/490[3]. The minimum level of EIA required is the completion of a Preliminary Environmental Assessment (PEA). This document is a review of Rothera Modernisation Phase 1 – RMP Sitewide Services 23-24 Season PEA.

Privacy Notice: The British Antarctic Survey (BAS), a constituent organisation of the Natural Environment Research Council (NERC), will retain the personal data provided as confirmation of agreement with the conditions in this PEA and Specialist Activity Permit Application Form. A copy of the completed form may be circulated to all or any of the named participants, internally to BAS colleagues and to the Foreign and Commonwealth Development Office (FCDO)/or other relevant permitting authority in accordance with the guidelines set out in the Antarctic Act, 1994 & 2013. No personal data will be supplied to any other third party without consent. The personal data on this form and all other information provided will be retained for long-term environmental monitoring purposes.

[1] BAS, 1991. Protocol on Environmental Protection to the Antarctic Treaty (1991). [Online] Available at: https://www.bas.ac.uk/about/antarctica/the-antarctic-treaty/environmental-protocol/protocol-on-environmental-protection-to-the-antarctic-treaty-1991/

[2] Legislation.gov.uk, 1994. Antarctic Act 1994. [Online] Available at: https://www.legislation.gov.uk/ukpga/1994/15

[3] Legislation.gov.uk, 1995. The Antarctic Regulations 1995. [Online] Available at: https://www.legislation.gov.uk/uksi/1995/490/made

1. PROJECT DESCRIPTION

1.1. OSPQ number *(where applicable[1]/ known)*		**1.2. Title of Project**	Rothera Modernisation Phase 1 – RMP/ Sitewide Services 23-24 Season

1.3. Personnel involved. *Please provide names, organisation and job titles of all personnel involved and identify their specific project role e.g., Principal Investigator/Project Lead, Field Leader, external collaborators/contractors etc.*

Full Name	**Organisation and Job Title**	**Project Role**

1.4. Location

- Name each location to be visited with a description of the area, and state whether the site has been visited before.

Location Name *(including depot sites)*	**Location Description** *(e.g. coastal, ice-free, glacier, open ocean etc.)*	**Has the location been visited previously?** *Please provide detail.*
Rothera Station	External Discovery building perimeter: North East corner	Yes – Rothera Station

1.5. **Please provide a brief description of your project including:**

(1) Proposed dates and duration of your project;

27/03/2024 – 21/04/24 Likely duration of construction works associated with this PEA 3-5 days

(2) Summary of the main aims (scientific of otherwise) of your project;

As part of the Rothera Modernisation project, the specified works form a part of the Discovery buildings external slab and earthing arrangement.

(3) Outline of project plan (e.g., referring to locations as above, route and mode of travel, number of persons and time spent at each location);

Works being conducted by BAM and GA Barnies (BAM sub-contractor) as part of the RMP (Phase 1). 4-6 persons will be allocated to construction in support of this task. These personnel will be part of the wider construction team are on station anyway to deliver other RMP works (covered by project EIA).

(4) Details of methodology (including equipment required); and

Prior to this application:

1 excavator and 2no of operatives have entered the excavation zone via the North haul road to dig a 10m (length) x 1m (width) x 0.7m (depth) trench on GL on the Northeast perimeter of the Discovery building *(Figure 1).* The trench has produced approximately 7m3 of type 6N aggregate which has been temporarily stockpiled adjacent to the works zone *(Figure 2).* The methodology included a CAT scan of the area and hand dug trial pits before proceeding with mechanical excavation. Hand digging was then readopted when completing works in close proximity to the perimeter of the building.

Figure 1

Figure 2

Excavation, earthing and backfill:

2no of operatives will enter the open excavation on GL10 A/B and hand dig the remaining material to expose the earthing connection points at the foot of Discovery. The nominal amount of material required for removal will be added to the existing temporary stockpile (adjacent to the trench) in preparation for backfilling post completion of the works. The 25mm x 3mm copper earthing tape will then be buried into the excavation with a 100mm Bentonite surround *(Figure 3).* This will then be tied in at 2 locations with the 2 exposed precast concrete pads already installed as part of the Discovery's foundations *(Figure 4).* After the earthing has been installed, the 7m3 of excavated aggregate will be mechanically backfilled using an excavator. This will then be compacted using a whacker plate to achieve the desired compaction. The is a potential requirement for a roller to mechanically compact the made-up ground.

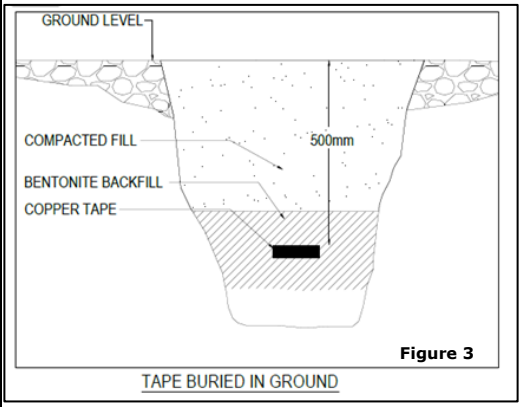


Figure 3

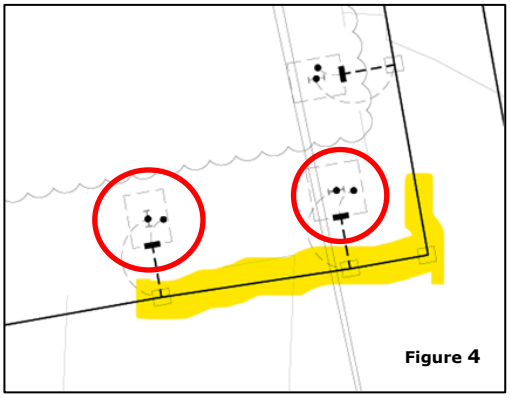


Figure 4

Installing the External slab:

Approximately 6m3 of 6N aggregate will be taken from the stockpile located to the west side of Admirals (between Admirals and the Runway) and transported around the North haul road to the location of the slab (northeast corner of Discovery). This stockpiled material originates from works conducted under permit no. 12/2019-20 (Specialist Activity permit for Rothera Works). In order to build up the ground, an excavator will lay the 6m3 of aggregate across an area of 4.6m (length) x 2.5m (width) before this is compacted using a whacker plate or roller. The compacted material will then receive a layer of fines material (approximately 1.3m3); this is to be extracted from the existing fines stockpile in proximity to the BAM fitters workshop. This material also originated from permit no. 12/2019-20 (Specialist Activity permit for Rothera Works). After this, a BAM excavator will then deliver the 4.6m x 2.45m precast concrete slab *(Figure 5)* from the Wharf via the North haul road. The BAM crane will then lift the slab into its final position on GL10 A/B before it is lined and levelled on site.

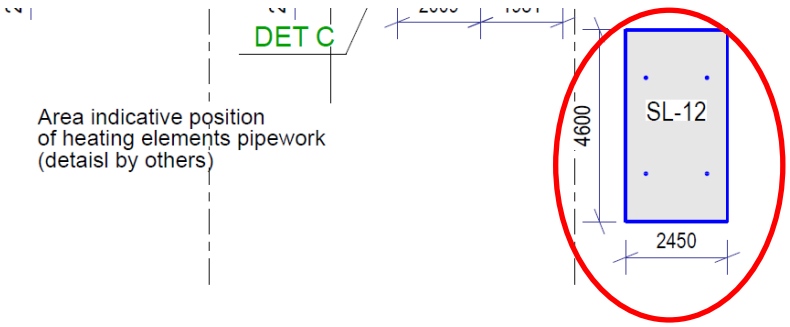


Figure 5

Following the installation of the concrete slab, the vehicle refuelling tank will be installed on the slab. This tank will have a capacity of 5,000 litres and will be used to refuel BAS vehicles following the handover of the Discovery building from March 2025 (eventually replacing the existing vehicles refuelling tank located outside the current Rothera vehicles garage). The tank is bunded (double skinned) in order to prevent any leakage into the local environment. It is also fitted with a High level alarm and a High High level alarm for further protection against over-filling. There is also a bund alarm which will alert personnel in the event that fuel is present between the two skins of the tank. Figure 6 below shows the design of the pre-fabricated fuel tank to be installed.

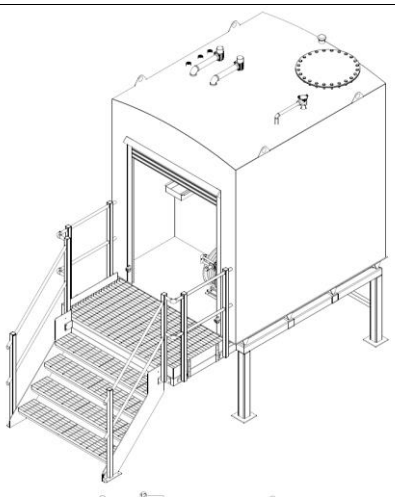


Figure 6

(5) *Brief justification of the environmental impact, as applicable*

As paragraph 1 of section 4 outlines, approximately 7m3 of material has been excavated at the Northeast of Discovery to deliver a section of the earthing and slab works for RMP.

Incorrectly, the enabling works for this task had mistakenly proceeded without the sign off a section 6 permit. This trench had not been covered in this season's PEA or explicitly outlined in the initial IEE. The BAS supervision team had not given the approval of this works. As soon as one of the BAS supervisors saw, it was halted immediately and reported back to the UK for further instruction. The failing is likely due to a communication breakdown caused by a changeover in BAM staff. This work had originally been planned for season 6 but had been bought forward by BAM as an opportunity. This was not communicated with the BAS supervision team, who would have prevented this happening prior to a permit being assigned.

The proposal to proceed with this works seems justified as the succeeding works require no further excavation. Furthermore, all excavated material will be returned to the trench and all new material required for the works has been previously processed under a permit. As a result, the environmental impact for proceeding with the works seems justified against the alternative of backfilling and re-disturbing the ground in Season 6.

The works outlined in this PEA are required in order to deliver the agreed the final design and capability delivery of the Discovery building as required by BAS. This specific area of works was originally planned to be completed in the 24/25 season, however being able to conduct these works this season will provide additional contingency in next year's programme and de-risk the construction team's ability to deliver the planned handover date of Mar 2025, which is critical to BAS operation.

2. IDENTIFICATION OF POTENTIAL IMPACTS

2.1. Chemicals and Hazardous Substances If you intend to use any chemicals, hazardous substances, radioactive material or stable isotopes you must submit a CAR form (with the associated RAs, COSHH assessments & SOPs) to the BAS Laboratory Manager for review and approval (Station/Field projects: emfi@bas.ac.uk; SDA projects: SDALabManager@bas.ac.uk). Please also contact Kath Nicholson for advice on how to package hazardous goods and hazardous waste for shipping - kani@bas.ac.uk			
2.1.1.	Do you intend to use any chemicals, radioactive material or stable isotopes likely to interact with the environment outside of the laboratory/ in the field? If so, please provide detail here (or attach a copy of your CAR form for our information only) explaining how you intend to use them and list the mitigation measures you intend to use to safeguard the environment.	No	
2.1.2.	Do you intend to use any other hazardous substances e.g. paints, batteries etc.?	YES ☐	NO ☒
2.1.3.	If so, please list substances likely to interact with the environment here and provide detail on how you intend to use them listing the mitigation measures you intend to use to safeguard the environment.		
2.2. Waste Management Please refer to the BAS Waste Management Handbook for further information on waste packaging and consignment.			
2.2.1.	How much waste (hazardous, radioactive and/or non-hazardous) will the project produce? ▪ *Please include approximate weights/volumes (and radioactive levels where applicable) by waste type anticipated.*	None	
2.2.2.	Is your project taking place on a BAS station or supported by BAS in the field?	YES ☒ *Please go to 2.2.3*	NO ☐ *Please go to 2.2.4*
2.2.3.	Please indicate the anticipated quantities and type(s) of waste packaging required, in particular for hazardous waste. ▪ *Environment Office will review this against the standard station supply and advise whether additional waste packaging for your project is required.*	No additional packaging required	
2.2.4.	Is your project taking place on the *Sir David Attenborough or other NERC vessel*?	YES ☐ *Please go to 2.2.5*	NO ☒ *Please go to 2.2.6*
2.2.5.	Please provide the quantities and type(s) of waste packaging required, in particular for hazardous waste. ▪ *BAS Environment Office will procure and provide the necessary waste packaging materials and ensure they are delivered to the vessel. If you do not provide any details here, you will be responsible for organising your own compliant packaging prior to boarding the ship.* ▪ *All project waste produced on the SDA (or NERC vessels supporting BAS science) within the Antarctic should be consigned to the BAS Environmental Manager in the UK for disposal. BAS Environment Office will then organise and pay for the disposal of this waste. However, please note that radioactive waste transport and disposal costs will be charged back to the responsible project.*	N/A	
2.2.6.	If your project is logistically supported by a non-BAS Antarctic operator or non-BAS/NERC vessel, please provide further details. ▪ *BAS Environment Office will not supply waste packaging or provide waste disposal. Please confirm that the project/operator/vessel will provide appropriate and compliant waste packaging and*	N/A No Waste	

	confirm how the waste will be disposed of in accordance with all relevant waste legislation[4].		
2.3. Oil Spill Response (for field activities only)			
2.3.1.	Please confirm the type and quantity of fuel that will be taken into, used, and stored in the field.	N/A	
2.3.2.	Please confirm that you have discussed your field fuel needs and requirement for spill kits with the BAS Field Operations Manager. All field parties must be familiar with the BAS fuel spill protocols.		
2.4. Deployment and Installation of Equipment			
2.4.1.	Do you intend to install or deploy any equipment in the field or ocean (including data loggers/markers on animals, moorings, gliders, etc.)?	YES ☐ *Please complete questions 2.4.2 – 2.4.6.*	NO ☒ *Please go to 2.5*
2.4.2.	Provide a brief description of the equipment including details of the materials, dimensions, weight, and any hazardous substances such as batteries or oils.	N/A	
2.4.3.	Provide a brief summary of the location where equipment will be installed or deployed (including coordinates).	N/A	
2.4.4.	Provide details of how the equipment will be labelled and referenced (equipment should be easily identifiable as science instrumentation and be able to be traced back to the organisation or project).	N/A	
2.4.5.	Describe how and when the equipment is to be maintained and removed. Confirm if funding and operational support is in place for your retrieval plans. *If any of the equipment you deploy in the field or ocean is lost or cannot be retrieved as planned you will need to report this at the time of the incident on Maximo[5] and to the Environment Office on the EIA Post Season Questionnaire.*	N/A	
2.4.6.	Is the intention for any of your equipment to remain in the field/ocean permanently (e.g. mooring anchors, buried seismic conduits, etc.)? If, so please detail the equipment to be left behind intentionally and explain why it cannot be retrieved.	N/A	
2.5. Remotely Piloted Aircraft Systems (RPAS) or other remotely operated marine or terrestrial vehicles (ROVs) RPAS includes drones, quadcopters or any remotely operated or autonomous aircraft whether rotary or fixed wing. If you are operating RPAS contact Carl Robinson for further advice – carob@bas.ac.uk.			
2.5.1.	Does the project intend to utilise RPAS or other remotely operated marine or terrestrial vehicles? If so, please provide detail including the size, make, model and operating capacity (e.g. maximum wind resilience, flight time, fail safes, etc.)	No	
2.5.2.	Does the project involve Beyond Visual Line of Sight (BVLOS) operations for RPAS? If so, please provide details. **If yes, this will require review by the Air Unit.**	No	
2.5.3.	Describe the location in which the RPAS/ ROV will be operated (e.g. off a ship, deep field, near a station, over wildlife, etc.)	N/A	
2.5.4.	Do you require BAS Ops to provide the RPAS/ ROV and/or pilot?	N/A	

[4] Waste (England and Wales) (Amendment) Regulations 2012, The Duty of Care Regulations 1991, and the Hazardous Waste (England and Wales) (Amendment) Regulations 2009. These regulations affect the packaging, containment, storage, transportation and disposal of waste from source to final disposal. This includes transportation from the UK port, where the waste is offloaded from the ship, and to the waste disposal site.

[5] Maximo is the BAS Incident Reporting System

	▪ If yes, contact Carl Robinson to coordinate the request and confirm here that you have done so.	
2.5.5.	Do you intend to provide your own RPAS/ ROV and/or pilot?	N/A
2.5.6.	Confirm the names of all the pilots/vehicle operators.	N/A
2.5.7.	Detail number of hours flown in the last 3 months and number of hours in total flown on proposed platform.	N/A
2.5.8.	Do the pilots hold a General Visual Line of Sight Certificate (GVC) or equivalent? Please provide details of qualifications held.	N/A
2.5.9.	Please confirm you have read and will commit to follow the BAS Regulations on RPAS use in Antarctica.	YES ☒
2.6. Construction and Maintenance Work		
2.6.1.	Do you intend to import natural materials to Antarctica (e.g. untreated wood, aggregate, sand etc.)? Provide details of type, quantity and from where the materials will be sourced. Please refer to Section 4.4 of the BAS Biosecurity Regulations and discuss with Environment Office as appropriate.	No
2.6.2.	Will the work require concrete mixing on site? Provide details of the expected quantity and working methods.	No
2.6.3.	Will the project require the removal of any asbestos? Provide details of the expected quantity.	No
2.6.4.	Do you anticipate the alteration, removal or destruction of equipment, buildings or structures (or parts of buildings or structures) that may be considered to have heritage value?	No
2.7. Biosecurity		
2.7.1.	Please confirm that you have familiarised yourself with the biosecurity guidance provided by BAS in the Biosecurity Regulations and by SCAR in the Environmental code of conduct for terrestrial scientific field research in Antarctica.	YES ☒
2.7.2.	Do you intend to move terrestrial or marine specimens, including unfixed biological samples, soils, sediments, rocks, or other mineral resources between different areas of Antarctica (including returning materials to research stations)? If 'yes', please describe the precautions you will take to prevent the transfer/release of indigenous species between distinct Antarctic Conservation Biogeographic Regions[6] (ACBRs) or between Antarctic and sub-Antarctic locations.	No
2.8. Sensitive sites with restrictions or guidelines		
2.8.1.	Do you intend to visit any CCAMLR registered Vulnerable Marine Ecosystems (VMEs), CCAMLR Ecosystem Monitoring Programme (CEMP) Site(s) or Marine Protected Areas (MPAs)[7]? Please provide details.	No
2.8.2.	Do you intend to visit any Important Bird Areas (IBAs)? Please provide details.	No

[6] Note: On 'Antarctic Conservation Biogeographic Regions' select 'Antarctic conservation biogeographic areas' from the 'Layer List' at the top right hand corner symbol, to see the ACBRs displayed.

[7] Geographic details (positions, area) of these sites can be viewed in the CCAMLR GIS (select the appropriate designation(s) from the layers list on the left-hand side.

2.8.3.	Do you intend to visit any Antarctic Specially Managed Areas (ASMAs)? Please provide details.	No
2.8.4.	Do you intend to visit any of the most visited locations in Antarctica (excluding research stations) as identified by the Antarctic Treaty System? Please confirm which locations you will visit and that you have read and understood the associated Visitor Site Guidelines.	N/A

3. IDENTIFICATION OF SPECIALIST ACTIVITIES IN ANTARCTICA

Specialist activities in Antarctica are prohibited without issue of a specialist activity permit under the Antarctic Act 1994; 2013 (Sections 6-10):

- Mineral resource activities (Section 6 permit)
- Disturbance/harmful interaction with fauna and damage to flora (Section 7 permit)
- Introduction of non-native species (Section 8 permit)
- Entry into protected areas (Section 9 permit)
- Damage or disturbance of Historic Sites and Monuments (Section 10 permit)

Specialist Activity Permits may be issued by the UK Foreign, Commonwealth and Development Office or by the BAS Director under delegated authority in accordance with the UK Antarctic Act (1994; 2013) or by another competent authority. The BAS Environment Office will advise you upon review of your application.

3.1. Do you intend to undertake any of the following specialist activities in Antarctica? If you answer 'yes' to any of the below questions please also complete parts 4, 5 and 6 of this form. If you answered 'no' to all of the below questions, you only need to complete parts 4 and 6.

3.1.1.	Do you intend to undertake any of the following mineral resource activities? a. Drill, dredge or excavate for mineral resources; or b. Collect/use any samples of mineral resources; or c. Do anything else for the purpose of identifying specific mineral resource occurrences or deposits.	YES ☒	NO ☐
3.1.2.	Do you intend to sample, capture, kill or harmfully interfere with any marine or terrestrial flora or fauna (including invertebrates)?	YES ☐	NO ☒
3.1.3.	Do you intend to take to the Antarctic any non-sterile soil or non-native marine or terrestrial animal, plant, microorganism, seed or other propagule?	YES ☐	NO ☒
3.1.4.	Do you intend to visit any Antarctic Specially Protected Areas (ASPAs)?	YES ☐	NO ☒
3.1.5.	Do you intend to damage or disturb Historic Sites and Monuments and/or their artefacts?	YES ☐	NO ☒

4. ENVIRONMENTAL IMPACT MATRIX

4.1. Environmental Matrix (please complete as per guidance and examples provided in the table below)

Science and logistical activities undertaken as part of your project *e.g. collection of samples, deployment of monitoring equipment, storage/ handling of fuels and chemicals, waste production and camping*	**Identify possible impacts - direct, residual and/or cumulative**[8]	**Mitigating measures** *Please provide details of the mitigation measures you intend to implement to ensure that **negative impacts are minimised or avoided**.*
Excavation/Trenching Works	• *Direct/Cumulative* – Noise. Digging and trenching activities will create noise emissions which could disturb wildlife. • *Direct/Cumulative – Vibration* • *Direct/Cumulative* - Removal/relocation of rock/mineral material	• Works will only take place between 0800-1800. Area of works is within main station activity zone and is not within proximity to sensitive bird nest sites. Every plant move whereby visibility is restricted includes a banksman who is responsible for ensuring a safe zone around the vehicle, checking to ensure that personnel and animals are not within the operation of the plant. Only trained individuals will move animals from the work area and in accordance with wildlife interaction guidelines. All incidents of interaction are reported. • All material removed during excavation will be stockpiled local to the works area and replaced by backfilling into the trench on completion.
		• *Noise and Vibration will be managed by the following mitigation measures:* • *10 mph speed limit maintained and enforced on site;* • *Plant items will be positioned to ensure exhaust outlets point away from sensitive receptors;* • *Regular maintenance of all plant and vehicles to ensure they are working efficiently and generating as little noise as possible; and* • *A soft-start procedure , outlined in the IEE, will be implemented if necessary as detailed in the IEE. Consideration of the impact of noisy activities to all wildlife in the vicinity will be given.* • *The removal/relocation of rock/mineral material is a physical or mechanical disturbance on land and will be managed by the following mitigation measures:* • *Minimise the footprint of works;* • *Where possible, trenches/excavations will be backfilled at the end of a shift, however if this is not feasible, trenches/ excavations will be suitably covered, fenced, and signed and not be left open for longer than necessary; and* • *If contamination is encountered during the trenching/excavation, all equipment will be cleaned between trial pits to prevent cross contamination. Any occurrences of contamination to be reported to the BAS Environment Office and recorded in the PVR.*

[8] Direct impacts of your activities on flora, fauna, air quality, water quality (fresh and marine), geology, soils, permanent ice, noise levels or cultural heritage. Residual impacts once your project is complete such as leaving equipment in the field longer term, permanent removal of samples from the field, and impacts on the value of the locality for future science. Cumulative impacts: If you are aware of any other projects or activities in the past, present or foreseeable future then these could, combined with your proposed project, result in a significant environmental impact.

Science and logistical activities undertaken as part of your project *e.g. collection of samples, deployment of monitoring equipment, storage/ handling of fuels and chemicals, waste production and camping*	**Identify possible impacts - direct, residual and/or cumulative[8]**	**Mitigating measures** *Please provide details of the mitigation measures you intend to implement to ensure that **negative impacts are minimised or avoided**.*
Installation of underground earth tape and bentonite bedding	*Direct/Indirect/Cumulative* - Man-made materials will have been introduced underground and will require removal and disposal when they reach end-of-life. Design life planned for 60 years, with first major works 25 years after the Project Completion Date.	Details and locations of all materials installed below ground will be provided to BAS by the Contractor,, BAM as part of the as-built drawings, allowing BAS to identify and locate all elements for future removal when they reach end of life, no earlier than 25 years from handover (Mar 2025) . The earthing installation is expected to last significantly linger than 25 years and neither bentonite nor copper earth tape is considered to be a residual hazardous material when future disposal is required.
Laying of gravel/rock bed for concrete slab	*Direct/Cumulative* - Cables and pipes will be bedded on a fine grade gravel. This will be taken from stockpiles already quarried from the Rothera point location and processed on site. This rock will have been moved from Rothera Point to the Sitewide Services Run A location between the STP and BAM Fitter's Workshop.	Approximately 6m3 of 6N aggregate and 1.3m3 of fines aggregate will be used to provide a bedding material for the concrete slab. These materials have been sourced locally from within the Rothera area with no significant bio-diversity difference from the location it is to be infilled. All materials to be used have been previously sourced and stockpiled under permit no. 12/2019-20 (Specialist Activity permit for Rothera Works) Volumes will be kept to the minimum required to meet construction specification. Remainder of trench will be infilled with original material that was removed during excavation.
Construction and Maintenance Work	*Direct – The generation of Dust*	*All material to be used must have passed all biosecurity checks.* *Dust will be managed in by the following mitigation measures:* • *If required dust suppression should be used;* • *Where practicable, keep activities which create dust downwind of sensitive receptors and avoid close proximity to known vegetation and ice locations;* • *All routes used by vehicles and plant will be well maintained and have compacted surfaces;* • *10 mph speed limit maintained and enforced on site;* • *All plant and equipment will be maintained on a regular basis;* *Dust will be monitored using environmental monitors, positioned across the construction site. Any exceedances are recorded and reported to the BAS Environment Team and updated on the Project Variation Register. On immediately being notified by the monitors of an exceedance, the BAM Environmental Manager will investigate, and stop activity creating dust. The BAM Environmental Manager will develop the Activity Plan, with appending Risk Assessment, to include actions to mitigate further excess production of dust. The Activity Plan will be signed off by the BAS Contract Administrator.*

Science and logistical activities undertaken as part of your project *e.g. collection of samples, deployment of monitoring equipment, storage/ handling of fuels and chemicals, waste production and camping*	**Identify possible impacts - direct, residual and/or cumulative**[8]	**Mitigating measures** *Please provide details of the mitigation measures you intend to implement to ensure that **negative impacts are minimised or avoided**.*

Working in Low Light Conditions	*Direct – Light Emissions*	• All works are planned to be undertaken during daylight hours, therefore it is not anticipated that any site lighting will be require, however given the time of the season and possibility of inclement weather, there is potential that very localised lighting may be required for a limited number of hours at the beginning/end of a shift (site working hours are 0700-1900)
		• If lighting is required, the following mitigations will be implemented:
		  ○ Minimise use of lighting rigs during low light or darkness
		  ○ Rigs to be angled towards the ground, not horizontal.
		  ○ Lights to be turned off when not in use.

Examples		
E.g. Travel on foot between ice-free areas	*E.g. Possible introduction or intra-regional spread of non–native species (vegetation and/or invertebrates, including those in soil)*	*E.g. Biosecurity briefing provided to all team members prior to departure* *Boots, clothing and equipment to be cleaned thoroughly before departure from the UK.* *Visual checks/cleaning between sites to check no soil is stuck to boots or equipment.* *Follow guidelines in Scar Code of Conduct for Terrestrial Scientific Field Research and BAS Biosecurity Regulations.*
E.g. Camping on ice sheet	*E.g. Generation of domestic waste and human waste*	*E.g. All team members to read and be briefed on the 'Field Operations Manual' relating to Environmental Management and the BAS Waste Management Handbook.* *Waste bags and poo bins to be issued by Field Ops Manager. All domestic waste will be segregated in the field and returned to Rothera prior to final disposal outside of the Antarctic. Human waste will be incinerated at Rothera.*
E.g. Deploying retrievable sensors in the field	*E.g. Impact to wilderness and aesthetic value of the region.* *Risk of equipment becoming waste if not recovered.*	*E.g. Design phase of project has identified low toxic materials to be used in the construction of the sensors.* *The Environment Office will be informed of sensor deployment locations if equipment is not retrieved, and the details will be added to the 'lost equipment' log.*

Reference guidance documents

Please review the guidance documents provided below (please note that this is not an exhaustive list) and where applicable, reference these and any other environmental guidance relevant to your activities in the mitigation measures in the Environmental Matrix above.

- SCAR Codes of Conduct for Antarctic field work and the use of animals in Antarctica
- BAS Wildlife Interaction Manual
- BAS Waste Management Handbook for guidance and advice on waste management in Antarctica
- BAS Biosecurity Regulations for guidance and advice on appropriate biosecurity measures

5. SPECIALIST ACTIVITY PERMIT APPLICATION

If you have answered 'yes' to any of the questions in part 3 you may require a Specialist Activity Permit to carry out your planned activities. You must complete this Specialist Activity Permit application and confirm the details of all personnel involved in the proposed permitted activities.

4.2. Application Details

		Full Name	Job Title and Organisation/Employer	Nationality (as listed on passport)
4.2.1.	Permit applicant/holder (this is usually the PI/Project Lead)			
4.2.2.	Full list of people actively participating in sampling/specialist activities			

4.3. Mineral Resource Activities (Section 6 Specialist Activity)

Mineral resources include (but not exclusively) rock, soil, peat, sediment, seabed nodules, fossils, meteorites and coal.

4.3.1.	Do you intend to undertake any of the following activities: drilling, dredging or excavating for mineral resources? If so, please describe the activity you plan to undertake, the type of mineral resource and the purpose of the activity.	**Excavation:** The creation of a trench measuring approximately 10m x 1m x 0.7m, generating approximately 7m3 of aggregate.
4.3.2.	Do you intend to collect and or use any mineral resources? If so, please provide a description of the mineral resource type and the collection/use activities you intend to undertake.	**Material from existing stockpiles:** As per permit: 12/2019-20 (Specialist Activity permit for Rothera Works), -6m3 of aggregate taken from the stockpile will be laid across an area of 4.6m (length) x 2.5m (width). -Approximately 1.3m3 of fines material is to be extracted from the existing stockpile in proximity to the BAM fitters workshop.
4.3.3.	Do you intend to undertake any other activity for the purpose of identifying mineral resource occurrences or deposits? *e.g. assessing suitability of ground for use as construction site or suitability of soil or rock as construction material?* Please provide a description.	No
4.3.4.	Do you intend to sample mumiyo (solidified, waxy deposit produced when snow petrels vomit up their stomach oils) during your activities?	No

4.3.5. Provide information on estimated quantities and volumes or mass of mineral resource samples and the number and location of sampling sites:

Mineral resource	**Estimated number and volume/mass of individual samples to be collected**	**Total quantity of mineral resource to be collected**	**Number and locations of sampling sites** *(please also provide coordinates)*	**Method of extraction/collection**
Surface ground layer adjacent to Discovery building	Single trench measuring approximately 10m x 1m x 0.7m, generating approximately 7m3 of aggregate.	All materials excavated will be backfilled in the same location	1 – Single trench adjacent to north east corner of Discovery Building	Mechanical Excavator and hand digging
Type 6N aggregate from existing Rothera stockpile locate between Admirals and Runway	6m3 Total	6m3 Total	1 – Type 6N aggregate stockpile located between Admirals and Runway	Mechanical Excavator/loader

Fines aggregate from existing stockpile located adjacent to BAM fitters workshop	1.3m3 Total	1.3m3 Total	1- Fines aggregate stockpile located adjacent to BAM fitters workshop	Mechanical Excavator/loader

4.3.6.	Provide a brief justification for the requested quantities of samples.	Essential excavation and material needed to complete the earthing and external slab system for Discovery building
4.3.7.	Are the mineral resources being requested available, in an appropriate form, from publicly accessible collections outside of the Antarctic Treaty area?	N/A
4.3.8.	Do you intend to import any biological samples (soil) to the UK?	YES ☐ NO ☒

If you answered 'yes' to the above question, please take note:
You must ensure you have read and understood the separate import licence requirements detailed in point 5.3.5.

4.4. Disturbance/harmful interaction with fauna and damage to flora (Section 7 Specialist Activity)

4.4.1.	Do you intend to sample, capture, kill or harmfully interfere with any marine or terrestrial flora or fauna (including invertebrates)? Please provide detail of the activities you intend to undertake which involve interaction with flora and fauna.	

4.4.2. Complete the table below detailing the species that would be affected by the activity.
Provide information on estimated quantities and volumes or mass of biological samples and the number and location of sampling sites:

Species (including sex/life stage, where appropriate)	**Estimated: (i) numbers of individuals to be handled or collected and/or (ii) total volume/mass of samples**	**Individual sample size/mass/volume**	**Total number of samples to be collected.**	**Sampling location** *(please also provide coordinates)*
e.g. female breeding adult Gentoo penguin	e.g. 12 x penguins/12ml blood, 12 feathers	e.g. 1 x 1ml blood sample and 1 feather from each penguin handled	e.g. 12 x 1ml blood samples (12ml of blood) and no more than 12 feathers	e.g. Gourlay Peninsula, Signy Island
e.g. colobanthus quitensis	e.g. 10 x plants/c. 50 g total dry weight	e.g. each plant sample is ~ 5g (dry weight)	e.g. 10 x 5g plant samples	e.g. Bernsten Point, Signy Island

4.4.3.	If your project involves working with vertebrates and/or cephalopods, has it been subject to Animal Welfare and Ethics Review? If so, please include details of the reviewing body, date of review and a copy the approval document.	Reviewing body and date of review: Copy of approval document attached YES ☐ NO☐
4.4.4.	Do you consider any of your activities as 'biological prospecting'? Do you intend to utilise the requested samples for commercial applications?	
4.4.5.	Do you intend to import any biological specimens (animals or plants) to the UK?	YES ☐ NO ☒

If you answered 'yes' to the above question, please take note:

(1) Importation of biological or soil samples to the UK requires a relevant DEFRA/CITES import/export licence which is not covered by this 'Specialist Activities Permit application'.

(2) How and where your fauna/flora samples will be stored and curated may have an impact on the import/export licences required.

(3) If you require storage at BAS Cambridge, please agree this in advance with the Cambridge Laboratory Team.

(4) If samples are to be transferred to another institute, you must ensure you have any required site registration/import permissions in advance of collection.

Please contact Elaine Fitzcharles in the first instance: emfi@bas.ac.uk. For details on the protocols and procedures for consigning biological samples from all Antarctic stations and ships please refer to https://www.bas.ac.uk/for-staff/polar-predeployment-prep/intro-guidelines-and-forms/importing-biological-samples-into-the-uk/

4.5. Introduction of non-native species (Section 8 Specialist Activity)

4.5.1.	Do you intend to take to the Antarctic any non-sterile soil or non-native marine or terrestrial animal, plant, microorganism, seed or other propagule?	No

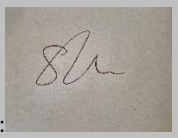
Importation of non-sterile soil into Antarctica is prohibited under the Protocol on Environmental Protection to the Antarctic Treaty.		
4.5.2.	Provide a species list and estimate of quantity and volume.	
4.5.3.	Provide an outline of the scientific purpose of the proposed introduction and why it is considered essential.	
4.5.4.	Outline the measures you will take to prevent escape or spread of the introduced species or their contact with native fauna or flora.	
4.5.5.	Describe the method of removal of the introduced species or its/ their disposal.	
4.6. Entry into Protected Areas (Section 9 Specialist Activity)		
4.6.1.	Do you intend to visit any Antarctic Specially Protected Areas (ASPAs)? Please provide detail.	No
4.6.2.	Is the reason for your visit to the ASPA(s) for scientific research or for environmental management/conservation activities?	
4.6.3.	What activities do you intend to undertake in the ASPA(s)? Please explain why these activities cannot be carried out outside the protected area.	
4.6.4.	Provide a short justification of how your project meets the requirements of the protected area Management Plan.	
4.7. Damage or Disturbance to Historic Sites and Monuments (Section 10 Specialist Activity)		
4.7.1.	Do you intend to visit any Historic Sites and Monuments (HSMs)? Please provide details and explain the purpose of your visit. Please note that HSMs are protected and any damage to sites or removal of objects is prohibited.	No

6. STATEMENT OF AGREEMENT

In signing this form, you the PI/Project Lead (or other designated deputy) are confirming the following:

- I have read and agree with the 'Privacy Notice'.
- The information provided in this form is accurate and up to date. Any deviation from the information provided in this form will be communicated to the BAS Environment Office at the earliest opportunity.
- The information I have provided in this form, and the mitigation measures including those relating to biosecurity to which I have committed, will be communicated to all members of the project team.
- Should any environmental incidents occur, I will report these on the Maximo.
- I understand that this Preliminary Environmental Assessment (once agreed) and any associated Specialist Activity Permits (once issued) are activity/ person/time specific and are not transferrable to other locations in Antarctica, or to another person and are only valid for the period specified.
- I agree to provide feedback and a retrospective review of my activities by submitting the BAS EIA Post-Season Questionnaire to the Environment Office upon completion of my project or by the 30th of April (whichever is soonest).
- In accordance with Regulation 2 of the Antarctic (Amendment) Regulations 2008/3066, brief details (applicant name and job title, description of project and planned dates) of all permit applications (issued by the FCDO or the BAS Director) will be published on the FCDO website. My signature below will be taken as consent to publish this information.

Applicant/PI Name	Applicant/PI Signature	Date
MI		26/03/2024
		Revision date (s)

This section to be completed by the BAS Environment Office only.		
Project to proceed with mitigating measures in place	☒	
An Initial Environmental Evaluation is required	☐	
Project requires Specialist Activity Permit to proceed. The BAS Environment Office will advise.	Section 6 ☐	
	Section 6 BAS authorisation letter ☐	
	Section 7 ☐	
	Section 8 ☐	
	Section 9 ☐	
	Section 10 ☐	
	Project requires permit from another national authority ☐	
Signature: 	Date: April 5th 2024 Revision Date(s):	