

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	Neil Goulding
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	<p>Modernisation of Rothera Research Station including:</p> <ul style="list-style-type: none"> • 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	Neil Goulding

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:
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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 60° 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

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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	<p>Use of site won materials for 99.8% of earthworks (only 50 tonnes of sand import compared to 25000 tonnes of site won fill)</p> <p>Spare sheet piles from the existing Wharf will be used for the foundations of the Waste Handling Facility</p> <p>Steel from the jig used to construct the new Wharf frames will be reused for widening the services bridge at Admirals</p> <p>The scaffold tower from the same jig will be used for access to the New Operations Building during installation.</p> <p>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</p> <p>Redundant electrical cables to be used for site power distribution.</p> <p>Aim for high percentage of recycled aggregates and cement replacements in concrete mixes.</p> <p>Aim for high percentage of recycled material in steel.</p>
Methods of construction	
Pre-fabrication off site	All concrete elements will be pre-cast outside of the Antarctic region and shipped to Rothera.

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	<p>Control Tower and staircase to be fabricated in the UK</p> <p>Plant rooms to be fabricated in the UK</p> <p>Main service corridors to be fabricated in the UK</p> <p>MEP Plant room components to be fabricated and tested in the UK before being broken down for transportation to Rothera</p> <p>Insulated wall panels are to be pre-fabricated outside of the Antarctic region and shipped to Rothera</p> <p>Use of flat pack systems for internal components including the sauna</p>
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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 CO ₂ 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)			

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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

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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 / Bingham's	2.29	20.28		39.55					
Totals	429	501.59	14.67	971.42	19.18	6.44	8.76	22.66	2.27

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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 be 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
<ul style="list-style-type: none"> All buildings to be constructed using a modular design with panels pre-fabricated in Europe. 	<ul style="list-style-type: none"> All excavated material (except any hazardous material) to be re-distributed at Rothera.
<ul style="list-style-type: none"> Accurate measurement, and minimal wastage will be allowed when ordering materials 	<ul style="list-style-type: none"> All construction waste materials to be offered to the Research Station Manager for re-use within the station
<ul style="list-style-type: none"> Materials are to be stored and transported correctly so as to avoid damage 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> Materials are to be kept off the ground by the use of pallets or timber bites 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> All operatives are to receive training on the agreed reduction measures 	<ul style="list-style-type: none">
<ul style="list-style-type: none"> (any other measures) 	<ul style="list-style-type: none">
Concrete and hardcore	
Reduction measures	Reuse measures
<ul style="list-style-type: none"> Foundations to be constructed from pre-cast concrete, cast outside the Antarctic region 	<ul style="list-style-type: none">

Excavated material (soil & stones)	
Reduction measures	Reuse measures
<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • Excavated soil and stone to be re-distributed on site
Timber	
Reduction measures	Reuse measures
<ul style="list-style-type: none"> • All buildings to be constructed using a modular design with panels pre-fabricated in Europe. 	<ul style="list-style-type: none"> • All construction waste materials to be offered to the Research Station Manager for re-use within the station
<ul style="list-style-type: none"> • The use of reusable plastic pallets to be used 	<ul style="list-style-type: none"> •
<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> •
Metals	
Reduction measures	Reuse measures
<ul style="list-style-type: none"> • All buildings to be constructed using a modular design with panels pre-fabricated in Europe. 	<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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".
<ul style="list-style-type: none"> Clothing / Textiles 	20 01 10	Stored in FIBC within ISO container	Return to UK. Disposal to follow waste hierarchy
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> Glass 	17 02 02	Stored in re-used 205 litre drum.	Containers to be marked "WASTE GLASS" and returned to the UK for recycling

<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> Oil 	13 02 07	Stored in re-used 25 ltr plastic containers marked "WASTE LUBRICANTS"	Returned to the UK for recycling
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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 (m³)	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)

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- 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					

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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 / Bingham's									
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												