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## The Danish Church, NW1 4HH

Ground Source Heat Pump Installation

Risk Assessment Method Statement

Document Reference:	<b>11029</b>
Project:	<b>The Danish Church, 5 St Katharine's Precinct, London, NW1 4HH</b>
Company:	<b>Coniston Construction Limited</b>
Contact:	<b>Mr Dennis McNamara</b>
Document:	<b>Risk Assessment Method Statement</b>
Work Type:	<b>Ground Source Heat Pump – Borehole Heat Exchanger</b>

<b>Revision</b>	<b>Description</b>	<b>Issued by</b>	<b>Date</b>	<b>Checked by</b>
01	For Approval	Rob Gardiner	19/07/2019	Elliott Holmes
02	For Approval	Rob Gardiner	25/07/2019	Michael Regis
03	For Approval	Rob Gardiner	05/08/2019	Elliott Holmes

This document has been prepared for the sole benefit, use and information of the Client for the purposes set out in the proposal. The liability of G-Core Limited information contained in the document will not extend to any third party in respect of the G-Core Limited is a full service ground source and geothermal energy company, specialising in the planning, design, specification, installation, integration, commissioning, operation and maintenance of ground and air source heat pump and geothermal.

Our unbiased approach ensures that all of our Clients receive unbiased advice on the most appropriate technologies for their development in order to maximise savings on the most appropriate technologies for their development in order to maximise savings with statutory and planning requirements and capitalising on, finance incentives.

All of G-Core's design, installation and commissioning procedures are performed, where applicable in accordance with the following standards:

- a. Microgeneration Installation Standard MIS3005, Issue 4.3
- b. G-Core's in-house design and operating procedures
- c. The Ground Source Heat Pump Society Recommendations and publications
- d. The International Ground Source Heat Pump Association (IGSHPA)
- e. American Society of Heating, Refrigeration and Air-conditioning Engineers
- f. International Energy Agency (IEA)
- g. Environment Agency guidelines HVAC Guide to Good Practice – Heat Pumps [TR/30], July 2007

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# 1. Project Details

<b>Project:</b>	The Danish Church	
<b>Project Number:</b>	11029	
<b>Site Address:</b>	c/o Coniston Limited Albany Street London NW1 4HH	
<b>Main Contractor:</b>	Coniston Limited	
<b>G-Core Client:</b>	Coniston Limited	
<b>Client Contact:</b>	Dennis McNamara	07515 101007 <a href="mailto:DMcNamara@conistonltd.co.uk">DMcNamara@conistonltd.co.uk</a>
<b>G-Core Director:</b>	Rob Gardiner	01223 941070 / 07554458119 <a href="mailto:rob.gardiner@gcore.co.uk">rob.gardiner@gcore.co.uk</a>
<b>G-Core Project Manager:</b>	Richard Matthewman	01223 941070 / 07468 510208 <a href="mailto:richard.matthewman@gcore.co.uk">richard.matthewman@gcore.co.uk</a>
<b>Lead Drilling Engineer:</b>	GeoDrill	TBC
<b>GSHP Engineers:</b>	Malcolm Amm:	07476 238811 <a href="mailto:malcolm.amm@gcore.co.uk">malcolm.amm@gcore.co.uk</a>
<b>Commissioning Engineer:</b>	Clive Lewis	07939584808 <a href="mailto:clive.lewis@gcore.co.uk">clive.lewis@gcore.co.uk</a>
<b>Type of Work:</b>	GSHP – Installation and commissioning	
<b>Approximate Duration:</b>	Start date:	TBC
	Drilling:	2-3 weeks
	Cross connections:	1 week
	Plant room:	2 weeks
	Testing & Commissioning:	2 days
<b>Workforce:</b>	3 no drilling engineers (borehole heat exchangers) 2 No. GSHP Engineers (ground works and plant room) 1 No. commissioning engineer	
<b>Prepared By:</b>	Rob Gardiner	
<b>Date:</b>	19/07/2019	

## 2. Introduction

This Method Statement and Risk Assessment describe the specific safe working methods and operating procedures for G-Core and its Subcontractors which will be used to carry out the works. It gives details of how the work will be carried out and what health and safety issues and controls are involved.

The RAMS cover the drilling and installation of borehole heat exchanger, cross connection of the heat exchangers to a wall mounted manifold, flow and return header pipework to the plant room and in the installation of the Ground Source Heat Pump system within the plant room (GSHP).

This Method Statement and Risk Assessment must be read and used in conjunction with any Site/Project specific Inductions and/or Health, Safety and Environmental Plans.

All operatives working on site must read this document and sign the acknowledgement register presented in Appendix A.

A risk assessment has been completed for each activity forming the proposed works. The risk assessment register is presented in Appendix C.

The activity specific RAMS for the drilling and borehole heat exchanger works are presented in Appendix D.

## 3. Scope of Works

The first phase of the ground source heating system installation is primarily external works. This work comprises the drilling and installation of 3 No. Borehole Heat Exchangers (BHE) drilled using rotary wash boring techniques to a depth of 120m below final formation level.

The second phase is to cross-connect the individual BHE flow and returns to a 10-way manifold located at ground level adjacent to the plant room doorway. Single header flow and return pipes will then be taken from the manifold through into the heat pump plant room.

The third phase is to install the plant room element of the system, fill and pressurise the ground energy collector and complete set-to-work and commissioning of the heat pump system.

Phase one will be completed by drilling subcontractors Geodrill Limited. Geodrill will be subcontracted and managed directly by G-Core.

Phase 2 and 3 will be complete by G-Core.

All phases of works will be designed, co-ordinated and managed by G-Core.

The external works are to be carried out within the area shown on the drawing at Appendix B. All excavation works will be fenced off locally to ensure the safety of the public & other site workers is not compromised (Main Contractor responsibility).

## 4. Communication and Contact Details

### 4.1 Personnel Structure:

<b>G-Core Project Manager:</b>	Richard Matthewman	01223 941070 07468 510208
<b>Lead Drilling Engineer:</b>	Geodrill	TBC
<b>GSHP Engineers:</b>	Malcolm Amm:	07467 238811
<b>Commissioning Engineer:</b>	Clive Lewis:	07939 584808

## 5. Subcontractors

Where used, all G-Core subcontractors will be managed by G-Core's Project Manager.

The proposed subcontractors are as follows:

- Drilling works: Geodrill Limited

## 6. Site Details

### 6.1 Site access and egress & Plant Movements

Safe access routes to and from the work area to be pre approved between G-Core's Site Supervisor and the Client's Site Manager.

Site working hours are 0800 to 1800hrs Monday – Friday. Weekend working is by prior approval with the Main Contractor and the Client.

All plant and equipment movements are to be supervised by a qualified banks man wearing an orange hi-vis vest.

Access & egress for the works will be via the main site entrance off Albany Street. This may be via a hole mad in the boundary wall or via crange of plant and equipment over the wall. If the latter, this is to be confirmed by the Client prior to mobilisation. All lifting plans are to be provided by the Client. This will be completed in accordance with the lifting plan and the site traffic movement plan.

Access and egress to the plant room is to be confirmed by the Main Contractor.

All deliveries are to report to the Main Contractor holding bay before being transferred onto the main site.

### 6.2 Delivery of Plant, Equipment and Materials

All deliveries to site will be notified to the Main Contractor at least 48 hours before any delivery is made.

Details as to the delivery (i.e. number of vehicles, pallets, weights, dimensions and offloading method) will be provided.

We are currently not aware of any restrictions on delivery times within the site operating hours. No deliveries are expected to be required outside normal site working hours.

### 6.3 Site inductions and briefings

Prior to work beginning, all site personnel (G-Core and its subcontractors) will attend a site specific induction provided by the Main Contractor. This will include any site specific health, safety and environmental issues and information on first aid and fire arrangements.

## 7. Personal Protective Equipment

All personnel will be issued with appropriate PPE. This includes high-viz, steel toe-capped boots, hard hats and gloves as standard, and if required, water proofs, safety glasses, and ear protection will also be provided. Any site specific PPE will be explained in the induction and will again be re-iterated in the method statement briefing provided by G-Core's Supervisor to All personnel involved with the pre trial works.

Item	Standard	Notes
Hard Hat	EN397	White
HI-VIZ Vest/Jacket	EN471	Yellow (Mandatory)
Safety Footwear	BSEN345	Ankle support & mid sole protection.
Gloves	BSEN388	General building work
Cotton Coveralls		Mandatory
Ear Defenders		In accordance with noise assessments
Safety Glasses		Mandatory

NOTE: Shorts are not permitted to be worn by any G-Core personnel or G-Core subcontractors whilst operating on site.

## 8. Monitoring and Compliance

All works will be re-appraised each day before starting works, either by G-Core senior engineer, the lead driller or by pre-works daily briefing with the Main Contractor.

Weekly inspections of plant, equipment and labour activities will be completed.

Monthly site safety assessments will be carried out by the G-Core Project Manager and/or Director. G-Core's external safety advisor will complete at least 1 site safety assessment per project.

## 9. Sequence of Work

### 9.1 External Works – Borehole Heat Exchangers

1. Mobilise plant, equipment and personnel to site.
2. Complete engineer inductions



3. Obtain permit to dig
4. Drill and install 1 no borehole collector to the scheduled depth using a rotary drilling rig.
5. Install 40mm diameter single U tube pipes (HDPE SDR11) to a nominal scheduled depth of 120m (GeoDrill RAMS Appendix D).
6. Pressure test to 5 bar for 20 mins.
7. Fill with potable water.
8. Complete remaining 2 No. BHEs (continuous from completion of BHE No.1).
9. Pressure test all boreholes.
10. De - Mobilise all drilling plant, equipment and personnel from site.
11. Pressure Test.

## **9.2 External Works – Borehole Connections, Manifold and Header Pipes**

1. Complete engineer inductions.
2. Obtain permit to dig.
3. G-Core to excavate all trenches to the manifold location.
4. G-Core to excavate borehole spur and main trenches to manifold (pipe inverts to be minimum of 800mm below finished level.
5. G-Core to excavate main header trenches from the manifold to plant room pipe inverts to be minimum of 800mm below finished level.
6. G-Core to install borehole flow and return pipework to the manifold as per installation drawings. All connections will be made using 40mm diameter HDPE SDR17 pipework and HDPE fusion fittings and fixed using electrofusion bonding techniques.
7. G-Core to install main header pipes from the manifold to the plant room. All connections made using HDPE SDR17 pipework and HDPE fusion fittings and fixed using electrofusion bonding techniques.
8. G-Core to install pre-fabricated header pipework penetrations through into the plant room.
9. All installation works to be sequentially pressure tested before being backfilled and compacted. Reinstatement to final finished level and surface is to be by the Main Contractor.
10. The stability of any trench walls will be monitored at all times. Should any trenches be deemed to be unstable, they will be benched to reduce the angle of repose or stabilised by trench wall supports.

## **9.3 Internal Works – Plant Room**

1. Complete engineer inductions.
2. Obtain any permits required to access the plantroom.
3. Deliver and install plant room plant and equipment.
4. Complete hydraulic and interconnecting electrical works (power supplies to within 1m of G-Core plant and equipment, final connections by G-Core). Dead test certs to be provided.

5. Flush ground collector system with biocide and chemist certification.
6. Fill ground collector system with glycol solution.
7. Set system to work.

#### **9.4 System Commissioning and Handover**

1. Commission system.
2. Handover and tutorial to the end user.

## **10. Plant and Equipment**

Plant and equipment to be used for the installation is as follows:

### **10.1 Borehole heat exchanger installation:**

- 1 No Comacchio MC450P drill rig or similar (weight approx 12 ton)
- 1 No Set of settlement tanks and Mudpuppy separation unit
- 1 No Geo-Loop grout mixer/ loop installer
- 1 No Mud pumps or Compressor set
- Associated drilling equipment: drill rods, casing and tools

### **10.2 Borehole cross connections & Header pipework:**

- 5kva 110v generator.
- EF bonding machine.
- Biocide and glycol flushing/filling kart.
- 2 tonne excavator.

### **10.3 Plant Room:**

- 24v Geberit Compression tool.
- Battery operated hand tools
- Hand tools

## **11. Installation Methodology**

### **11.1 Overview**

G-Core's supervisor will assess each individual location prior to set up of machinery.

G-Core will arrange with the Main Contractor site manager/foreman to close access to our work areas by all other trades for the duration of our works (if required). NO work will be carried out until a permit to dig has been received from the Main Contractor.

No site investigation works for buried services or subsurface obstructions will be carried out by G-Core. It is required that records of all known buried services and potential obstructions are made available to G-Core prior to breaking ground and commencing any excavation works.

The G-Core area of work is to be sectioned off from other site works and site personnel. All excavations areas are to be sectioned off using solid barrier. The sectioning of working areas and subcontractors operating on site is to be agreed with the Main Contractor. The Main Contractor is to provide local site fencing or barriers within the agreed areas of the site. The movement and maintenance of the site fencing/barriers is to be undertaken by G-Core.

### **11.2 External Operations – Borehole Heat Exchanger Installation**

- Plant arrives on site and escorted to area of work by banks man along pre approved safe access routes.
- Set up operation within secure local fencing/hoarding as required (Main Contractor)
- Obtain permits to dig from Main Contractor.
- Drill boreholes as detailed in Appendix B under the management of G-Core.
- Install heat exchanger with each borehole to 120m depth below ground level and grout to ground level using thermally enhanced silica bentonite grout.

### **11.3 External Operations – Cross Connections & Headers**

- 40mm Medium Density Polyethylene pipe (SDR11) is installed horizontally to connect U tubes ensuring no sharp objects are near pipe. Access and egress to open excavations will be via a properly supported ladder. Special attention to manual handling as specified in risk assessment.
- Connect up flow and returns using Electro fusion bonding (fully qualified and experienced person only).
- Connect arrays to manifolds with EF bonding machine.
- Purging, filling and chemical testing of the collector with purge pump one circuit at a time using a food grade anti-freeze and water solution protection to -10 Celsius (min).

### **11.4 Internal Operations – Plant Room**

- Hydraulically Connect borehole header flow and return pipework to low loss header
- Installation of heat pumps and ancillary plant, equipment and fittings
- Electrical and controls installation
- Fault finding and testing.
- Commission.

## **12 Risks to the Environment from Working Operations**

The location of the drilling works has been assessed and they are not within the immediate vicinity of surface or shallow surface water courses.

The underlying ground conditions have been assessed and there are no risks associated with the drilling of the boreholes with respect to contaminating underlying aquifers.

All drilling fluids will be controlled via reverse return drilling methods and containment within settlement tanks. All tanks and bowsers will be inspected regularly for integrity and any potential leaks.

All tanks, bowsers and generators will be banded to control any potential spillages.

All re-fuelling will be carried out in the designated area on site.

There is not data available with respect to potential contaminated land. During execution of the works, should any contaminated ground (or suspected) be encountered, G-Core will stop works, secure the area and report to the Main Contractor for further instructions.

Any spillages will be contained by bunds around all plant and equipment. Should spillages occur, spill kits will be used to contain and remove spilt materials. Spillages (either controlled or otherwise) will be notified to the Main Contractor for inclusion within the site Health and Safety file.

There have been no restrictions notified to us with respect to ecology (i.e. flora and fauna). Where permits are provided, we deem these to consider and detail any precautions or restrictions to working methods or activities.

## **13 Archaeology and Heritage**

G-Core has not been notified as to any site issues, restrictions or specific working practices to be adopted with respect to existing or potential above or below ground archaeology or on site heritage.

However, there is potential for archaeology to be encountered. Should archaeology be encountered, works will cease, the working area will be sectioned off and reported to the site manager, with a request on how we are to next proceed.

## **14 Personnel Training, Certification and Supervision**

All installation operations will be completed by fully qualified and experienced personnel, fully trained to undertake the tasks assigned.

Copies of relevant staff competencies will be presented on site and copies made for retention on site by the Main Contractor.

Installation personnel will provide originals of CSCS and CPCS cards during the induction process. Copies of each will be taken and provided for retention by the Main Contractor on site as part of the induction process. All personnel are SSSTS or SMSTS. Copies of certificates will be provided for retention on site.

## **15 First Aid**

First Aid arrangements for the site are to be detailed by the Main Contractor during the site induction. The nominated first aiders for the site are to be detailed also at this time.

## **16 On Site Attendance and Welfare**

The following on site attendances and welfare facilities are to be provided without restriction:

- Toilet, hand washing, messing and drying facilities (main site welfare)

- Free, unrestricted access to the working areas.
- Unrestricted 2 Bar water supply with 50mm connection.
- Suitable and adequate lighting for access and on site movements.
- Suitable power supplies at appropriate source points. Task leads will be provided by G-Core.
- Suitable barrier or edge protection to section off drilling and excavation works from other trades on site.

## 17 COSHH

COSHH sheets relating the subcontract works are presented within Appendix D.

COSHH sheets relating to the biocide, glycol and diesel used for the works are presented in Appendix E.

## 18 Waste Management

All waste materials generated by the works (e.g. packaging, pipe off-cuts) will be disposed of to the segregates waste skips provided by the Main Contractor.

All liquid and solid waste will be removed from site by licenced waste carrier. The waste certificate for all loads leaving site will be provided to the Main Contractor for the site Health and Safety file.

Any spillages will be contained by bunds around all plant and equipment. Should spillages occur, spill kits will be used to contain and remove spilt materials. Spillages (either controlled or otherwise) will be notified to the Main Contractor for inclusion within the site Health and Safety file.

## 19 Permits and Certificates

All works will be completed under a permit to work issued by the Main Contractor.

All works will be full inspected and tested throughout the construction and installation process. All such inspection reports and certificates will be issued to the Main Contractor for retention in the site Health and Safety File.

All safety and test certificates for plant and equipment (including ancillary equipment such as lifting chains, slings and harnesses) will be supplied on site and copies retained on site for the site Health and Safety File. Regular inspections visual inspections of all plant and equipment (including ancillary equipment) will be made and the reports provided to the Main Contractor for retention in the site Health and Safety File.

## 20 Working alongside other Contractors

Where G-Core's works interface with other contractors, we will adopt the following practices:

1. All works will be completed under a permit to work system which will detail any works being carried out either to adjacent to or interfacing with other contractors.
2. All works adjacent to other contractors will be sectioned off from G-Core works and clear and suitable signage being put in place.
3. Where G-Core works interface with other contractors or trades (either pre or post G-Core works), the interface point will be inspected by G-Core prior to undertaking any works or G-Core will be available to enable any subsequent contract works to be carried on from any G-Core installed works.

## 21 Noise Restrictions

There is a restriction of 80dB for all operations outside of the hours of 10:00 to 14:00.

The noise rating for the drilling plant and equipment is presented in Appendix F. At 10m from the drilling equipment, the noise rating is 77.5dB.

The location of the boreholes has been revised as required to sit within the area designated by the original tender documents. The borehole locations are presented in Appendix B.

The drilling works are to be separated from the remainder of the site using noise attenuation barriers (e.g. Echobarrier). (TBC Main Contractor).

# Appendix A – Method Statement Briefing Record Sheet

# Method Statement Briefing Record Sheet

Upon first arriving on site, ALL persons shall receive a site Induction from a Supervisor, Manager or delegated competent person representing the Client.

This Method Statement shall be briefed out to ALL persons at risk PRIOR to the commencement of activities on site by the G-Core Site representative.

I confirm I have been briefed and fully understand this method statement; I have also had the opportunity to raise any queries relating to the tasks that are to be carried out. I WILL NOT DEVIATE FROM THE CONTENTS OF THE METHOD STATEMENT AND IF ANYTHING DOES CHANGE WHILST CARRYING OUT THE WORK I WILL STOP AND SEEK ADVICE FROM A SUPERIOR.

NAME	COMPANY	ROLE	SIGNED	DATE



## Appendix B – Installation Drawings

1. Ground Energy Collector layout
2. Trench Sections
3. System P&ID Schematic
4. Plant room layout

# Appendix C – Risk Assessment Register

Assessed By: R. Gardiner

Date: 19/07/2019

Signature:

**HEALTH & SAFETY RISK ASSESSMENT**

Site: The Danish Church		Risk Assessment No: 1		G-Core H&S Advisor:												
Persons Exposed: 5		Employees: 2		Other workers: 0		Public/Visitors: Unknown			Date:							
Young Persons (Under18): 0		Total No of persons at risk (any one time): 3		<b>Notes:</b>												
<p><b>Hazards which create potential for harm:</b></p> <p>Transport to/from site      Clinical Hazards      Contaminated Ground</p> <p>Spillage of fuel oils      Falling</p> <p>Objects Slips, Trips &amp; Falls      Noise</p> <p>Plant/Site vehicles      Fire</p> <p>Manual Handling      Buried Services</p> <p>Cuts &amp; abrasions      Excavations</p> <p>Other (The above list is not exhaustive):</p>				<table border="1"> <tr><td>x</td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> </table>	x							<p>a. Likelihood of harm:      3=Likely, 2=Possible, 1=Unlikely b.</p> <p>Severity of harm/Injury:      3= Major, 2 = Notifiable, 1 = Minor</p> <p>c. If following controls there remains a result greater than or equal to 4 in column 7, refer the assessment to your Project Manager for a review of the controls. Further controls should be implemented to reduce the degree of risk.</p> <p>d. If our operations are likely to affect pedestrians or the safe operations of a public transport system, the control measures must reduce the likelihood of significant harm to the level that existed before our work commenced.</p>				
x																
Hazard	1	2	3	4		5	6	7	8	9						
	Factors of Harm		Risk	Control Measures		Likelihood	Severity	Residual Risk	Control measures monitored by	Notes						
	Likelihood	Severity														
Transport to/from site	3	3	9	Vehicle checks carried out daily/weekly. Competent drivers, with correct licences Safe access to site to be approved with the Main Contractor site manager		1	3	3	Driver							

Spillage of fuel oils	3	3	9	Spillage packs carried on all vehicles Training in handling and cleaning techniques Product carried in suitable/approved containers  All substances to be stored in dedicated areas on site as specified by the Main Contractor site manager  COSHH Certification and relevant PPE supplied	1	3	3	Team Leader	
Slips, Trips & Falls	3	3	9	Staff supplied with quality footwear  Good housekeeping  Appropriate fencing around all excavations where left temporarily open.	1	1	1	Team Leader	
Incidents involving moving plant/site vehicles	3	3	9	Use of Banksman at all times  Flashing lights and reversing mirrors/cameras  Vehicles/Plant to use the Main Contractor designated traffic plan  Observation of site speed limits  Nonessential vehicles parked in Main Contractor designated parking area	1	3	3	Team Leader	
Manual Handling (heat pumps, pipes and materials)	3	3	9	All staff trained in correct manual handling techniques  Correct lifting/moving equipment to be used  Daily/weekly/monthly checks on all lifting	1	3	3	Team Leader	

Cuts & abrasions (Cutting of pipework)	3	3	9	Staff trained in the use of machinery Toolbox talks PPE to be worn All site staff first aid trained	1	3	3	Team Leader	
Exposure to asbestos	2	3	6	Site staff trained in asbestos awareness NO work carried out in areas where asbestos is suspected Do not disturb any suspected materials Report any discoveries to site contact immediately	1	3	3	Team Leader	
Exposure to clinical hazards inc Leptospirosis	3	3	9	Gloves to be worn. Wash hands and exposed skin on completion of works Sharps are not handled and reported to site	1	2	2	Team Leader	
Risk of falling objects	3	3	9	Hard hats worn at all times Inspection of work area prior to work commencing All areas of potential danger made safe using safety nets support ropes or other fixings	1	3	3	Team Leader	
Noise	3	3	9	Use of ear defenders Training in use of PPE	1	2	2	Team Leader	
Fire	3	3	9	Combustible materials stored in suitable/approved containers Location of fire point known by all from site induction All site staff fire marshall trained	1	3	3	Team Leader	

Buried Services	3	3	9	Area to be checked by the Main Contractor and any buried services clearly marked No work to be carried out outside of G-Core designated work area	1	3	3	Team Leader	
Excavations	3	3	9	Banksman to be used at all times Entry to & from excavation via designated area Open excavations to be fenced off	1	3	3	Team Leader	
COSHH	3	3	9	All relevant materials to be stored in area designated by the Main Contractor site manager Correct PPE to be worn COSHH Certification supplied	1	3	3	Team Leader	
Contaminated Ground	3	3	9	If encountered work to stop immediately Report any discoveries to the Main Contractor site manager immediately No work to restart until written confirmation that area is clear from the Main Contractor site manager	1	3	3	Team Leader	



## Appendix D – Drilling Subcontractor RAMS



## Appendix E – COSHH





## Appendix F – Noise Data for Main Plant