URS

Application Site Report

Draft

January 2012

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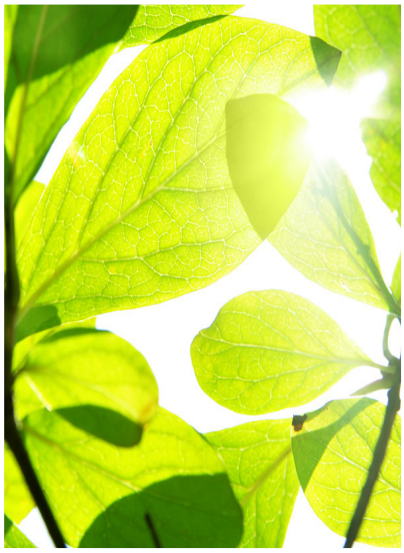
Prepared for:
Ferrybridge MFE Ltd

UNITED KINGDOM & IRELAND



REVISION RECORD					
Rev	**Date**	**Details**	**Prepared by**	**Reviewed by**	**Approved by**
1	16th January 2012	Draft for comment	Hannah Short Environmental Consultant	Richard Wood Principal Consultant	Richard Lowe Associate Director
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1 INTRODUCTION

This document represents the Application Site Condition Report (ASR) for the Ferrybridge MFE Limited Multifuel Power Station installation at Ferrybridge, nr Knottingley, West Yorkshire, UK, submitted to the Environment Agency as part of an application for a permit to operate an installation under the Environmental Permitting (England and Wales) Regulations 2010.

This report is structured in accordance with the Environment Agency Environmental Permitting Regulations: Site Condition Reports - Guidance and Templates (H5).

Records of the site and surrounding areas have been reviewed along with operational site records in order to describe the condition of the site and, in particular, to identify any substance in, on or under the land that may constitute a pollution risk to the land. Pollution prevention measures have been identified and an assessment of pollution potential to land has been undertaken.

2 SITE DETAILS

2.1 Site Details

SITE DETAILS	
Name of Applicant	Ferrybridge MFE Limited
Activity Address	Ferrybridge 'C' Power Station Stranglands Lane, Knottingley, West Yorkshire, WF11 8SQ
National Grid Reference	447335, 424995
Document Reference and Date for Site Condition Report at Permit Application	49352131/LERP0003 16/01/2012
Document References for Site Plans (Copies of these figures are included at the end of this Site Condition Report – see Figures)	Figure 1 – Site Location Figure 2 - Site Layout Figure 3 – Conceptual Site Model

2.2 Site Overview

The installation site ('the site') is located in Knottingley, West Yorkshire (Figure 1), approximately 1.25 kilometres (km) to the southeast of the settlement of Castleford and is separated from this settlement by the A1(M). The centre of the site is at National Grid Reference 447335, 424995.

The site comprises land within the ownership boundary and operational area of the Ferrybridge Power station site ('the power station site'). The site is located in the northwest of the power station site and is bounded by the existing coal-fired power station to the south, golf course and coal stockyard to the north, A1(M) motorway to the west and coal-fired power station and associated cooling towers to the east.

Fryston Beck flows from the east of the site, adjacent to the railway line and is culverted under the northern part of the site. The residential area of Brotherton is located approximately 1km across the River Aire, to the northeast of the site. The residential area of Ferrybridge lies approximately 400 metres (m) from the installation boundary across Stranglands Lane to the south.

The site and surrounding area is generally flat and is at an elevation of approximately 12-15m Above Ordnance Datum (AOD).

The site location and layout can be seen in Figure 1 (Site Location Plan) and Figure 2 (Site Layout Plan).

2.3 The Wider Ferrybridge Power Station Site

The wider Ferrybridge power station site contains the 2000 Megawatt (MWe) coal-fired Ferrybridge 'C' Power Station, which has four 500 MWe turbo-generators. Eight cooling towers (113m in height) are located in the centre of the power station site. It is bounded to the east by the A1(M) and to the north is the coal storage area. Flue Gas Desulphurisation (FGD) equipment is located to the south of the cooling towers and the associated limestone and gypsum handling facilities and stores are located adjacent to the railway line in the north. East of the railway line, lies a plasterboard manufacturing plant owned and operated by Lafarge Plasterboard Ltd, which utilises the (gypsum) by-product from the Ferrybridge FGD.

2.4 Details of the Installation

Full details of the activities at, and layout of the installation (including installation boundary) are provided in Annex 1 of the Environmental Permit Application. In summary, the Multifuel power station will utilise a variety of fuel types to generate up to 69 MWe (net), or up to 76MWe (gross).

The installation is designed to use a range of fuels with a design capacity of approximately 500,800; maximum capacity 676,000 tonnes of mixed fuel per year. The fuel will consist of biomass, solid recovered fuel (SRF), refuse derived fuel (RDF) and waste wood. There will be no combustion of hazardous material or treatment of waste at the facility.

The site, comprising fuel reception and storage area, blended fuel store, main process area and rail handling facility is approximately 16 hectares (ha) in area and is located within the northern part of the existing power station site.

Operational access to the site from public highways will be gained via Kirkhaw Lane through 'B' Gate to the east of the cooling towers. Fuel is to be delivered to the HGV reception / weighbridge area to the northeast of the existing cooling towers. Delivery vehicles will then proceed to offloading bays via an internal access road where fuel is deposited into the indoor fuel bunker. The option for delivery of fuel by rail is also facilitated through the extension and use of the existing rail siding adjacent to the Multifuel power island.

Fuel will be stored in a bunker within the integrated facility located in the northwest of the site. The bunker system will have capacity to store around seven days of fuel (around 10,000 tonnes). The storage bunker is estimated to be a maximum of 64m x 30m excavated to a depth of 7m (including foundations). The fuel storage bunker will be a reinforced concrete, water-retaining structure with additional protection barriers such as membrane liners anchored down for flotation. No hazardous waste will be stored in the fuel bunker.

To minimise odour, the fuel stores will be kept under negative pressure by the fans of the boiler.

Additional raw materials will be used at the installation including low sulphur gas oil start-up (auxiliary) fuel, boiler treatment chemicals and flue gas treatment chemicals (ammonia solution, lime and activated carbon). All will be stored in appropriately bunded above ground storage tanks.

The permitted process produces the following residual materials:

- inert bottom ash (including ferrous metals), which will be stored in a sealed bunker;
- fly ash which may contain some unreacted lime, to be stored in three bunded silos;
- ferrous metal from the bottom ash, which will be stored in a dedicated metals bin prior to collection for off-site recycling; and
- Minor quantities of waste oils associated with maintenance activities.
- Bottom ash and fly ash will be transported off-site daily for treatment and recycling or disposal. Any waste oils from maintenance activities will be sent for off site treatment or disposal using appropriately licensed third party waste operators.

A materials inventory and assessment of the pollution potential of raw materials used at the facility can be found in Appendix A.

3 CONDITION OF THE LAND AT PERMIT ISSUE

3.1 Environmental Setting

Geological, hydrogeological and hydrological information for the installation was obtained from the following sources;

- A Landmark Envirocheck® Report Reference Ref. 27644584_1_1;
- BGS Sheet 78, Wakefield Solid and Drift Edition;
- Environment Agency (EA) Groundwater Vulnerability Map 12 Vale of York;
- Ordnance Survey (OS) Landranger 105 York and Selby, 1:50,000; and
- The Environment Agency website - www.environment-agency.gov.uk.

3.1.1 *Geology*

BGS Sheet 78, Wakefield, Solid and Drift Edition indicates that the site is underlain by Made Ground overlying undifferentiated glaciofluvial deposits comprising sandy gravel across the majority of the site.

The Made Ground is underlain by alluvium and glaciolacustrine deposits (sands) in the southwestern corner of the site.

The drift deposits are underlain by dolomitic limestone of the Cadeby Formation (up to 70m) of Permian age.

3.1.2 *Hydrogeology and Hydrology*

The Groundwater Vulnerability Map 12 Vale of York, indicates that the site is underlain by a Principal Aquifer (highly permeable), which is considered to relate to the underlying dolomitic limestone. The overlying soils are classified as having a high leaching potential but the site is located in an urban area where few observations have been made. Principal Aquifers are classified as formations that are generally regarded as containing significant fracturing. They may be highly productive and able to support large abstractions.

The Landmark Envirocheck® Report shows there are three groundwater abstractions and one surface water abstraction located within 1km of the site boundary. Trustees of Ferrybridge Golf Club is licensed to abstract groundwater for top up water and Ferrybridge ‘C’ Power Station has two licenses for the abstraction of groundwater for the production of energy (boiler feed). The surface water abstraction is from the River Aire and licensed to Keadby Generation Ltd for General Cooling at Ferrybridge ‘C’ Power station. There are no Source Protection Zones located within 1km of the site.

URS is also aware that the Lafarge Plasterboard Ltd facility adjacent to the Ferrybridge ‘C’ Power Station site has two abstractions, one for groundwater (ref 2/27/18/148) and one for surface water taken from the River Aire (re. 2/27/18/149). Both are used for process water.

There are no nitrate vulnerable zones within a 1km radius of the site.

3.1.3 *Hydrology and Flood Risk*

The nearest surface water feature to the site is the Fryston Beck which is culverted beneath the site and flows east into the River Aire. A drain flowing north between part of the eastern boundary and the railway line flows into the beck before it leaves the site and is culverted beneath the railway line prior to its confluence with the River Aire. The Aire and Calder Navigation canal is located approximately 450m east of the site.

Fryston Beck has a River Quality Chemistry of Grade C (fairly good). Table 3-1 presents information for the River Aire.

TABLE 3-1 ENVIRONMENT AGENCY WATER QUALITY FOR FRYSTON BECK TO AIRE AND CALDER NAVIGATION (0.60KM)

Parameter	Grade	Status
Chemistry	C	Fairly good
Biology	D	Fair
Nitrates	-	-
Phosphates	-	-

There will be two attenuation ponds located on site. The largest is located on the western part of the site, with a smaller pond located in the weighbridge area to the east. The ponds are designed to accept runoff from the major areas of the site and discharge runoff at greenfield rates and attenuate to the 1 in 100 year event with an allowance for climate change.

The site is shown on publicly available documents to lie within the EA's delineated Flood Zone 3a, which is a high risk category. A site specific topographic survey has been undertaken and flood levels modelled on this data demonstrate that the site is above the River Aire 1 in 100 level. However the site is liable to flooding from overflows if the capacity of the Fryston Beck culvert was exceeded, or in the event of culvert failure within the site.

There are flood defences along both banks of the River Aire to the east of the site. These are graded on their condition and are Grade 3 (fair) on the western banks and Grade 2 (Good) on the eastern banks. To the east of the River Aire there is an area of controlled washland, which receives and stores water in times of flood. This stretch of the River Aire has been classified by the Environment Agency as being heavily modified.

The risk of flooding from groundwater, sewers and overland flow is deemed to be low. However, the site is recognised to be at risk of flooding from the

culvert of Fryston Beck, therefore the flood risk is considered to be of high importance.

3.1.4 *Land Use*

No Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), Special Protection Areas (SPA), RAMSAR sites, Areas of Outstanding Natural Beauty (AONB), national or local nature reserves or other ecologically designated sites were identified within a 1km radius of the subject site.

The closest residential receptor is Holmefield Farm, approximately 300m to the west of the installation boundary.

3.2 Pollution History

On behalf of Keadby Generation Ltd., URS has undertaken a review of historical maps and publically available information, as provided in an Envirocheck® Report commissioned from Landmark Information Group Ltd, to review the pollution history for the site. An electronic copy of the report is provided with the application, with the findings summarised in the following sections.

3.2.1 *Historical Map Review*

Information pertaining to the history of the site and the surrounding area was obtained following a review of historical Ordnance Survey ('OS') maps dated between 1893 and 2008. Significant land-use changes on-site and within the immediate vicinity of the site in this period of time are summarised below. The approximate distances to features described in this section have been estimated from the closest site boundary.

History of the Site

The Landmark Envirocheck® Report shows the land use on and surrounding the site dating back to 1908. From 1908, the area was undeveloped agricultural land with Fryston Beck located in the southeastern corner. The land use on the site remained unchanged until 1984 when three buildings are shown in the centre and west of the site. By 1999 the site was developed as part of the existing power station layout with no subsequent change to 2008. The Proposed Development Site is currently occupied by general stores, a workshop, golf course and cricket field associated with Ferrybridge 'C' Power Station.

The Envirocheck report indicates the potential presence of a former landfill site located approximately 35m to the north of the railway sidings that are currently utilised for the offloading of the heavy fuel oil. The landfill was reportedly operated by Central Electricity Generating Board for the disposal of Deposited Waste including Inert, Industrial and Commercial Waste, and Liquid, from December 1964.

History of the Immediate Surroundings

Between 1899 and the present day, the surrounding area has been occupied by potentially contaminative land uses including power stations and railway lines.

From 1908, the Knottingley Branch Railway Line was located approximately 540m east of the site, running from north to south.

Although not indicated on the historical plans, it is understood that construction began on Ferrybridge 'A' Power Station in 1927, which was subsequently closed in 1957.

By 1967, the Ferrybridge 'B' Power Station main building and cooling towers had been constructed approximately 600m northeast of the site. The Ferrybridge 'C' Power Station was also under construction immediately south and east of the site.

In is understood that the Ferrybridge 'B' Power Station was closed in 1992 and by 2008 had been completely demolished.

There is a former site waste disposal tip understood to be located within Fryston Park, to the north of the oil off-loading rail siding. Anecdotal evidence indicates that it was mainly used for the disposal of demolition/ construction waste, possibly including asbestos, during early power station operations. The site predated waste licensing controls, and no records of tipping at this location remain; it is not shown on the Envirocheck report.

A Coal Authority Report obtained for the site indicates that the power station site is within the likely zone of influence from workings in four coal seams at depths ranging from 330 to 590m. The seams were last worked in 1966.

3.2.2 *Environmental Regulatory Database Search*

The following sections detail the sources of desk study information searched in order to describe the condition of the installation and, in particular, to determine the potential for substances to be present in, on or under the land associated with present and past uses of the site and its surrounding areas.

Direct consultation with statutory authorities has not been undertaken as information from these bodies has been obtained via the third party database search (Landmark Information Groups 'Envirocheck Report').

On behalf of Keadby Generation Ltd., URS commissioned the 'Envirocheck' UK regulatory authority database search from the Landmark Information Group Ltd (Reference 27644584_1_1 7th April 2009) to obtain information on the following types of operation within a 1km radius of the site:

- Landfill operations, waste treatment and disposal, and waste transfer operations;

- Facilities holding either Part A or Part B authorisations under the Environmental Permitting or Pollution Prevention and Control (IPPC) Regulations;
- COMAH sites or sites holding hazardous substances consents;
- Sites holding radioactive substances authorisations;
- Pollution incidents to controlled waters;
- Operators holding consents to discharge to controlled waters;
- Sites which have been the subject of regulatory authority enforcement notices and / or prosecutions; and
- Sites that have been designated as contaminated land by the local authority.

Environmental Permits

The Ferrybridge installation (registered as Keadby Generation Ltd) holds an IPPC permit for combustion of fuel greater or equal to 50MW; inorganic chemicals; non-hazardous waste disposal and associated processes. No other Part A IPPC authorised operations have been identified within 500m of the site.

- Three HFO tanks (denoted A, B and C) are currently located in the northwest part of the power station site, which are associated with the Combustion Activities of the Ferrybridge 'C' Station. These are not associated with the proposed Multifuel plant.
- The HFO tanks are operated under Environmental Permit (VP3337SR) for Ferrybridge 'C' Station and the land under Tank C will be surrendered from the main power station installation boundary to be included in the Multifuel plant installation boundary, as described in a Minor Technical Variation Application for the main power station..
- The tanks are of steel fabricated construction, within earthwork and concrete walled bunds. During the enabling and construction phase of the Multifuel plant installation development, Tank C (7680m^3) will be decommissioned and removed; Tank B (6000m^3) will be retained and Tank A (6000m^3) will be removed and replaced. This will free up some of the land to be used for the Multifuel plant. In combination, the retained tank and replacement tank will provide approximately 12,000m^3 storage capacity for HFO to supply Ferrybridge 'C' Station.
- Contaminants of concern associated with the heavy fuel oil storage tanks include total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs) and metals. Extensive soil and groundwater monitoring is proposed following the removal of Tanks A and C and will indicate any historic contamination from the tanks. Contamination is anticipated to be local only due to the nature of the fuel. The tank removal process will be followed by remediation, as appropriate.

The Envirocheck Report identified two sites within a 1km radius as operating under a Part B Integrated Pollution Prevention and Control Permit. The nearest (Lafarge Plasterboard - Ferrybridge) is located approximately 600m to the northeast of site for 'plaster process'. The second (Thorpe Brothers Ltd.) is 900m to the southeast of the site for waste 'oil burners' (less than 0.4 MW net rated thermal input).

Landfills, Waste Treatment or Disposal Sites

The Envirocheck report identified the following landfill and waste treatment, disposal and transfer facilities within 500m of the installation:

- One historical landfill site was identified north of the rail sidings, licensed to Central Electricity Generating Board, containing inert industrial and commercial waste and liquid sludge;
- Three revoked or surrendered waste management facilities (metal recycling) identified approximately 400-450m east of the site;
- One licensed waste management facility was identified approximately 495m east of the site, licensed to W.S.S Group, authorised to accept household, commercial and industrial waste transfer.
- One operational registered waste treatment or disposal site was identified approximately 410m east of the site, operating as a scrapyard, authorised to accept cars and tyres.

A further three landfill and waste treatment, disposal and transfer facilities were identified within 500m - 1km of the site. Of these three facilities, two are identified as now being closed. The operational site is a Civic Amenity site operated by City of Wakefield MDC, authorised to accept a variety of waste including household waste, electrical waste, empty paint and solvent drums, glass and scrap metal.

Hazardous Substances

A review of the Envirocheck report did not identify any Control of Major Accident Hazard sites (COMAH) within 1km of the site.

No Planning Hazardous Substance Consents or Explosive Sites were identified within 1km of the site.

Radioactive Substances

A review of the Envirocheck report identified no sites as holding Radioactive Substances Authorisations within a 1km radius.

Discharge Consents

The Envirocheck Report notes surface water discharges into the River Aire, including trade effluent and site discharge now under the control of Keadby

Generation's Ferrybridge 'C' Power Station. Lafarge Plasterboard Ltd has a discharge consent for treated sewage effluent (approximately 800m northeast of the site) and Yorkshire Water Service Ltd hold a consent for overflow from a storm overflow tank at a sewage treatment works (approximately 850m east of the site).

There are also consented discharges into Fryston Beck, including site drainage from Industrial Pallett Services, National Grid Company Plc (within 500m of the site) and Yorkshire Water Services Ltd (within 1km of the site).

Pollution Incidents

The Envirocheck Report identified 27 pollution incidents to controlled waters within 1km radius of the subject site. The nearest pollution incident was located approximately 590m west of the site. This was a category 3 minor incident caused by an industrial premises and the pollutant was oil. The nearest significant incident (category 2) was identified approximately 760m east of the site.

The Envirocheck report identified one Substantiated Pollution Incident, approximately 425m east of the site, involving oils and fuel and resulted in a category 2 (significant incident) impact to land and a category 4 (no impact) impact to water.

Enforcement Notices, Prohibition Notices or Prosecutions

No enforcement or prohibition notices relating to controlled waters or authorised processes were identified as being issued to any facilities within 1km of the subject site.

No prosecutions relating to authorised processes were identified within 1km of the subject site.

Contaminated Land

No sites determined as 'Contaminated Land' under Part IIA of the Environmental Protection Act 1990 were identified within a 1km radius of the subject site. The subject site was not identified as being designated by the local authority as a "Contaminated Land" site.

Summary

Given the history of the site and surrounding activities, it is possible that there may be historical contamination at the facility. The site has been in use for industrial, and specifically power generation, purposes since the late 1920s. There is therefore some potential for historic and more recent contamination of the site as a result of these operations.

3.3 Conceptual Site Model

3.3.1 *Introduction*

The Conceptual Site Model (CSM) described herein is based on the information presented above, and is a simplified version of the process set out in the Environment Agency's Horizontal Guidance Note H1 – Annex j, used to assess groundwater discharges.

For a risk to be considered plausible, a mechanism (or 'pathway') must be present by which contamination from a given source can reach a given sensitive receptor. Consequently complete 'source-pathway-receptor' exposure mechanisms are commonly termed 'pollutant linkages'.

Pollutant sources, exposure mechanisms and receptors at the subject site are discussed below. The CSM is illustrated in Figure 3 at the end of this report.

3.3.2 *Pollutant Sources*

Based on the proposed installation operations, the following potential contaminant sources were identified:

- Storage of fuel in the fuel bunkers and in containers received by rail;
- Storage, use and transport of raw materials for installation operation (including auxiliary fuel, ammonia solution, lime, activated carbon and other boiler treatment chemicals); and
- Storage and transport of residual materials (including bottom ash, fly ash / APCR).

3.3.3 *Pathways*

Pathways by which pollutants have the potential to migrate from potential sources, to identified sensitive receptors, are considered to include the following:

Human Health

- Dermal contact with contaminants in shallow soils and groundwater wherever they may be exposed;
- Accidental ingestion of absorbed and dissolved phase contaminants by current / future site workers; and,
- Inhalation of contaminants from the partitioning of vapours from soil and groundwater contamination.

Controlled Waters

- Surface water run off routes;
- Vertical migration through cracks or joints in hard standing;

- Lateral and vertical migration within shallow groundwater in Made Ground and Alluvium;
- Lateral and Vertical migration within the underlying Limestone; and
- Leakage from drainage systems;
- Structure, foundations and piles in building walls.

3.3.4 *Receptors*

The following potential sensitive receptors have been identified:

Human Health

- Current / future on-site workers; and
- Off site residents (located west, south and southeast of the site) and infant school (located south).

Controlled Waters

- Fryston Beck, culverted beneath the northern section of the site;
- River Aire, approximately 450m east;
- Aire and Calder Navigation system, emerges from the River Aire approximately 1.5km southeast of the site;
- Underlying shallow groundwater within the Made Ground and/or Alluvial deposits; and
- Deeper groundwater within the Cadeby Formation dolomitic limestone (Principal aquifer).

3.4 Land Pollution History

Site management provided the following details of major spillages of hazardous liquids (i.e. where the quantity was sufficient to require a vacuum tanker or similar to recover) during the last ten years (Table 3-1). All of these spills were contained on site, and none resulted in off-site impacts or residual impacts to land at the installation.

TABLE 3-1: MAJOR SPILLAGES IN RECENT SITE HISTORY	
Date	**Details**
April 2002	HFO transfer line leak in Road 5 - contained on site
September 2002	Turbine lubrication oil conditioner overflowed - intercepted in S6 sump
November 2002	B3 HFO pump leak
August 2003	Oil spill from Unit 1 main boiler feed pump - intercepted in S6 sump
August 2003	Oil spill into No.2 ash hoppers
August 2003	HFO leak at pump station. Contained in pump station. Planned improvements to this area were completed end of 2005.

Table 3-2 presents the incidents to controlled waters that are recorded on the public register as being attributed to the power station site.

TABLE 3-2: INCIDENTS TO CONTROLLED WATERS		
Incident Date	**Description**	**Category**
11 August 1995	Release of oil to freshwater stream/river (River Aire)	Category 2 - Significant Incident
12 August 1995	Pollutant (not recorded) released to freshwater stream/river (River Aire)	Category 3 - Minor Incident
Not recorded	Release of oil to freshwater stream/river (River Aire)	Category 3 - Minor Incident

These incidents are discussed below:

- A major heavy fuel oil spill occurred at the rail offloading facility in 1995. Impacted soils were removed for offsite disposal.
- Approximately 20 - 25 litres of diesel was spilled into the River Aire in 1995 by a contractor working on the barge unloader at the coal plant. Immediate action was taken to stop the leak and deploy absorbents, but it was observed by a National Rivers Authority (NRA) inspector before the incident could be reported. URS understands no regulatory action was taken against the site operator. Barge unloading no longer occurs.
- Oil offloading from barge. It was reported in 2001 that a transfer line had become disconnected, resulting in a small spillage of oil to the river. This was dealt with swiftly, and reported to the Environment Agency by letter. No further action was reportedly taken by the EA.

3.5 Conceptual Site Model Summary

The CSM identifies a number of potential current sources. Pathways to identified receptors, in particular the underlying aquifer and Fryston Beck are present.

Section 3 sets out the measures in place to break the source-pathway-receptor linkage and minimise the potential for pollution.

3.5.1 *Graphical Representation of the CSM*

Graphical representations of the CSM have been produced and are shown in Figure 3.

3.5.2 *Uncertainties in the CSM*

In developing the conceptual model for the site the following assumptions have been made:

- Geological boundaries shown on the BGS map are relatively accurate; and
- Groundwater flows towards surface water bodies as described in the CSM.

3.6 Reference Data

Due to the historical contamination present within specific areas of the proposed installation boundary, and the similarity of previous site processes with the proposed process, the collection of reference data to provide a baseline for the Environmental Permit is recommended. This data will be collected as part of the partial surrender of the land from Environmental Permit ref. VP3337SR, and is envisaged to represent a suitable baseline for the proposed installation.

4 CONTROL OF PERMITTED ACTIVITIES

4.1 General Description

The general techniques that will be employed at the installation to reduce the risks of accidental environmental impact include the following:

- An inventory of potentially environmentally hazardous substances will be maintained by the SHE and Quality Manager;
- Non bulk hazardous materials will be stored within dedicated areas which will be provided with concrete hardstanding. Any drums of hazardous material will be stored within a dedicated secure bunded compound;
- Procedures for controlling the filling and discharging of tanks, material deliveries and the removal of wastes from the installation will be defined for the installation;
- Full responsibilities and duties will be defined for key personnel associated with the management and operation of the site processes and materials handling procedures. Operatives and personnel will be trained in the use of safety systems and responses to alarms or equipment failure.
- Spill kits and drain covers will be available across the installation to locally contain spillages of hazardous materials.
- Preventative maintenance procedures will be in place for the inspection and maintenance of process equipment, abatement systems and sensors.

4.2 Site Infrastructure

At the time of submitting this report the full installation has not been constructed and there was no infrastructure in place for the operational site. As such no photographs are provided within this report.

Although not yet installed it is proposed that the following infrastructure will be installed on the site.

4.2.1 *Fuel Bunker*

Solid fuel will be stored in a bunker within the integrated facility located in the northwest of the site. The storage bunker is estimated to be a maximum of 64m x 30m with a depth of 7m. The water table is estimated to be at a depth of 10m at this location. The bunker will extend to a height of 23m above ground level, which gives a total volume of 57,600 m^3, of which 52,431 m^3 will be used for fuel storage. The bunker will have capacity to store around seven days of fuel (around 10,000 tonnes). The bunker will be reinforced concrete, and designed as a water-retaining structure with additional protection barriers such as membrane liners anchored down for flotation.

Fuel Production and Delivery

Prior to delivery to the site, all fuel will be processed including screening and removal of recyclables such as plastics, metals, glass etc. The resulting fuel used to power the plant will have a low moisture content compared to residual municipal solid waste (MSW). The fuel is not designated as a hazardous substance.

However, it is recognised that traces of hazardous substances could theoretically remain within the processed waste based on what may be present within domestic waste and commercial & industrial waste. As a proportion of the overall waste mass however this constitutes a negligible fraction.

Fuel monitoring and delivery protocols put additional operational controls on the fuels that are accepted and stored in the bunker, including:

- The fuel will not contain anything other than traces of hazardous substances. The 2009 ES, Section 4.8.4.2 describes the fuels. Fuel quality will be analysed at source and certified. Any loads not meeting the specification could be rejected and a quarantine area will be provided at the installation for out of specification fuel;
- Should a certified but non-compliant delivery arrive on site (and non-compliance is visually identified by the operations staff), the delivery from the specific supplier will be quarantined and not be mixed with the other stored fuel;
- Fuel will be monitored for compliance with Environmental Permit requirements and the specification. The fuel specification for each fuel supplier will state the maximum moisture content, typically 40%, and excessively wet loads will be rejected. Liquid waste with the potential to generate leachate will not be accepted by the site.

Fuel Bunker Design

The bunker will incorporate a number of design features that will result in the potential for the groundwater coming into contact with the fuel to be negligible. These include:

- The bunker will be designed in accordance with BS EN 1992-3: 2006 *'Design of concrete structures. Liquid retaining and containing structures,'* to prevent the ingress of ground water or the seepage of leachate from the fuel;
- The bunker will be constructed to support not only the significant pressures resulting from the rock walls of the excavation, but also the hydrostatic pressures and uplift imposed by the groundwater;

- Should a failure of the integrity of the bunker construction occur, water would flow into the bunker rather than any leachate head forcing water out of it into the groundwater;
- The bunker will be enclosed in a permanent steel framed building to prevent the ingress of rainwater and hence maintain a dry fuel.

Fuel Bunker Operation

The following controls and monitoring regime will be adopted:

- The amount of fuel in the bunker will normally be 2-3 days storage, i.e. about half full. The maximum storage capacity (7 days storage) would be used in preparation for foreseen events, e.g. public holidays and maintenance outages, and the operational plan is used to manage stock levels so that the plant can function efficiently, and receive fuel from the suppliers as required;
- The fuel will be rotated so that it is consumed in the plant normally on a three day cycle, with the first fuel received being the first fuel consumed and mixing and preparation carried out each night; it will not be left in situ for extended periods;
- The fuel will be placed in specific areas within the bunker and stocks will be managed to allow a regular inspection programme of the base and sides. The bunker integrity will be subject to ongoing formal operational inspections as part of the site preventative maintenance regime;
- The bunker will not be allowed to flood, so there is no potential for the hydrostatic head inside the bunker to exceed that of the surrounding water table, and thus migrate into the aquifer;
- A programme of groundwater monitoring will be employed in wells around the fuel storage facility to assess the potential for any changes to the quality of the groundwater local to the bunker.

Bottom Ash Bunker

The non-hazardous wet bottom ash will be temporarily stored in a 1500 tonne capacity (approximately five day storage capacity) storage bunker. The ash storage bunker will be designed in accordance with BS EN 1992-3: 2006 *'Design of concrete structures. Liquid retaining and containing structures,'* to prevent the ingress of ground water or the seepage of leachate from the fuel. Ferrous metals removed from the bottom ash will be stored in ferrous metal bins in the bottom ash storage area. Bottom ash and ferrous metals will be removed daily from the site to an appropriate licensed recycling facility.

4.2.2 *Tanks and Silos*

- The site will have a number of above ground bulk storage tanks as defined in Table 4-1 below.
- All process activities that have the potential to result in pollution through spillage will be located in suitably bunded areas or on hardstanding (i.e. concrete) with a sealed drainage system.
- There will be no underground storage tanks on-site and no former underground tanks are understood to have been present on the site.

TABLE 4-1: STORAGE TANKS AND CONTAINMENT

Tank Description and Contents	Secondary Containment	Secondary Containment Capacity (m^2)	Secondary Containment Capacity Volume Required for 110% containment (m^2)
Auxiliary Fuel (gas oil) (2 tanks with 160m^3 total capacity)	Concrete bunded area	88	88
Ammonia Solution (1 tank with 40m^3 capacity)	Double skinned tank	44	44
Hydrated Lime (powder) (3 x 250m^3 capacity silos)	Concrete hardstanding area with no surface water drains	n/a	n/a
Activated carbon (powder) (1 tank with 100m^3 capacity)	Concrete hardstanding area with no surface water drains	n/a	n/a
Fly ash (powder) (3 silos with 750m^3 capacity)	Concrete hardstanding area with no surface water drains	n/a	n/a

The gas oil tank and associated fill points will be located above ground in a bunded area within the process building envelope. A bund volume of at least 110% of the capacity of one tank will be provided, constructed in accordance with the Environment Agency guidance "How to Comply with your Environmental Permit".

Aqueous ammonia solution will be delivered in sealed tankers and off-loaded via a standard hose connection into a 40 m^3 double skinned tank. Tank

vapours will be vented back to the delivery vehicle when offloading, in accordance with indicative BAT.

The lime will be delivered by bulk tanker and offloaded pneumatically into the silos with displaced air vented through a reverse pulse jet filter.

Activated carbon for the flue gas cleaning process will be delivered by bulk tanker and offloaded into one 100 m^3 silo with displaced air vented through a reverse pulse jet filter.

Fly ash collected from the bag filters will be combined with the APC residues and temporarily stored on site in three silos. Fly ash and residues will be removed daily from site via enclosed tankers by licensed contractors for recycling or treatment or disposal at a hazardous landfill

The bunds / bunded areas will have no gravity outlets or drains meaning that there are no pathways to the water environment. Regular inspections will be carried out to ensure that potential defects are found and corrected before causing problems.

Weekly visual bund inspections will be carried out for the above tanks as part of the planned preventative maintenance (PPM) regime with records maintained on site. Bund contents will be emptied as and when required and would be tested prior to discharge to the power station drainage system or taken off site by licensed waste contractor for appropriate disposal.

4.2.3 *Non-Bulk Storage*

Various maintenance materials (oils, greases, insulants, antifreezes, welding, refrigerant and fire fighting gases etc.) will be delivered to site in dedicated containers and stored in secure bunded areas within buildings.

Various other water treatment chemicals will be delivered in appropriate containers and stored in bunded areas.

Oil drums, IBCs and pallets of smaller volume chemicals will all be stored within buildings in bunds with 110% of the largest tank volume or 25% of the total volume, whichever is greater. Any areas where oil will be handled and used will be protected by an enclosed drainage system. This will allow the storage and collection of any spillages, so that they can be disposed of via a suitable 3rd party licensed waste contractor as required.

4.2.4 *Substation*

An electrical substation will be located on hardstanding in the southwest of the permitted installation. The transformer oil will not contain PCBs and the sub-station will be appropriately bunded to prevent the release of oils to ground in the event of a spillage.

4.2.5 *Switchgear and Transformer Building*

A switchgear and transformer building is located on hardstanding within the permitted installation. The transformer oil will not contain PCBs and the switchgear will be appropriately bunded to prevent the release of oils to ground in the event of a spillage.

4.2.6 *Hardstanding*

All operational and storage areas of the site will be surfaced with concrete hardstanding.

4.2.7 *Drainage / Interceptors*

During normal operation the installation is designed to have zero discharges to water as it will be a net consumer of water. All process wastewater generated within the Installation will be reused the waste water collection system.

The facility will give rise to surface water run-off from roads, vehicle parking areas, roofs of buildings, other hard standings and landscaped areas. Most surface water would flow into four surface water detention basins. The surface water from the detention basins will discharge into the adjacent watercourse.

Some rainwater will be diverted to a rainwater harvesting tank located within the main building.

Surface water flows from areas susceptible to the risk of pollution e.g. roads and parking areas, would pass through petrol/oil interceptors prior to being discharged into the detention basins. Penstocks would also be fitted to the discharge points to enable the detention basins to be isolated in the event of a pollution event.

The only discharge to water from the installation will therefore be of uncontaminated rainwater.

Domestic foul effluent will be discharged to a nearby mains sewer.

4.3 Inspection and Maintenance

4.3.1 *Procedures*

There will be a Planned Preventative Maintenance (PPM) system implemented at the installation. This will involve suitable arrangements for:

- Supervision;
- Planning;
- Prioritisation; and,
- Recording of planned maintenance activities.

Reactive maintenance will also be prioritised.

All key equipment related to process operation and safety will be entered into the PPM system, including mechanical and electrical control and instrumentation based equipment.

4.3.2 *Recording*

An environmental management system (EMS) will be established in accordance with the requirements of the ISO14001 standard. The EMS will be combined with both the quality and health and safety management systems to form an Integrated Management System (IMS).

The site will have a formal recording system which will keep relevant records, including but not limited to the following:

- waste transfer/duty of care documentation;
- records of incidents, accidents and emergencies including details of follow-up; and
- any other records required to be kept by the permit.

4.4 Site Layout Plan

A plan showing the site layout is included as Figure 2 in the Figures section of this report.

4.5 Environmental Risk Assessment

An environmental risk assessment of the activities to be undertaken within the installation has been carried out for the proposed operations. Specific assessments of the potential for fugitive and accidental releases are set out in Tables 3 and 4 of Appendix C of the main application, copies of which can be found in Appendix B of this Application Site Report.

5 CONCLUSIONS

The Conceptual Site Model for the facility identifies the oil and ammonia storage tanks as the main source risk covered by this application. There are also limited risks from the fuel bunker which is partly underground.

The facility has a number of measures in place including:

- Bunding of bulk chemical storage in accordance with the Environment Agency guidance “How to Comply with your Environmental Permit”;
- Rigorous construction design for the fuel bunker, including the application of membrane liners;
- Well-established procedures in the event of a spill at the facility;

- Regular planned inspection and maintenance of both internal and external containment measures.

As a consequence, it is considered that there is little likelihood of potential pollution of the site, and that no continued monitoring of the site with regard to ground contamination is required. As part of the partial surrender application from the main power station permit, reference data will be collected from under the existing HFO tank previously used by the main power station that is located within the Multifuel plant installation boundary.

Figures

SITE LOCATION

N

0 1000m

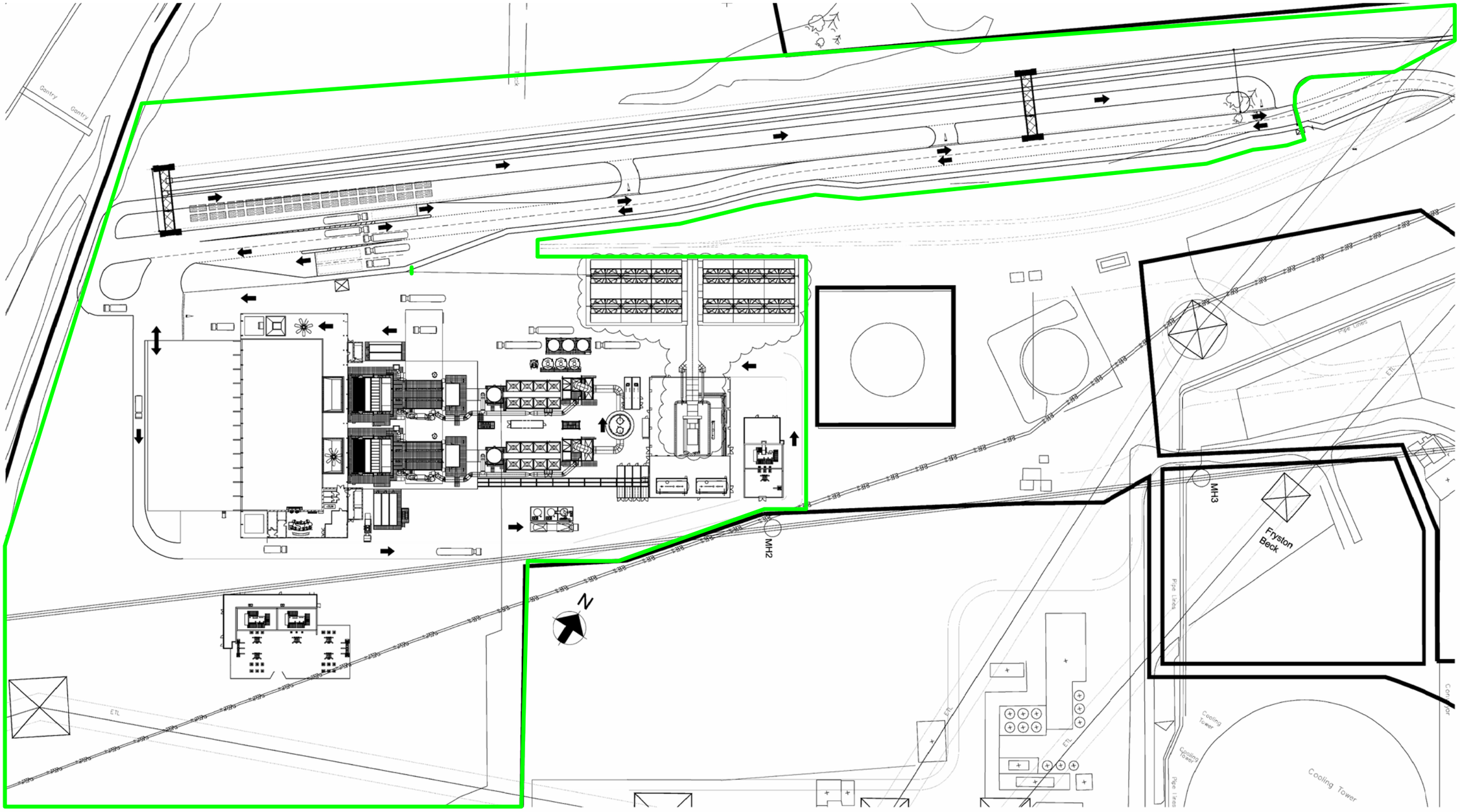
APPROXIMATE SCALE

Based upon an Ordnance Survey map with the permission of the Controller of Her Majesty's Stationery Office. Crown copyright reserved. Licence No. AL 100017812

Title	SITE LOCATION
Location	FERRYBRIDGE, WEST YORKSHIRE
Client	FERRYBRIDGE MULTIFUEL ENERGY LTD

URS

App'd:	Drawn:	Date:
HS	RH	JAN 2012
		Ref: HS/RH/MCH
Scale: AS SHOWN		Job No: 49352131
Drg. Size: A3		**FIGURE 1**



Scale: NTS DO NOT SCALE	Original Size A3	Rev.	Amendment	By	Chkd	Date
Drawn By: RK	Date: 12.01.12	A1	PRELIMINARY	RK		13.01.12
Checked By: JRS						
CAD Ref.: 1053–031–A1						

KEY:

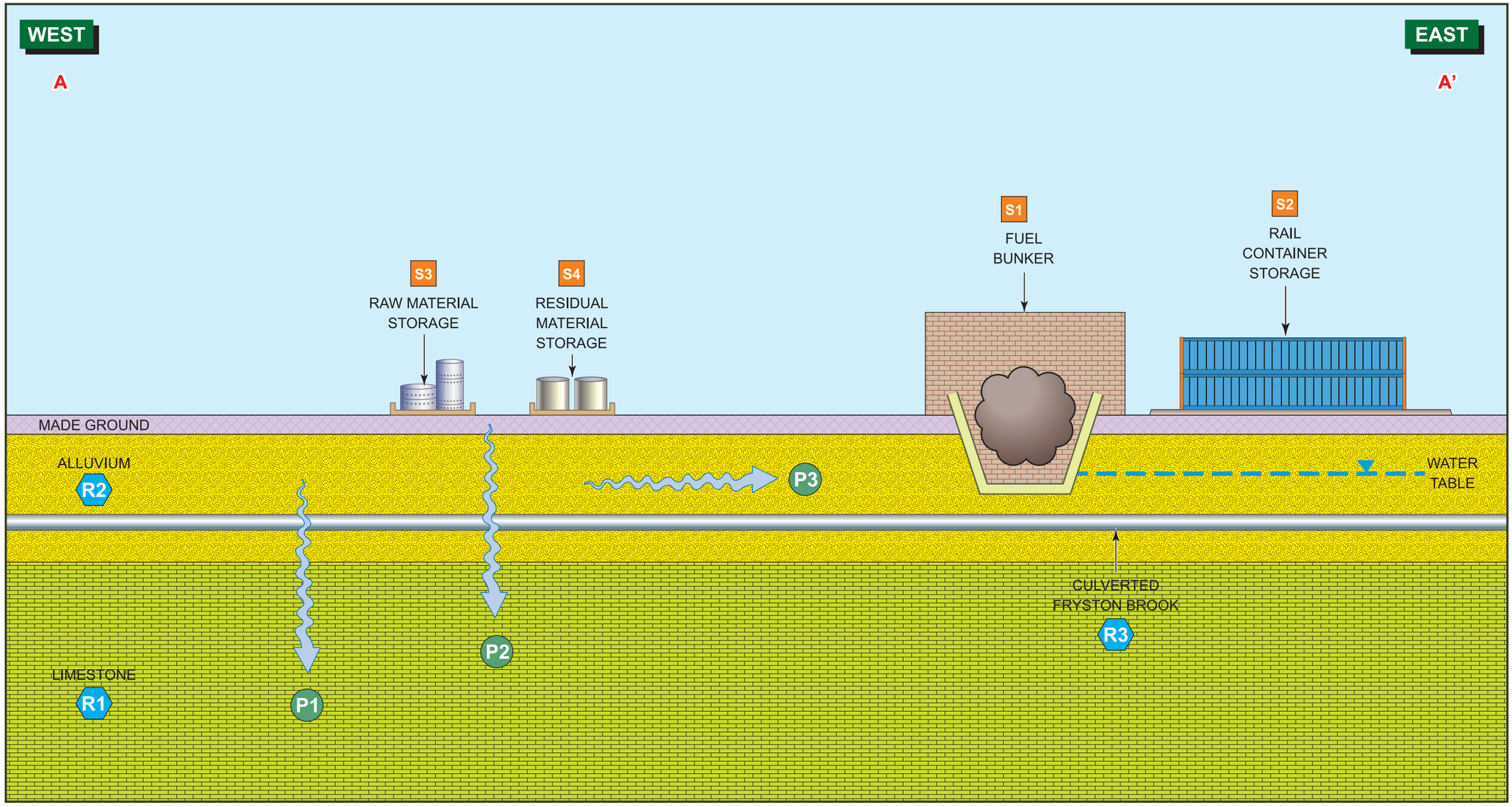
INSTALLATION BOUNDARY

Client	FERRYBRIDGE MULTIFUEL ENERGY LIMITED
Site	FERRYBRIDGE
Project	EP APPLICATION
Title	INSTALLATION BOUNDARY
Office of Issue	STOCKPORT
Telephone No.	0161–476 0032

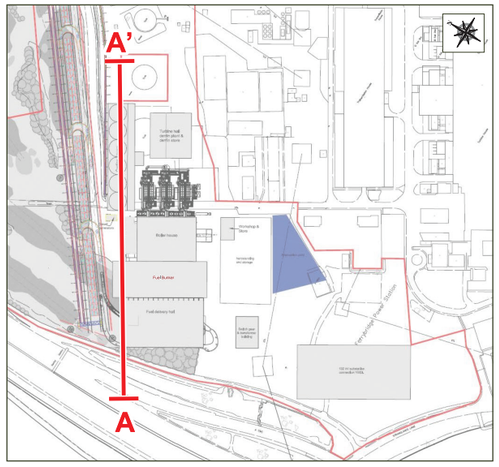
FICHTNER

CONSULTING ENGINEERS LIMITED
Kingsgate, Wellington Road North
Stockport, Cheshire SK4 1LW
Tel: 0161–476 0032 Fax: 0161–474 0618

Drawing No.	Revision
Figure.2 SHT. 1 OF 1	A1



Source – Pathway - Receptor	
Potential Sources of Pollution	Fuel bunker storage (S1)
	Temporary rail container storage (S2)
	Raw material storage' including auxiliary fuel, ammonia solution, lime, activated carbon and other boiler treatment chemicals (S3)
	Residual material storage, including bottom ash, fly ash / APCR, and ferrous metals (S4)
Pathway	IF preventative measures were to fail:
	Vertical migration into deeper groundwater (P1)
	Vertical migration into shallow groundwater (P2)
	Lateral migration within alluvium potentially toward Fryston Beck (P3)
Receptor	groundwater in underlying Principal aquifer (R1)
	groundwater in alluvium (R2)
	Culverted Fryston Beck, and then the River Aire (R3)



CONCEPTUAL CROSS-SECTION KEY:

- MADE GROUND
- ALLUVIUM
- LIMESTONE
- S1 PATHWAY
- P1 PATHWAY
- R1 RECEPTOR
- WATER TABLE

Title	GRAPHICAL CONCEPTUAL SITE MODEL
Location	FERRYBRIDGE, WEST YORKSHIRE
Client	SCOTTISH & SOUTHERN ENERGY

URS

App'd:	Drawn:	Date:
HS	RH	JAN 2012
		Ref: HS/RH/MCH
Scale: AS SHOWN		Job No: 49352131
Drg. Size: A3		**FIGURE 3**

Appendix A – Materials Inventory and Assessment

TABLE A1: INVENTORY OF RAW MATERIALS (FOR SCHEDULE 1 ACTIVITY)					
Material	**Storage Capacity**			**Annual Throughput (tonnes per annum)**	**Description**
	Number of tanks	**Tank Capacity (m^3)**	**Maximum Amount (m^3)**		
Auxiliary fuel	2	80	160	1,000	Low sulphur gasoil
Ammonia solution	1	40	40	1,300	25% aqueous solution
Lime	3	250	750	10,000	Dry, hydrated
Activated carbon	1	100	100	220	Powdered
Other boiler treatment chemicals	_	_	1	<50	Corrosion inhibitor, scale inhibitor, biocide, ion exchange resins
Hydraulic and silicone-based oils	-	-	1	<5	Maintenance oils
Fire-fighting foams	-	-	1	<5	

Table A2: Pollution Potential Analysis of Raw Materials to be used at the Installation

Substance	Environmental Properties				Potential to Pollute
	Toxicity	Behaviour	Bioaccumulation	Fate	
Auxiliary fuel (low sulphur gas oil)	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment	Product spreads on the surface of water, a small amount may dissolve. Soluble in many organic solvents	Potential for bio accumulation is very low	Majority of the components of the product are intrinsically biodegradable over a long timeframe	High
Ammonium hydroxide solution	Toxic - harmful if swallowed or inhaled. Corrosive to eyes, skin and respiratory tract. LDLO: Inhalation – human – 5000ppm LD50: 350 mg/kg, Rat LC50: 0.024 – 0.93 mg/L/48hrs, Goldfish	Soluble in all proportions in water	Potential for bio accumulation is very low	-	High
Lime	Causes severe irritation and burns. Harmful if swallowed. No toxicity data available.	Reacts with water – generating heat. Very slightly soluble in cold and hot water.	Potential for bio accumulation is very low	-	Low
Activated carbon	Not classified as environmentally hazardous	Insoluble in water	Potential for bio accumulation is very low	Fine particles of this material could be dispersed in the environment by wind and water, while large particles would persist with little dispersion.	Low

Other boiler treatment chemicals (H_2SO_4, NaOH)	Various	Soluble in water. Affects pH	Potential for bio accumulation is very low	Predominantly acute effects on local environment	Medium
Hydraulic oils and silicone based oils	Various	Immiscible with water	Potential for bio accumulation is very low	Majority of the components of the product are intrinsically biodegradable over a long timeframe	Medium
CO_2 / fire fighting foam agents	Potential asphyxiant when discharged, stable thereafter	Immiscible with water	Potential for bio accumulation is very low	Majority of the components of the product are intrinsically biodegradable over a long timeframe	Low

Table A3 – Key Residues

Source/ Material	Properties of Residue	Storage location/ volume stored	Future annual quantity of residue produced (estimate)	Disposal Route and Transport Method	Frequency
Bottom Ash	Grate ash, grate riddlings. This ash is relatively inert, classified as non-hazardous.	Bottom ash storage bunker. Capacity of 1500 tonnes.	65,000 t	Sent to an ash recycling facility for further use as a secondary aggregate. A small fraction may be unsuitable for reuse and will be landfilled. Transport occurs by road vehicles.	Daily
Fly Ash / Air Pollution Control Residues (APCR)	Ash from boiler and dry flue gas treatment, may contain some unreacted lime	Three APCR silos. Combined capacity of 750m^3	25,500 t	Recycled or disposed of in a licensed site for hazardous waste. Transport occurs by road vehicle.	Daily
Ferrous metal	From Bottom ash	Ferrous metals bin – bottom ash storage area	3,200 t	The ferrous metals are separated from the residue and recycled. Transport occurs by road vehicles.	Daily
Waste lubricating/hydraulic oils?	Oils generated from equipment maintenance	Bunded containers within process building	<5t	Sent for treatment/recycling at waste oil processing facility	Annually

Appendix B – Environmental Risk Assessment

TABLE B1: ASSESSMENT OF FUGITIVE EMISSION RISKS

Hazard What has the potential to cause harm?	**Receptor** What is at risk? What do I wish to protect?	**Pathway** How can the hazard get to the receptor?	**Risk Management** What measures will you take to reduce the risk? If it occurs who is responsible for what?	**Probability of Exposure** How likely is this contact?	**Consequence** What is the harm that can be caused?	**What is the Overall Risk?** What is the overall risk that still remains? The balance of probability and consequence
Spillage of waste when offloading from the railhead	Groundwater (principal aquifer), Fryston beck / River Aire	Surface runoff, unmade ground.	Deliveries of waste will be in sealed ISO containers and offloaded with a forklift truck and/or gantry crane. The containers will not be opened until they have entered the tipping hall. All offloading to take place on impermeable hardstanding with drainage to the process water drainage system. Regular inspections of the hardstanding and infrastructure for part of the site management system.	Low	Pollution of surface water or land	Insignificant
Lime/activated carbon discharge when filling silos.	Groundwater (principal aquifer), Fryston beck / River Aire	Surface runoff, unmade ground.	Lime/activated carbon will be delivered in sealed tankers and off-loaded via a standard hose connection. Regular inspections/maintenance of equipment. All offloading to take place on impermeable hardstanding with drainage to the process water drainage system. Regular inspections of the hardstanding and infrastructure for part of the site management system.	Low	Pollution of surface water or land	Insignificant
Bottom ash discharge when removing ash	Groundwater (principal aquifer), Fryston beck / River Aire	Surface runoff, unmade ground.	Once removed from the grate on a conveyor belt, the bottom ash is then discharged to a bottom ash bunker within the main building for storage to avoid dust releases.	Low	Pollution of surface water or land	Insignificant

from grate.						
Discharge of air pollution control residue when emptying silo.	Groundwater (principal aquifer), Fryston beck / River Aire	Surface runoff, unmade ground	APC silo will be located inside the main building, with sealed drainage	Low	Pollution of surface water or land	Insignificant
Spillage/leak when tanker off-loading: Ammonia Low Sulphur gasoil HCl NaOH	Groundwater (principal aquifer), Fryston beck / River Aire	Unmade ground, drainage system	Deliveries will be from sealed tankers and off-loaded via a hose. Spillage will be prevented by good operating procedures, high tank level alarm/trips etc. Chemical storage facilities will be bunded and located within buildings. All offloading to take place on impermeable hardstanding with drainage to the process water drainage system. Regular inspections of the hardstanding and infrastructure for part of the site management system.	Low	Hazardous liquid release leading to pollution of surface water or land/groundwater	Insignificant

Table b2: Assessment of ACCIDENT RISKS

Hazard What has the potential to cause harm?	**Receptor** What is at risk? What do I wish to protect?	**Pathway** How can the hazard get to the receptor?	**Risk Management** What measures will you take to reduce the risk? If it occurs who is responsible for what?	**Probability of Exposure** How likely is this contact?	**Consequence** What is the harm that can be caused?	**What is the Overall Risk?** What is the overall risk that still remains? The balance of probability and consequence
Spill during transfer of substances	Groundwater (principal aquifer), Fryston beck / River Aire	Direct contact	Training in unloading practices. Under manual control, continual observation. Impervious surfaces outdoors with drainage to sealed effluent tank, or surface water detention tanks with penstock-controlled discharge.	Low	Pollution of surface water/ groundwater	Not significant
Overfilling of chemical storage tanks/vessels	Groundwater (principal aquifer), Fryston beck / River Aire	Surface runoff, unmade ground.	Training in unloading procedures. Under manual control, continual observation. Impervious surfaces outdoors with drainage to sealed effluent tank, or surface water detention tanks with penstock-controlled discharge. High level alarms. Secondary containment for storage vessels with routine inspection and maintenance.	Low	Pollution of surface water/ groundwater	Not significant
Leak of chemical NaOH, HCl, boiler feed water conditioning	Groundwater (principal aquifer), Fryston beck / River Aire	Surface runoff	Secondary containment for storage vessels. Routine inspection and maintenance. Impervious surface indoor, separate drains for process water to sealed effluent tank, low storage volumes.	Low	Pollution of surface water/ groundwater	Insignificant
Fuel Storage containment Failure	Groundwater (principal aquifer)	Leaching to ground	Storage in bunker with sealed floor designed to appropriate standards, regular inspections	Very Low	Contamination of groundwater	Insignificant
Failure of containment	Groundwater (principal aquifer), Fryston	Surface runoff, unmade	Regular inspections of bunds. Impervious surfaces outdoors with drainage to sealed effluent tank, or surface water detention tanks with penstock-controlled	Low	Pollution of surface water	Not significant

(e.g. bund)	Beck / River Aire	ground	discharge.			
Leak within drainage system / cross-connection	Groundwater (principal aquifer), Fryston Beck / River Aire	Leaching to ground.	Segregated drainage system. Regular inspections of drainage system, including five-yearly CCTV survey of process drains.	Low	Pollution of surface water/ groundwater	Not significant
Residues handling failure	Groundwater (principal aquifer), Fryston Beck / River Aire	Surface runoff, unmade ground	Training in transfer practices. Contained transfer systems. Impervious surfaces outdoors. Controlled drainage to sealed effluent tank in areas where residues are stored.	Low	Pollution of surface water/ groundwater	Not significant
Flooding leading to contamination of surface water	Groundwater (principal aquifer), Fryston Beck / River Aire	Flood water	Refer to Flood Risk Assessment in Environmental Statement.	Low	Release of chemicals or waste to water	Not significant
Contaminated fire water	Groundwater (principal aquifer), Fryston Beck / River Aire	Surface runoff, unmade ground.	All fire water will be collected in the waste bunker, process water system will be isolated in the event of a fire. Provision of storage in bunker and elsewhere. Maintenance of storage areas. Overflow to lagoons which are contained	Low	Pollution of surface water/ groundwater	Not significant