Powerfuel Power Ltd

Hatfield Power Park

Proposed 900 MW Power Station

Natural Gas - CCGT & Coal - IGCC

Section 36 Application - Electricity Act

Environmental Statement

March 2008
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INTRODUCTION TO THE ENVIRONMENTAL STATEMENT

1.1.1 This Environmental Statement (ES) has been prepared by Heaton Planning Ltd and accompanies the S36 application, which sets out in detail Powerfuel Power Limited (Powerfuel) proposed 900MW Power Generation Station as part of the Hatfield Power Park development, Stainforth, Doncaster.


1.1.3 The 2000 Regulations state that EIA is mandatory for thermal power stations over 300MW (‘Schedule 1 developments’) and, as such, an ES must be submitted with the application to the Department of Trade and Industry (now Department of Business, Enterprise and Regulatory Reform (DBERR)) for Section 36 Consent.

1.1.4 The proposed Power Station will operate on both natural gas and syngas produced from the gasification of coal produced at the adjacent Hatfield Colliery.

1.1.5 The Plant therefore includes gas turbines and Coal Integrated Gasification Combined Cycle (IGCC) technology.

1.1.6 The Power Park Site already benefits from both a planning permission for a mixed use Masterplan of development – including environmental improvements, coal mining development, business uses and infrastructure – and a S36 consent for a Coal IGCC Power Station with a net output of 430 MW, which would operate on Syngas and Natural Gas, see Drawing No. PPF/HPL/S36/003A – Permitted and Planned Development.

1.1.7 In order to operate the proposed new IGCC Plant a permit under the Pollution Prevention and Control (PPC) Regulations will be required. The application for a permit will be required to be made to the Environment Agency. Both the PPC permit application and the Section 36 application will demonstrate that the Best Available Techniques (BAT) have been used in the design of the facilities to maximise energy efficiency and minimise emissions to and water.

1.1.8 An Environmental Statement (ES) accompanied both the Masterplan application and the application to the Department of Trade and Industry (DTI) for consent under Section 36 of the Electricity Act 1989 (Section 36 Consent).
1.1.9 This latest Section 36 application has been submitted in order to meet the needs of both the UK energy market and to address environmental needs in terms of emissions and air quality, as well as other sustainable development considerations. In this regard the key points to note are:

1.1.10 The proposed Power Station is a power plant capable of running on both natural gas and syngas produced from the gasification of coal.

1.1.11 The proposed Power Station will have the potential to provide Combined Heat and Power (CHP).

1.1.12 The proposed Power Station has been designed to ensure that emissions to air are minimised including, low levels of Sulphur Dioxide (SO₂) and Oxides of Nitrogen (NOx) emissions and the facility for Pre-Combustion Carbon Capture.

1.1.13 The feedstock for the production of syngas is from the immediately adjacent Hatfield Colliery, which has returned to coal production following substantial recent investment. The colliery has significant long term reserves.

1.1.14 The supply of coal for gasification as part of the permitted proposed coal IGCC development will:

- Potentially reduce the export and transportation of large volumes of coal to more distant coal-fired power stations
- See the Hatfield coal used as a feedstock for a significantly cleaner and less damaging form of power generation from existing coal-fired power stations.

1.1.15 The proposed 900 MW power stations will be sited within the permitted Masterplan site and will benefit from the redevelopment, screening and environmental improvements taking place on this regeneration site see drawing no. PPF/HPL/S36/005 – Proposed Power Station Development Layout.

1.1.16 The Power Station development will itself bring significant regeneration benefits to this site, as well as Doncaster and the Region.

1.1.17 In preparing the ES, Powerfuel and its consultants have had regard to the contents of Schedule 4 of the Town and Country Planning (Environmental Impact Assessment) Regulations 1999 (as amended in 2000). Specifically, the ES has addressed the main elements of the proposals that have the potential to impact (positively and/or negatively) on:

- Population
- Soils, Flora and Fauna
• Air and Climatic Factors

• Archaeological Heritage

• Landscape

1.1.18 In accordance with good practice and guidance provided by the Department of Environment, Transport and the Regions (DETR) in Circular 02/99 entitled ‘Environmental Impact Assessment’ (EIA) the applicant has sought DBERR’s Scoping Opinion.

1.1.19 Heaton Planning recommended that the following impacts be assessed within the EIA:

**Main Environmental Impacts**

• Potential impact on Air Quality;

• Noise and Vibration;

• Potential impact on the Water Environment;

• Potential impact on Landscape and Visual Amenity.

**Other Potential Impacts**

• Transport and Traffic;

• Archaeology;

• Local Ecology and Nature Conservation;

• Flood Risk;

• Surface Water Drainage;

• Socio-Economics.

1.1.20 In accordance with paragraph 2, Part II of Schedule 4 of the EIA Regulations, the EIA has included an explanation of the measures that will be undertaken to avoid, reduce and remedy any potentially significant adverse effects.

1.1.21 A non-technical summary has been provided.
SITE LOCATION AND SETTING

2.1 Site Location

2.1.1 The site’s location can be seen marked on drawing no. PPL/HPL/S36/001 – Location Plan that accompanies this statement.

2.1.2 The site is located to the north of the residential area of Hatfield and sits immediately adjacent to the residential area of Stainforth.

2.1.3 The site is approximately 12 km to the north east of Doncaster.

2.1.4 Junction 5 of the M18 (running north to south) and the M180 (running east to west) lies approximately 2 km to the east of the site (indicated on drawing no. PPL/HPL/S36/001). Junction 5 is also the location of a Motorway Service Area (MSA) that includes several buildings and features.

2.1.5 To the north and west of the application site lies the residential area of Stainforth. Properties are located on the edge of the western and part of the northern boundary nearby the newly constructed screening mounds (described below). To the east the site is bounded by Kirton Lane which runs under Junction 5 of the M18 and has a small number of residential properties and agricultural land immediately to the north. The southern boundary of the site is bounded by the mainline railway, which is a goods and passenger line running Doncaster – Hull. Beyond this lies agricultural land and the Bootham Lane landfill/landraise site.

2.1.6 The two Public Rights of Way that cross the site are both indicated on drawing no. PPL/HPL/S36/005 and are confirmed by the Doncaster MBC “Definitive Map” of public rights of way as Bridleways No. 4 and No. 5.

2.1.7 Bridleway No 4 runs parallel with and adjacent to the Power Station site and the existing railway line for a distance of approximately 450 metres. It then turns northwards and joins Bridleway No 5 – Hugh Hill Lane – approximately 140 metres to the north of the railway line.

2.1.8 Bridleway No 5 – Hugh Hill Lane – runs through the application site in a southerly direction from Kirton Lane (which is at the northern boundary of the application site), between the 2 colliery spoil tips, to its junction with Bridleway No 4, where it then heads in an easterly direction before crossing the railway line via an over bridge. It then heads towards Hatfield in a south-easterly and then southerly direction.
2.2 Site Setting

2.2.1 The Site Setting section provides details of the following areas of land:

- The Former East Lane Tip Area (Outlined in Pink on drawing no. PPL/HPL/S36/002)

- Operational Colliery Complex and Tipping Area (labelled on drawing no. PPL/HPL/S36/002)

- Agricultural land immediately to the south of the Application Area, Railway Line Landfill/Landraise operations (shown on drawing no. PPL/HPL/S36/002)

- The MSA and Land to the south of the MSA (Junction 5 indicated on drawing no. PPL/HPL/S36/001)

### The Former East Lane Tip Area

2.2.2 As previously mentioned, under the Hatfield Masterplan permission (02/1402/P/FULA) the land to the west of the proposed power station site is undergoing comprehensive civil engineering, boundary screening and environmental improvement.

2.2.3 Reprofiling of the former East Lane tip and grassland/scrub areas in the western half of the Masterplan site is continuing to progress in preparation of the area for the permitted industrial and business developments.

2.2.4 Screening mounds have been constructed and now run along the north-western boundary of the Masterplan site from East Lane Industrial Estate to the Chestnut Avenue Sewage Pumping Station. The mounds are graded and to a height of approximately 40 m AOD.

### Operational Colliery Complex and Tipping Areas

2.2.5 The proposed power plant site lies within the operational colliery tip area which currently covers the eastern half of the Masterplan site, bounded by Kirton Lane and the railway line. The operational colliery tip has previously been constructed to approximately 45 metres above ground level. Excavation of the tip has taken place at the southern end in preparation of the site for the proposed Power Station.

2.2.6 The Operational Colliery Complex lies at approximately just below ground level directly west of the proposed power plant site.
2.2.7 Further details of the repoling and reclamiation of the tip area can be found in the Planning History section of this Supporting Statement.

**Land to the south of the Application area and Railway Line**

2.2.8 A domestic landfill/landraise development is taking place immediately to the south of the railway line/colliery site.

2.2.9 This land consists of low lying, flat agricultural land made up of a mixture of small and larger fields with boundary hedgerows containing some mature hedgerow trees.

2.2.10 A network of drainage ditches, which form some of the field boundaries, drains the area.

2.2.11 A small area of scrub/woodland and a small pond are located just to the south east of the landfill/landraise site.

2.2.12 Cuckoo Lane runs north to south immediately to the east of this woodland and pond area.

2.2.13 Bootham Lane runs northwards from Dunscroft up to the southern edge of the Colliery/Power Park site. The landfill/landraise takes its access off Bootham Lane, so a reasonably high volume of HGV/waste vehicles uses the lane.

**The MSA and land to the south of the MSA**

2.2.14 There is an existing access slip road off Junction 5 into the MSA, which is located to the west of the Section 36 application site.

- The MSA consists of:
  - Amenity Building
  - Petrol Filling Station
  - Travel Lodge
  - Car Parking (time limited to 2 hours)
  - HGV and Coach Parking
  - Landscaping
  - Drainage features
2.2.15 To the south and west lie areas of agricultural land, with a green/country Lane – Crook Tree Lane, which is classified as a public footpath, running immediately adjacent to the southern boundary of the application area. Similar lanes/rights of way are situated to the north of the MSA and to the south and west.
3 DESCRIPTION OF THE DEVELOPMENT

3.1 Introduction

3.1.1 The proposal is to develop a Power Station with a nominal capacity of 900 MW, with planned export to the electricity supply grid of 800 MW. The electricity generation plant has therefore been designed to ensure a continuous 800 MW supply to the grid.

3.1.2 The site already benefits from a s36 consent for a 430 MW coal IGCC. The applicant’s, Powerfuel, consider that it would be more sustainable to maximise and make best use of the site and deliver the Power Station development on the basis of a larger output plant, with a different design, brought forward in a phased manner. More specifically the reasons for submitting these proposals for a phased 900 MW development are as follows:

- As the site has already been considered suitable for the development of a clean coal Power Station, and having regard to the increasing need for new and cleaner generating capacity in the UK, there are benefits in sustainability terms in maximising low emissions energy generation and output from a suitable site.

- A larger 900 MW coal IGCC Power Station - with first phase natural gas start-up in 2011 and commissioning of the coal IGGCC, including carbon capture and export capability, programmed for 2013 – is more suited to the current and emerging legislative, regulatory and funding circumstances and is therefore deliverable.

3.1.3 The proposed 900 MW Power Station has been designed, not only to meet the UK’s need for new electricity power generation capacity, but with specific regard also to the Government’s desire for power generation from fossil fuels to become significantly cleaner and more efficient. Besides therefore filling the potential energy generation gap resulting from closure of old power stations and increasing energy demand, the proposed Power Station has been designed to facilitate a move to clean coal technology (SYNGAS fuelled) power generation, including carbon capture, based on the availability of a long-term coal feedstock from the re-opened and re-developed Hatfield Colliery.

3.1.4 The Power Station site has been chosen having regard to the locational benefits that flow from:

- The site already having a s36 consent for a 430 MW clean coal Power Station, which forms part of the Hatfield Power Park – a mixed-use
development of environmental improvements, coal mining development, new infrastructure and the development of a business park based around the Power Station.

- The site having a long-term supply of good quality Hatfield Colliery coal from which to produce Synthetic gas - SYNGAS, thus avoiding the need for the order of 2 million tonnes per annum of coal being transported by either rail or road to traditional coal-burning stations in the region.

- The site being located close to existing electricity transmission infrastructure in the locality, including infrastructure and connections at the retired Thorpe Marsh Power Station.

3.1.5 The Power Park having the potential to contain either power hungry industries, who currently find difficulty in finding suitable sites in Doncaster (as has been experienced), and/or business developments that can potentially utilise the power station by-products.

- The planned construction of new link road to J5 of the M18 providing the ability to route HGV traffic to and from the motorway network without the need for HGV’s to travel through local communities.

3.1.6 Unlike the existing Power Station s36 Consent, which covers a single site – which is broadly indicated on Drawing No. PPL/HPL/S36/003A, this s36 application for a 900 MW generating station proposes two development areas set within a larger overall application site. Drawing No. PPL/HPL/S36/004 shows the application site with a solid red line as well as the land that is under the control of the applicant with a solid blue line. Drawing No. PPL/HPL/S36/005 shows the general proposed layout within the application areas. This provides for:

- The two Power Station areas. The first, more westerly area measuring approximately 109,000 sq m and the second area, to the east of Hugh Hill Lane measuring approximately 46,250 sq m.

- A construction and laydown area consisting of the former spoil tip, now permitted for Phase II Power Park business development.

- Boundary tip flank restoration, screening and landscaping.

3.1.7 Drawing No. PPL/HPL/S36/006 – The Plot Plan shows the indicative proposed layout of the main plant elements and structures. The next section outlines these various plant items along with an indication of their dimensions.
3.1.8 A series of 3D perspectives – Nos PPL/HPL/S36/007 – PPL/HPL/S36/010 inclusive are also included and provide an indication of the relative heights, volumes and massing of the main plant elements based on the dimensions set out below.

3.1.9 Within the proposed layout for the Power Station there are two main access roads proposed. The first is situated immediately along the northern boundary of the western plant site. This road will provide the main vehicular access into the Power Station with an access into the western plant site close to its north-western corner, and an access to the eastern plant site via an existing bridge crossing over Hugh Hill Lane. The second access road is situated immediately along the southern boundary of the western plant site and will be used to provide a haul road for colliery spoil vehicles to access the permitted spoil tipping area to the south of the railway, shown on Drawing No. PPL/HPL/S36/003A. Both roads will be hard surfaced with tarmac and will be capable of accommodating a combination of HGVs, vans and cars. They will therefore be constructed to a minimum width of 7.5 metres.

3.1.10 Given the location of the Power Station immediately adjacent to the Hatfield Colliery complex the coal feedstock is easily transported by conveyor into the coal milling and drying plant, which will be situated at the western boundary of the western plant site. The coal gasifiers are then immediately adjacent to the milling and drying plant.

3.1.11 Whilst one of the main aims of the proposed 900 MW Power Station development is to ensure a secure and reliable market for the coal that is mined at Hatfield Colliery, the development of the generating station will be phased, with the delivery of the coal gasification, SYNGAS production and carbon capture elements being related to the conditions prevailing in the “carbon market” – which will change significantly in 2013 as a consequence of recent EU reforms to Europe’s energy markets. From 2013 power generators will no longer be provided with free carbon allowances. Instead power generators will be forced to bid for relatively scarce carbon dioxide permits. Effectively carbon dioxide will soon have a much higher price. Within the Yorkshire and Humber Region steps are already being taken through the involvement of Yorkshire Forward, towards the development of a regional carbon dioxide collection and sequestration system. This will support a UK region that contains a significant share of the Country’s power generation capacity, the majority of which is currently coal burning. Powerfuel plc’s proposal for a 900 MW station at the Hatfield Power Park will provide for the initial development of generating infrastructure – the “Power Island” – that will, in the early stages of commissioning, plant start up and operation, allow the Power Station to operate on natural gas alone. Natural gas is the cleanest of the fossil fuels, with natural gas fired stations having significantly lower emissions than traditional coal fired/burning power
stations in terms of carbon dioxide, nitrogen oxides, sulphur dioxide and particulates.

3.1.12 The planned production and supply of electricity from the Hatfield Power Station is based on a commitment to supply the National Grid in 2011. It is therefore anticipated that with changes in the carbon market set to occur in 2013 and the anticipated development of regional infrastructure for carbon collection and distribution, the development of the clean coal power generating elements of the plant along with the facilities for carbon capture will be phased closely behind the development and commissioning of the Station’s “Power Island”.

3.1.13 The time line of forward planning and the envisaged timescale for bringing forward the development is approximately as follows:

- 2007 – Coal Gasifier Licence signed with Shell
- 2007 – Letter of Intent signed with Air Products for ASU design, build, operate and gas supply
- 2007 - Agreement with National Grid to supply electricity to the grid from 2011
- 2007-2008 – Initial Power Station engineering design work
- 2008 – Obtaining s36 and s37 consents as well as pipeline consents
- 2008-2009 – Obtaining IPPC permit for operation of the station
- 2009-2011 – Constructing and commissioning the main “Power Island” based on the natural gas supply
- 2011 – Supplying electricity to the grid
- 2011 and beyond – development of the coal gasification and carbon capture infrastructure and commissioning and delivery of clean coal energy generation

3.1.14 The initial development of the Power Island and the plant start up utilising natural gas will include around £50 million of pre-investment, which is required to provide for a smooth conversion, in both economic and operational terms, from initial start to SYNGAS based power generation. This commitment to SYNGAS based power production from coal gasification is evidenced by the agreement already reached with Shell in regard to the licensing and supply of the gasifier infrastructure.

3.1.15 The next section summarises the main structures and elements of the 900 MW Power Station including both the initial Power Island elements as well as the coal gasification and SYNGAS elements of the development.
3.2 The Main Structures and Elements of the Power Station Development

3.2.1 Set out below is a summary of the main structures and plant elements that make up the proposed 900 MW Power Station development. The layout and the siting and configuration of the buildings, is at this stage indicative. There may be some revisions once more detailed design work is undertaken, although the split of plant and main elements between the two plots is not expected to change.

3.2.2 It is proposed that the main structures and items of plant will be clad using a grey coloured cladding to take account that upper sections of the taller structures, visible from certain viewpoints in the locality above the boundary screening, will be set against the skyline.

3.2.3 The boundary of the site will be landscaped and planted to afford maximum screening and mitigation of views of the taller parts of the plant.

3.2.4 The first two items in the list below – the Turbine Hall and the Heat Recovery Plant - along with the associated infrastructure and systems make up the Power Island, which will form the initial development of the Power Station. The Power Island will, following natural gas start up, be easily capable of conversion and adaptation to SYNGAS operation.

3.2.5 Each of these plant items and areas of operation can be identified on the Jacobs Plot Plan, which is Drawing No PPL/HPL/S36/006 contained in the plans and drawings. As mentioned the Power Station layout is made up of two plots – the main western plot and the smaller eastern plot, situated to the east of Hugh Hill Lane.

Turbine Hall

3.2.6 The turbine hall will be situated in the eastern section of the main, western plot and will measure approximately 120m by 40m in plan and 30m in height and will house two gas turbines and a steam turbine, each with their respective electricity generators.

Heat Recovery

3.2.7 The gas turbine heat recovery units - the steam generators, will be located in the main western plot and will measure approximately 30m by 15m in plan and 30m in height.
Gasification Trains

3.2.8 There will be 2 gasifier units located at the western end of the main Power Station plot, each comprising a structure 50m by 40m in plan and 88m high. These units will be served by several coal milling and drying units in an adjacent structure, 50m by 60m in plan and 70m high.

Air Separation Unit

3.2.9 An Air Separation Unit will be sited on the eastern Power Station plot, which is beneficial in both operational and commercial terms with the ASU being operated by a third party operator with the unit including pipeline links to the western plot.

3.2.10 The ASU will provide oxygen and nitrogen to the gasifier and other process units. The most prominent features of this unit will be 2 cold boxes approximately 45m high by 6m square in plan. All other equipment in this area will be low elevation. The unit compressors will be housed in a compressor building approximately 10m in height.

Acid Gas Removal Trains

3.2.11 This process section, situated centrally within the western plot, comprises several gas absorption and stripping units, with heights up to 45m, and associated heat exchangers and pumps.

3.2.12 The Hydrogen gas leaving the acid gas removal system is diluted with Nitrogen in order to reduce flame temperature and minimise NOx production.

Compressor House

3.2.13 This building will be situated adjacent to the above Trains in the centre of the western plot and will measure approximately 30m by 15m in plan and 10m in height and will house large compressors used for the transfer of carbon dioxide to safe storage.

High Voltage Switchyard

3.2.14 This will be situated in the eastern section of the western plot.

Water Treatment

3.2.15 The treatment area will be situated on the western side of the eastern plot.
Coolers

3.2.16 The cooling tower will be located in the centre of the western plot and is required for the circulating cooling water system. The cooling tower will be approximately 100m diameter at base and 55m in height.

3.2.17 Plume suppression is proposed such that, with the exception of very wet and cold days – when a plume will be visible, the plume will have minimal visual impact.

Stacks/Columns

3.2.18 Each gas turbine will have a flue discharging to atmosphere; and these will be located in a common stack 88m in height, which will be located in the centre of the western plot adjacent to the cooling tower.

Flare

3.2.19 Each Syngas train will have an emergency flare for temporary discharge of gas during upset conditions. Each flare will be 65m in height, which will be located in the centre of the western plot.

Coal Storage

3.2.20 Existing coal storage options and facilities will be utilised on the adjacent mine site.

Slag Storage

3.2.21 Only around 125,000 tonnes of slag will be produced per annum, which will be taken off site at a steady rate. Only a few days storage capacity will be needed on the site and it is therefore unlikely that a significant area will be needed within the layout and the storage heap will not reach a high elevation.

Administration Building/Workshop

3.2.22 Buildings for administration, control room, workshop, electrical control centre etc. will be a maximum height of 15m and will be located in the north-eastern corner of the western plot.

3.3 Operation of the Power Station Plant

Main Processes

3.3.1 The gasification process converts coal to a gaseous mixture of hydrogen and carbon monoxide by causing it to react with oxygen at high pressure and
temperature. This gas is referred to as "SYNGAS". The raw coal feedstock from the mine is pre-processed by a milling and drying system to produce pulverised coal which facilitates the combustion process and enables pneumatic conveying of the feed.

3.3.2 The Air Separation Unit (ASU) provides pure oxygen for the combustion process and pure nitrogen for purging and inerting systems to ensure safe operation of the plant. This unit essentially compresses and cools air to high pressure and low temperature, sufficient to liquefy oxygen and nitrogen and allow separation by distillation columns. Due to the very low operating temperatures, these columns are installed in heavily insulated enclosures known as ‘cold boxes’.

3.3.3 The SYNGAS produced by the gasifier trains is saturated with steam and passes to a set of catalytic reactors which convert the carbon monoxide to carbon dioxide and produce additional hydrogen from the steam.

3.3.4 The carbon dioxide and any sulphur compounds (principally hydrogen sulphide) produced in the combustion process are then absorbed from the SYNGAS stream in the Acid Gas Removal (AGR) section. This unit brings the gas into contact with a proprietary solvent, which absorbs the acid gas components, leaving the gas as a clean hydrogen-rich stream for use in the gas turbines downstream. The solvent, laden with carbon dioxide and hydrogen sulphide, passes to a regeneration section, where selective changes in temperature and pressure enable the carbon dioxide and hydrogen sulphide to be liberated as separate streams. The regenerated solvent is then recycled to absorb more acid gas.

3.3.5 The carbon dioxide stream can be compressed into a pipeline system for transfer to underground storage/use offsite, while the hydrogen sulphide stream passes to a sulphur recovery unit (SRU). The latter unit converts the hydrogen sulphide to elemental sulphur and recycles the remaining off-gas to the AGR unit. Elemental sulphur is a by-product which is exported from the plant.

3.3.6 The hydrogen gas leaving the Acid Gas Removal system is diluted with nitrogen and combusted in two gas turbines, which in turn drive two electricity generators providing power for export to the national grid. The products of combustion are essentially steam and nitrogen which can be safely discharged to atmosphere after heat recovery.

3.3.7 The products of combustion leaving the gas turbines, at very high temperature but low pressure, are cooled by a series of heat exchangers in a Heat Recovery Steam Generator (HRSG). This enables the heat recovered to generate high pressure steam which is used to drive a steam turbine, which in turn drives another electricity generator providing power for export to the grid. The cooled gas is finally
discharged to atmosphere at sufficient height to thoroughly disperse the very small concentration of remaining contaminants.

**Fuels/Feeds and Operating Modes**

3.3.8 The principle feedstocks to the power plant are coal from the adjacent mine plus atmospheric air and raw water.

3.3.9 LPG and diesel oil are required intermittently, in small quantities, during start-up of the gasifiers to establish sufficient temperature for combustion of the coal.

3.3.10 Natural gas is required as an alternative to SYNGAS during start-up and shutdown of the gas turbines.

**Plant Start Up**

3.3.11 Depending on external factors beyond the control of Powerfuel, such as the delivery/construction of a collection pipe network for the captured carbon dioxide, the construction of the various units described will be phased. The “power island”, comprising the gas turbines, steam turbine and HRSG’s, will be constructed first, along with all its associated utility systems. This will allow it to operate independently using natural gas as fuel instead of SYNGAS.

3.3.12 Due to the proposed SYNGAS ready per-expenditure, this mode of operation does not requires any additional, or different equipment to that described for SYNGAS. The main difference is that the emissions to atmosphere, whilst operating on natural gas, will contain carbon dioxide (approximately 9% by volume) as well as water and nitrogen.

**Electricity Generation and Supply**

3.3.13 The overall electricity output of the Power Station is proposed to be 900MW. Electricity will be supplied to the National Grid via pylons which will be the subject of a section 37 Electricity Act application. This will involve a route that avoids residential and other sensitive areas to connect to existing infrastructure situated at the retired Thorpe Marsh Power Station situated to the west of Stainforth.

**Other Products and By-Products**

**Heat**

3.3.14 Heat is not a product as such. However heat generated in the gasifier reaction and shift reaction is recovered in the form of steam and used in the steam turbine.
Steam

3.3.15 Steam generated in the plant is used internally in the steam turbine.

Hydrogen

3.3.16 All the hydrogen produced will generally be combusted in the gas turbines. However, the gasifier units are designed to around 110% of generation demand and could, if the market becomes available (i.e. for passenger transport executives, Hydrogen cell buses, etc), supply significant volumes of Hydrogen to the local economy.

Sulphur

3.3.17 Sulphur is exported by tanker as a liquid product from the sulphur recovery plant.

Water Supply and Water Treatment

3.3.18 Filtered raw water is used directly as make-up to the cooling water system, and, after treatment, it is used as make-up to the process water system and as feed water to the steam/condensate system. Water softening is sufficient for the process water make-up, while the boiler feed water is also demineralised and de-aerated before use in the steam systems.

Cooling Systems

3.3.19 The principle cooling system on the power plant will be circulating water, which will reject heat to atmosphere via a fan-assisted natural draught cooling tower.

Controls over Emissions to Air

3.3.20 Operation of the gas turbines on both natural gas and SYNGAS gives rise to very low emissions to atmosphere, especially when compared to conventional coal fired power stations. Gas turbines, when operated on a gaseous fuel give rise to negligible particulates emissions.

3.3.21 In terms of natural gas, sulphur dioxide emissions are very low due to the low amount of sulphur in the fuel. For SYNGAS operation, the removal of sulphur as part of the gasification process ensures that there are very low sulphur dioxide emissions.

3.3.22 Control of NO\(_x\) emissions when operating on natural gas is via staged combustion, where-as when operating on SYNGAS, nitrogen is used as a diluent to cool the combustion flame. NO\(_x\) emission concentrations will be approximately 50 mg/Nm\(^3\)
under both fuels corresponding to Best Available Techniques (BAT) benchmark levels.

3.3.23 The stack height has been shown by modelling to provide adequate dispersion of the emissions to air such that no breaches of air quality strategy objectives are predicted. Nitrogen deposition on Hatfield and Thorne Moors is predicted to be less than 1% of the critical loads.

3.3.24 Without the initial carbon capture and storage infrastructure in place, gas fired CCGT power generation will remain the most efficient form of fossil fuel energy generation in terms of carbon emissions. It is appropriate to begin operation of the station as a gas fired CCGT plant, with conversion to an IGCC plant later. This is confirmed by a comparison of carbon dioxide emissions per kWh of electricity generated:

- **Current UK generating mix** – 0.52kgCO₂/kWh;
- **Typical coal fired power station** – 1kgCO₂/kWh;
- **Hatfield CCGT** – 0.36kgCO₂/kWh;
- **Hatfield IGCC with carbon capture** – 0.025kgCO₂/kWh.

### Controls over Liquid Emissions/Effluent and Discharges/Surface Water Management

3.3.25 A new surface water drainage system will be installed on site. Surface water will be segregated from process effluent and will be attenuated and passed through interceptors as necessary prior to discharge to the local watercourses. Storage capacity will be provided such that in the event of an incident, potentially contaminated water will be retained on site.

### Management of Solid Waste

3.3.26 Solid waste streams will be collected and stored in a manner to prevent releases to the environment. Disposal operations will be undertaken in accordance with the requirements of Waste Management Licensing.

### Fire Fighting Systems

3.3.27 The plant will be provided with a dedicated firewater reservoir and pumping system.
Staffing/Workforce

3.3.28 Once fully constructed the total workforce is estimated at approximately 150. During construction it is estimated that the maximum construction workforce would be of the order of 500.

3.4 Power Station Construction

3.4.1 At this stage the details concerning construction, whilst being robust, are indicative. Powerfuel propose that more precise details be submitted and agreed in accordance with planning conditions.

Timescale/Construction Programme

3.4.2 It is important to recognise that as part of the overall Power Park development, works have already commenced on the Power Station development within the existing S36 consent site. As shown on Drawing No. PPL/HPL/S36/002 – civil engineering operations are currently being carried out within the S36 site. Further spoil excavation and site preparation is programmed for 2008 such that a level, stable and developable site is available at the end of the year, with plant development programmed for 2009.

3.4.3 In broad terms the plant development phasing would be firstly to construct and commission the Power Island to allow Power Station plant start up with natural gas, with the construction and commissioning of the coal gasification and SYNGAS elements to follow shortly after. The predicted timescales are - Power Island construction and commissioning to take place over approximately 24 months commencing in 2009, with coal gasification development taking approximately 36 months starting potentially in 2010.

Construction Workforce

3.4.4 It is envisaged that during each phase of plant development there will be a construction workforce of approximately 500 personnel.

Operational Areas/ Laydown Areas/ Compounds and Accommodation

3.4.5 Drawing No PPL/HPL/S36/005 shows the proposed area to be used for laydown, accommodation and construction purposes. This area consists of a significant part of the Phase II Power Park development area and will be made available for the construction work through the excavation and engineering of the existing tip to a lower profile.
Typical Construction Sequence

3.4.6 Typical construction sequence

- Site clearance and levelling (removal of any heavy metals etc)

- Set up of temporary construction camp which will be developed as the works increase with buildings designated to subcontractors and the principal constructor who will oversee safe site working

- Temporary and where possible permanent road construction should be phased in as early as possible to allow the flow of plant materials and personnel around the site.

- Install underground services and open up more ground area earlier in the works and avoid numerous repeat, adjacent, open excavations

- Piling (if necessary)

- Condenser pit construction followed by cooling tower and cooling water pipework

- Gas Turbine, Steam Turbine and HRSG slabs

- Installation of structural steel work / cladding of structure

- Installation of turbines

- Transformer installation follows on after the drainage system is complete, thus ensuring adequate environmental protection should there be a leak.

- The final equipment to be installed would be the switch gear, and associated equipment

3.4.7 The IGCC will be constructed in a similar manner: from the ground up

3.4.8 The exact construction sequence will optimise the construction labour force.

3.4.9 Construction will begin on more than one area of the plant at one time. The ASU will be constructed under the aegis of the ASU vendor for over the fence oxygen and nitrogen delivery

3.4.10 Major earthworks will begin early on – fire water pond etc

3.4.11 The steel work for the IGCC will include pipe racks for pipe interconnection of plant sections
3.4.12 The IGCC will include a number of large lift columns and vessels and planning of these lifts will be optimised to minimise large craneage use.

3.4.13 All large equipment will be delivered in time for construction so that minimal storage will be required on site.

3.4.14 Delivery of bulk materials (valves and instruments) will be to a secure store in the construction compound and moved to site on an as required basis.

3.4.15 Steelwork, and large piping will be laid down in the area of construction to minimise the number of movements of bulk materials.

3.4.16 After mechanical completion the plant will be commissioned and tested on a sequential basis followed by a performance test when electricity will first be delivered to grid.

3.5 Transport and Traffic

Imports During Power Station Operation

Pipelines

3.5.1 Natural gas for start-up and intermittent use by the gas turbines and raw water for make-up to the cooling water and steam systems will be imported by pipeline.

Coal

3.5.2 Coal, the main feedstock to the gasifier process, will be provided by mechanical conveyor direct from the adjacent mine coal storage area.

 Deliveries

3.5.3 Other materials consumed in the process will be delivered by road trucks:

- Limestone: 70,000 tonnes per annum
- Caustic soda: 60,000 tonnes per annum
- Hydrochloric acid: 17,000 tonnes per annum
Exports during Power Station Operation

Pylons – electricity

3.5.4 Electricity will be exported to the national grid infrastructure at Thorpe Marsh by pylons leaving the site in a North-Easterly direction and passing to the North of Stainforth. The Pylons will be the subject of a s37 Electricity Act application to DBERR in the near future.

Pipeline – gas and waste water

3.5.5 Captured carbon dioxide and treated waste water will be exported from the plant by pipeline.

Solid waste

3.5.6 Approximately 125,000 tonnes per annum of coarse slag from the base of the gasifier will be exported by road truck for use as building material or landfill.

3.5.7 Approximately 42,000 tonnes per annum of sulphur by-product will also be exported (in liquid state) by road tanker.

Workforce Traffic

3.5.8 It is anticipated that the Power Station will have a permanent workforce of 150 personnel.

3.5.9 These employees will operate in x3 shifts such that at any one time there will be around 112 staff on site.

3.5.10 As a result of shift patterns most workforce traffic movements will mainly be outside peak hours. In the peak hour this would result in 24 trips in predominant direction and 5 in the opposing direction.

Construction Traffic

3.5.11 Construction traffic is in overall terms estimated to have a similar profile to that predicted for the consented 430 MW station, although with the larger plant and the phasing of development the total construction period will be of the order of 5 plus years rather than the 2 years for the 430 MW station. During the construction phase for the original 430 MW IGCC station the predictions for the peak hours construction traffic are set out below:
<table>
<thead>
<tr>
<th></th>
<th>AM Peak</th>
<th></th>
<th>PM Peak</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Arrive</td>
<td>Depart</td>
<td>Arrive</td>
<td>Depart</td>
</tr>
<tr>
<td>Admin/Supervisors</td>
<td>42</td>
<td>4</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>Construction workers</td>
<td>42</td>
<td>4</td>
<td>17</td>
<td>168</td>
</tr>
<tr>
<td>Visitors</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Deliveries/HGV</td>
<td>8</td>
<td>8</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total Vehicles (inc. HGV)</strong></td>
<td><strong>94 (8)</strong></td>
<td><strong>18 (8)</strong></td>
<td><strong>27 (4)</strong></td>
<td><strong>223 (4)</strong></td>
</tr>
</tbody>
</table>

3.5.12 During the first phase – 2 years - construction of the Power Island the vehicle movements are predicted to be approximately 50% lower than these figures.

3.5.13 During the subsequent construction phase, involving construction of the coal IGCC infrastructure over a 3 plus year period, the vehicle movements could be up to 50% greater than those predicted for the consented station.
4 RELEVANT DEVELOPMENT PLAN POLICY AND OTHER MATERIAL POLICY CONSIDERATIONS

4.1 Introduction

4.1.1 Section 38(6) Planning and Compulsory Purchase Act 2004 states that determination must be made in accordance with the development plan unless material considerations indicate otherwise.

4.1.2 The Planning and Compulsory Purchase Act 2004 defines the development plan as (a) the regional spatial strategy for the region in which the area is situated, and (b) the development plan documents (taken as a whole) which have been adopted or approved in relation to that area. Adopted structure and local plans retain development plan status and automatically became ‘saved’ policies for a period of three years from the commencement of the Act. For plans in preparation the three year period will commence from the adoption or approval of the draft plan.

4.1.3 In reaching a decision on this application the first consideration is therefore whether the proposals accord with the Development Plan. Having done this it is then necessary to have regard to all other material considerations, which include all relevant policy considerations contained in the emerging Development Plan as well National Planning Policy Guidance and other relevant documents.

4.1.4 As will be demonstrated, the Application is in accordance with the Development Plan and other material policy considerations.

4.2 The Development Plan

4.2.1 In the case of this proposal the Development Plan consists of the following documents:

- Regional Spatial Strategy for the Yorkshire and Humber Region – Published December 2004

- Doncaster Unitary Development Plan – Adopted July 1998

4.2.2 This document sets out the Regional Spatial Strategy for Yorkshire and the Humber (RSS) following the selective review of RPG12 which itself was issued in 2001. The selective review of RPG12, upon which this version of RSS is based, addressed the following topics: rural regeneration, coastal communities, culture and tourism, climate change, renewable energy, flood risk, waste management and transport. Other parts of RPG12 have been carried forward largely unchanged.
4.2.3 The RSS contains the following policies that are of most relevance to this proposal.

- Policy S2 – Regeneration Priority Areas
- Policy S5 – Climate Change
- Policy N1 - Biodiversity
- Policy N3 – Landscape Character
- Policy R2 – Development & Flood Risk
- Policy R3 – Water Resources & Drainage
- Policy R12 – Energy Generation, Transmission and Supply

Regeneration Priority Areas

4.2.4 Paragraphs 3.21 - 3.25 of the RSS deal with Regeneration Priority Areas and provide that parts of the region are socially dynamic and economically successful, whilst other parts are in serious need of regeneration. The proposal is situated in an area in serious need of regeneration. The regional priorities for regeneration suggest that investment, infrastructure provision and environmental improvements ought to be targeted towards certain geographical parts of the region.

4.2.5 Policy S2 identifies South Yorkshire and the Coalfields (particularly Dearne Valley Development Zone) as the first priority in the region. The area to which this relates is defined on the key diagram and includes the M18 corridor between Junctions 3 and 6 within which the proposed development is located. This area is identified as a regionally significant location within the coalfield area. South Yorkshire is eligible for Objective 1 funding which aims to target resources in specific areas in order to maximise job creation and economic investment.

Climate Change

4.2.6 Policy S5 relates to climate change and provides that Local and regional authorities and agencies and others should seeks to reduce the Region’s greenhouse gas emissions by at least

4.2.7 20% below 1990 levels by 2010 and by at least 25% below 1990 levels by 2015 by including policies and proposals in their development plans, local transport plans, strategies and investment programmes. Local and regional authorities and agencies and others should also take into account the land use implications of the predicted impacts of climate change on their area and plan for both the successful adaptation
to the resulting effects and maximisation of potential economic, environmental and social opportunities in land use terms.

**Biodiversity**

4.2.8 Policy N1 relates to Biodiversity and provides that LPA should develop policies for areas important to conservation of biodiversity.

**Landscape Character**

4.2.9 Policy N3 relates to Landscape Character and requires that quality, diversity and local distinctiveness of landscape character throughout the region should be protected and enhanced.

4.2.10 The importance of the area as an electricity generator is recognised by Part F of Policy R12 which states that ‘Development plans should support the use of fossil fuel power stations which incorporate clean coal technologies or significant abatement measures’.

**Water Environment**

4.2.11 Policies R2 (Development & Flood Risk) and R3 (Water Resources & Drainage) seek to ensure that development proposals do not increase the risk of flooding and or pose unacceptable risks of pollution to the water environment.

**Energy Generation, Transmission and Supply**

4.2.12 Policy R12 deals with Energy Generation, Transmission and Supply. Paragraphs 10.68 - 10.71 recognise that the Yorkshire and Humber region is an important generator of electricity with several major coal fired power stations (representing 25% of UK coal-fired generation capacity), and gas turbines. It states that it is important to sustain this source of power generation in order to maintain a secure and diverse power supply, and thereby help to protect the region's economic stability. The region however needs to reduce its energy use and meet the renewable energy resources to deliver the target in Policy S6.

**Doncaster Unitary Development Plan (UDP) – Adopted July 1998**

4.2.13 In September 2007 the SoS for DCLG saved a number of adopted policies of the UDP (July 1998) until they are replaced by the emerging LDF. The most relevant policies to the proposed development are as follows:

- Policy GEN3 – Regeneration Priority Areas
• Policy GEN5 – The Countryside
• Policy GEN7 – Sustainability
• Policy M15 - Collieries
• Policy ENV4 – Countryside Policy Area Policies
• Policy SWD9 – Colliery Spoil
• Policy SM6 – Thorne & Hatfield Moors
• Policy SPU1 – Public Utilities

4.2.14 The most relevant saved UDP policies relate to the designated colliery land, the countryside policy area, public utilities, industrial development and Thorne & Hatfield Moors.

4.2.15 Policy GEN3 relates to Regeneration Priority Areas and provides that in a number of areas (including Hatfield and Stainforth) attention will be focused on measures to secure economic, environmental and social improvements.

4.2.16 Policy GEN5 relates to countryside and provides that the Council will conserve and enhance Doncaster’s countryside heritage whilst promoting the growth and diversification of the growth economy in ways that respect the character of the countryside.

4.2.17 Policy GEN7 supports the concepts of sustainable development seeks to ensure that new development incorporates its principles.

4.2.18 Policy M15 designates the whole of Hatfield Colliery site, including pithead and the associated tips as existing colliery land. This policy restricts surface development at the site and strongly supports the retention of the existing operational collieries for their employment. It also provides a context for consideration of any subsequent proposals for afteruse in the event of closure.

4.2.19 The pithead area of the colliery is solely subject to Policy M15 while the adjacent tips are washed over by a Countryside Policy Area (Policy ENV4 - CPA). The CPA extends to the south east towards Junction 5 of the M18 within which a new link road is proposed. Policy ENV4 is generally restrictive on the type of development that will normally be permitted in the CPA.

4.2.20 Policy SWD9 deals with colliery spoil and requires that alternative options must be assessed as part of the consideration of proposals for the extension of colliery tips.
Such proposals may include the regarding of the existing tips which will involve some coal recovery.

4.2.21 Policy SPU1 requires development proposals to have regard to the need for the provision of utility services such as electricity.

4.2.22 Policy SM6 relates to Thorne & Hatfield Moors and seeks the protection of its nature conservation interests.

4.3 Emerging Development Plan

4.3.1 The emerging Development Plan Documents currently consist of the following:

- Draft Regional Spatial Strategy for Yorkshire and Humber (Yorkshire and Humber Plan)
- Doncaster Metropolitan Borough Council Local Development Framework (Core Strategy: Preferred Options December 2005)
- Doncaster Metropolitan Borough Council Local Development Framework (Further Options August 2007)

Draft Yorkshire and Humber Plan (draft RSS)

4.3.2 The draft RSS sets out a long-term strategy (up to 2021) for the spatial development of the Yorkshire and Humber region and is intended to replace the existing Regional Spatial Strategy for the Yorkshire and Humber Region (December 2004). The most relevant policies of the draft RSS in relation to the proposed development are as follows:

Core Approach

- YH2 - Climate Change & Resource Use
- YH3 – Key Spatial Priorities

South Yorkshire

- SY1 – South Yorkshire Sub Area Policy

Economy

- E1 – Creating a Successful and Competitive Regional Economy
Environment

- ENV1 – Floods and Flood Risk
- ENV2 – Water Resources
- ENV3 – Water Quality
- ENV5 – Energy Efficiency
- ENV8 – Biodiversity
- ENV9 – Cultural Heritage
- ENV10 – Landscape

4.3.3 Policy YH2 relates to climate change and resources. Part A (viii) provides that increasing renewable energy capacity and carbon capture should be implemented to assist to meet the Region’s targets for reducing greenhouse gas emissions.

4.3.4 Policy YH3 relates to key spatial priorities and provides all plans, strategies, major investment decisions and programmes in the Region will aim to transform economic, environmental and social conditions in the older industrialised parts of South Yorkshire, West Yorkshire and the Humber.

4.3.5 Policy SY1 relates to South Yorkshire Sub Area Policy all plans, strategies, major investment decisions and programmes in the Region will aim to protect and enhance the environmental quality of the area, support economic development in some areas and

4.3.6 Part I of Policy E1 (Creating a Successful and Competitive Regional Economy) promotes opportunities for business relating to the Region’s unique environmental assets and challenges, including sustainable construction, renewable energy, resource and waste efficiency and environmental technologies and the ‘low carbon economy’.

4.3.7 Policies ENV1, ENV2 and ENV3 are all water related. ENV1 seeks to avoid development in high flood risk areas wherever possible. ENV2 seeks to safeguard water safeguarding water resources and ENV3 seeks to maintain high standards of water quality.

4.3.8 Policy ENV5 is particularly relevant as is relates to specifically to energy. This policy and its supportive text seek to improve the energy efficiency and increase renewable energy production to meet the Regions targets. Part A seeks to improve the energy efficiency and maximize the efficient use of power sources by, amongst
other ways, supporting the use of clean coal technologies and abatement measures (part A, v).

4.3.9 ENV8 relates to Biodiversity and seeks to safeguard and enhance biodiversity and geological heritage in the Region.

4.3.10 ENV9 relates to Cultural Heritage and seeks to safeguard and enhance the historic environment. Part A (C) aims to conserve distinctive elements of the historic environment and enhance local character and distinctiveness including Industrial landscapes, housing areas and civic buildings, especially in West and South Yorkshire.

4.3.11 ENV10 relates to Landscapes and seeks to safeguard and enhance landscapes that contribute to the distinctive character of Yorkshire and the Humber.

4.3.12 Doncaster Metropolitan Borough Council Local Development Framework (Core Strategy: Preferred Options December 2005 and Further Option August 2007)

4.3.13 Doncaster Core Strategy is part of the new Local Development Framework, which will replace the Unitary Development Plan and will set out planning policy and locations for different types of development like housing, offices, mineral working and waste treatment plants across the borough up to the year 2021.

4.3.14 Theme 1 of the Sustainable Settlements section identifies both Stainforth and Hatfield as potential growth settlements (Policy CS-S9). Policy CS-S11 identifies land at Stainforth (within the cartilage of Hatfield Colliery) as having potential for the development of new strategic employment opportunities and local scale housing development provided a number of criteria are met (including the provision of a new link road, flooding risk is addressed, development is appropriately located and landscaping is provided).

4.3.15 Policy CS – E5 identifies M18 J5 (Stainforth/Hatfield Triangle) as being a preferred area for new strategic employment allocation along with other parts of the M18 corridor.

4.3.16 Policy CS – A3 seeks improvements to the road network to facilitate connections to the motorway network including M18 J5 to Stainforth/Hatfield.

4.3.17 Policy CS – N2 provides that the Countryside Policy Area (in the eastern half of the borough) will be retained, amended as necessary to accommodate new development allocations.

4.3.18 Policy CS – N3 seeks to protect and enhance international, national and regional/locally important sites of nature conservation interest.
4.3.19 Policy CS – N6 provide that new allocations and development will not be permitted in areas in risk of flooding or where the development would increase the risk of flooding elsewhere.

4.3.20 Policy CS – N7 provides that development proposals that would have adverse impact on air, water or land or which would cause unacceptable levels of noise, smell, light or other nuisance will not be permitted.

**Doncaster Metropolitan Borough Council Local Development Framework (Further Options August 2007)**

4.3.21 The Doncaster Core Strategy (Further Options) is part of the new LDF. New Government guidance requires approximate housing numbers and employment land quantities for different parts of the borough (plus more detail on waste and minerals) to be added to the Core Strategy.

### 4.4 Other Material Policy Considerations

**National Planning Guidance**

4.4.1 The most directly applicable elements of national planning policy guidance concerning the proposed development are contained in the Governments Planning Policy Guidance Notes (PPG) and the replacement Planning Policy Statements (PPS). Most relevant to this application are:

- PPS1 - Delivering Sustainable Development (2005)
- PPS 9 - Biodiversity & Geological Conservation (2005)
- PPG13 - Transport (2001)
- PPS 23 - Planning and Pollution Control (2004)
- PPG 24 - Planning & Noise (1994)
- PPG 25 Development and Flood Risk (2001)
**PPS1 Delivering Sustainable Development**

4.4.2 PPS1 sets out national policies on land and planning and overarching policies on the delivery of sustainable development. The Government’s four aims for sustainable development are repeated from its 1999 strategy as follows:

- Social progress which recognises the needs of everyone;
- Effective protection of the environment;
- Prudent use of natural resources; and
- Maintenance of high and stable levels of employment.

4.4.3 It confirms that where the development plan contains relevant policies, applications for planning permission should be determined in accordance with the development plan unless material considerations indicate otherwise.

**PPS 9 - Biodiversity & Geological Conservation (2005)**

4.4.4 PPS 9 sets out national policies for the protection of biodiversity and geological conservation through the planning system. Biodiversity is described as the variety of life in all forms discussed in the UK biodiversity Action Plan (1994) and geological conservation concerns sites that are designated for their geology and, or geomorphological importance. Guidance is provided on how the Government’s policies for the conservation of national heritage are to be reflected in land use planning.

4.4.5 PPS 9 recognises that the most important sites for biodiversity are those identified through international conventions and European sites. These include Special Protection Areas (SPAs) and Ramsar sites.

**PPG13 - Transport (2001)**

4.4.6 The objectives are to co-ordinate land use, planning and transport, to promote more sustainable transport choices for both people and moving freight, promote accessibility and reduce the need to travel, especially by car (paragraph 4).
**PPS 23 - Planning and Pollution Control (2004)**

4.4.7 PPS 23 advises that any consideration of the quality of land, air, or water and potential impacts arising from development, including health, may be a material planning consideration in so far as it affects land use. It distinguishes between planning and pollution control regimes which should complement rather than duplicate. There is also advice in Appendix A on matters for consideration in preparing local development documents and decisions on individual applications, need and alternative sites. It points out that the nature of polluting development and national or regional need for them may make availability or lack of availability of suitable alternative sites material to planning decisions.

**PPG24 - Planning & Noise (1994)**

4.4.8 PPG 24 provides guidance to local authorities on the use of their planning powers to minimise the adverse impacts of noise and its effects on the environment and quality of life. In assessing applications, LPAs should give reasonable consideration to the compatibility of proposed activities with the surrounding uses and in particular, the potential for increase in noise effects over time, different noise levels throughout the day and night and the nature of the noise effects likely to be produced.

**PPS 25 - Development and Flood Risk**

4.4.9 PPS25 explains how flood risk should be considered at all stages of the planning and development process. Inappropriate development in areas at risk of flooding is to be avoided. Regional and local planning bodies are required to prepare and implement planning strategies to help to deliver sustainable development by appraising, managing and reducing flood risk.

**4.5 Other Relevant Documents**

**The Conservation (Natural Habitats, &c.) Regulations 1994**

4.5.1 The Conservation (Natural Habitats, &c.) Regulations 1994 set out the legal requirements which decision makers must follow when dealing with proposals which may have a significant effect on a European designated site. The application site is
approximately 5.5km to the west of Thorne and Hatfield which is designated as a Special Protected Area (SPA) and as a Special Area of Conservation (SAC).

**Circular 15/97 – United Kingdom National Air Quality Strategy and Local Air Quality Management: Guidance for Local Authorities 1997**

4.5.2 This circular is intended to promote a corporate approach to the issue of local air quality, which gives an introduction to the function of local authorities in delivering the Government’s UK National Air Quality Strategy through the Local Air Quality Management (LAQM) System.

4.5.3 ODPM Circular 6/2005 (DEFRA) Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System

4.5.4 This circular provides guidance on the application of legislation relating to planning and nature conservation complimenting PPS9.


4.5.5 The Government’s White Paper on Energy addresses the main energy supply and consumption issues that this country will encounter in the transition towards a low carbon economy. The document also gives particular reference to the National and International aim to tackle climate change in the period to 2020 and beyond.

4.5.6 It recognises that the global challenge is how to accelerate the deployment of technologies that allow us to continue to benefit from coal-fired power generation while reducing greenhouse gas emissions.

4.5.7 It is recognised that renewable energy sources such as wind and wave are vital in our strategy to tackle climate change but in order to secure supply we cannot rely on renewables alone.

4.5.8 On page 8 of this document it is mentioned that in order to deliver security and accelerate the transition to a low carbon economy it will require urgent and ambitious action at home and abroad, and in doing so:

- Develop cleaner energy and supplies; and
- Secure reliable energy supplies.
4.5.9 In addition maintaining a diverse mix of energy supply will help avoid over-dependence on a single fuel type and contribute to security of supply. Currently, gas and coal account for over one third each, nuclear about a fifth, and renewables around 4%.

4.5.10 Para 4.2 notes that today around 90% of the UK’s energy needs are met by oil, gas and coal. It is expected that fossil fuels will still supply the great majority of the UK energy needs by the year 2020, although around 80% of our fuels will come from overseas.

4.5.11 On pages 15 to 19 of the document it is recognised that between now and 2020 many nuclear and coal power stations will close in compliance with EU Legislation, thus imposing a need for energy supply companies to make substantial new investment.

4.5.12 In the electricity market new generation capacity of around 30-35 GW will be required over the next two decades to replace power station retirements and meet rising electricity demand as the economy grows.

4.5.13 Investment must be targeted in order to meet our ambitious carbon reduction goals and in conjunction energy sources such as coal and gas must become cleaner.

4.5.14 It is noted that England, Wales and Scotland still have significant recoverable coal reserves. Where coal recovery is economically and environmentally acceptable it is in our own vital interests that the technologies necessary to make coal low carbon are developed and deployed as rapidly as possible. Coal-fired generation makes an important contribution to the UK’s energy security and flexibility of the energy system.

4.5.15 Para 5.4.3 notes that there are three principle methods for reducing carbon emissions from fossil fuel fired powered generation:

- Improving coal-fired power station efficiency;
- Co-firing with biomass; and
- Carbon Capture and Storage (CCS)

**Landscape Character Assessment (DMBC)**

4.5.16 A Landscape Character Assessment has been carried out by DMBC in 2006 and is used to guide planning policy and planning decisions in accordance with PPG7, which encourages local authorities to consider Landscape Character Assessment
for those purposes. The DMBC Landscape Character Assessment describes the area immediately surrounding the site as ‘not highly distinctive’ due to its intrusive and diverse elements and describes the area as “disturbed”. It identifies urban edges to the east, west and south-west and indicates that there are more urban influences on the edge of Stainforth where there are degraded areas. Deep coal mining is a highly evident historic activity, with the views of the former collieries and spoil heaps. The area is physically divided by many elevated transport routes including railway lines and two motorways which enclose the landscape and cut off views.

**BERR – Energy Markets Outlook, October 2007**

4.5.17 This document marks the first stage in the delivery of the Government’s undertaking, in the 2007 Energy White Paper, to introduce an information service providing forward-looking energy market information relating to security of supply.

4.5.18 The document focuses on measuring the security of our energy supply by measuring the risk of involuntary interruptions to supply. As it details in para 3.4.2 this risk may be influenced by a number of factors namely; Capacity, Reliability and Diversity.

4.5.19 It is primarily these three criteria which are used to analyse and forecast the supply of Coal, Gas, Oil and Renewables.

4.5.20 The Large Combustion Plants Directive (LCPD) which requires large electricity generators, and some industrial facilities, to meet stringent air quality standards from 1 January 2008.

4.5.21 If they opt out of this obligation, large combustion plants will have to close by the end of 2015 or after 20,000 hours of operation from 1 January 2008, whichever is the sooner.

4.5.22 Some 12 GW of coal and oil-fired generating plant falls into this opted-out category (page 22).

4.5.23 Based upon historical operating patterns, some of these plants could have used up their allowance hours by early 2012 (page 23).

4.5.24 In addition para 4.4.4 acknowledges that over the next few years whilst these remaining opted-out plants are working out their remaining lives, the 20,000 hour limit may have an impact on plant owners’ operating decisions as to whether and when to run them.
4.5.25 This possible reduction in supply-side flexibility from this part of the total generating fleet is likely to present additional challenges to National Grid in their task of balancing aggregate electricity supply and demand, requiring additional flexibility from the rest of the generating fleet and perhaps leading to greater price volatility.

4.5.26 Para 4.12.1 indicates that in the near-term the security of supply outlook in the electricity sector looks relatively robust. Although, it goes on to say that the medium-term electricity generating industry faces a substantial challenge in ensuring delivery of the new generating capacity needed if demand continues to rise.

4.5.27 Additionally it is acknowledged that the introduction and successful deployment of carbon capture and storage (CCS) would expand the range of generating technologies available in a carbon-constrained world, by enabling coal to be used as a low-carbon technology (page 63).

4.6 Conclusions

4.6.1 The development plan and other material policy documents identify the following main issues as being most relevant considerations to the proposal:

- Regeneration and Economic Stability;
- UDP Designation and Permitted Uses;
- Environmental Considerations (Nature Conservation, Noise, Air Quality, Landscape and Visuals, and the Water Environment)
- Energy Policy

4.6.2 A summary of the main issues flagged up by the development plan and other material documents is set out below.

Regeneration & Economic Stability

4.6.3 The adopted RSS and adopted Doncaster UPD identify the application site as lying within an area in need of regeneration. This is also acknowledged in the Doncaster Core Strategy (Preferred Options). The area therefore requires investment, infrastructure provision and environmental improvements to be brought about to improve the situation. In the light of this South Yorkshire (within which the application is located) is eligible for Objective 1 funding which aims to target resources in specific areas in order to maximise job creation and economic
investment. It has been accepted that the extant planning permission for the master plan development of the Hatfield Colliery site (containing the construction of an electricity power generating plant) will make a significant contribution to the regeneration of the area. The proposed increase in capacity of the power plant on the site will have a significant economic benefit to the area in terms of the continued production of Hatfield Colliery, attracting investment and businesses to this part of the region meeting a number of objectives of the RRS in terms of providing economic stability. There are also many benefits to locating a clean coal power station adjacent to an operation colliery.

4.6.4 It must be stressed that from an economic point it is vitally important that planning permission is granted to increase the capacity of the permitted power generation plant from 430MW to 900MW. Without this permission the economic viability of the power plant project, as part of the implementation of the master plan development of the site, could be jeopardised. The economic contributions of the proposal to the area and region are therefore a significant factor in the determination of the application.

**UDP Designation & Future Land Uses**

4.6.5 In terms of the sites current policy designation, Policy M15 of the adopted UDP designates the whole of Hatfield Colliery site as existing colliery land. This policy designation though is out of date as a result of the planning permission that has been granted for a comprehensive mixed use development (including the power generation plant) that will see the whole colliery site redeveloped. The extant planning permission relating to the permitted uses is therefore considered to set the new policy designation for the area and supersede the UDP designation of Policy M15.

4.6.6 In addition to Policy M15 the site is also washed over by Countryside Policy Area (Policy ENV4). The Countryside Policy Area is generally restrictive on the type of development that will normally be permitted. Again the extant planning permission for the redevelopment of the site is considered to supersede the Countryside Policy Area designation as it could no longer be considered as countryside in terms of permitted land use.

**Environmental Considerations**

4.6.7 In accordance with good practice the proposed development has been ‘scoped’ to identify the most potentially significant environmental impacts and therefore which topics should be considered and assessed as part of the formal Environmental Impact Assessment process. In that regard it was considered that the following topics be assessed to form the Environmental Statement: - noise and vibration; air
quality; impacts upon the water environment; and landscape and visuals. These aspects have therefore been the subject of detailed assessment, including modelling of impacts where relevant. The resultant technical reports – prepared by Jacobs - are contained in the Technical Appendices forming part of the Environmental Statement.

**4.6.8** In addition to the above the Hatfield Power Park has already been the subject of a significant amount of environmental impact assessment carried out over the period 2002 to present, with significant parts of this being relevant to this s36 application. This was carried out as part of the favourable determination a 430 MW coal IGCC Power Station and the Stainforth/Hatfield motorway new link road, with a connection to the Power Park. These environmental matters which include: - traffic; archaeology; ecology; flood risk & surface water drainage; public rights of way; socio-economics have all been the subject of past consideration in the determination of the Power Park Masterplan and 430 MW Power Station proposals and the determination of the proposals for the motorway link road and associated business development. They are matters that have already recently been the subject of EIA but are considered again in the assessment of this current proposal. It is therefore concluded that the proposal has been considered against the development plan and other material considerations to ensure that the full range of potential environmental impacts are suitably addressed.

**Energy Policy**

**4.6.9** The Government has set out that around 30-35 GW of electricity will need to be provided by new power generation capacity to meet the rising electricity demand as the economy grows and to replace the retirement of many existing nuclear and coal fired power stations (in compliance with EU legislation). Many of the existing nuclear and coal fired power stations are at the end of their design life and will need significant investment to reduce their carbon emissions. Two thirds of the estimated 30-35 GW will be required by 2020. Put simply the UK has a demonstrable need for new sustainable power generation.

**4.6.10** To meet the energy requirements over the next couple of decades and to ensure security of supply the Government will be relying on having a diverse and flexible energy mix of fossil fuels, nuclear power and renewable. The Government has produced a White Paper on Nuclear Power setting out the potential contribution nuclear power could provide to help meeting the UK’s energy requirements. It does acknowledge though that it takes a long time to plan and build nuclear power stations and that new nuclear generation can make only a limited contribution before 2020. The large number of wind turbines presently being constructed in the UK, partially replace some of the generation capacity, however, there is still a requirement for installed thermal power plant capacity to be available for the days
when the wind does not blow, to provide security of supply to the grid. Fossil fuels will therefore continue to play an essential role in our energy system for the foreseeable future.
5 ASSESSMENT OF POTENTIALLY SIGNIFICANT ENVIRONMENTAL EFFECTS AND MITIGATION

5.1 Introduction

5.1.1 As referred to in the Introduction to the Environmental Statement, EIA Scoping with DBERR has taken account of all the previous EIA work and has therefore focussed on the potentially significant effects that would result from increasing the size and capacity of the Power Station from 430 MW to a nominal 900 MW capacity, with variations in the modes of operation to include power generation and supply from natural gas fuel.

5.1.2 The EIA Scoping identified the potentially significant environmental effects as being:

- Potential impacts on air quality and climate change
- Potential impacts of noise and vibration
- Potential impact on the water environment
- Potential landscape and visual impact

5.1.3 These aspects have therefore been the subject of detailed assessment, including modelling of impacts where relevant. The resultant technical reports – prepared by Jacobs - are contained in the Technical Appendices to this Environmental Statement. The findings and conclusions of these reports are then summarised below to form the main body or findings of the Environmental Statement on potentially the most significant environmental effects of the proposals.

5.1.4 As part of the work undertaken by Jacobs a review of “Best Available Techniques” – BAT - for the Hatfield Power Station development has been carried out. This assessment is helpful in the consideration of alternatives and the impacts of the development and the report is included in the Technical Appendices and a summary of the findings is set out below.

5.1.5 As referred to earlier in this Environmental Statement the Hatfield Power Park has already obtained planning permission and s36 consent has already been granted for a 430 MW coal IGCC Power Station. A planning application for a Stainforth/Hatfield motorway new link road, with a connection to the Power Park has also been determined favourably. There has therefore been a significant amount of environmental impact assessment carried out over the period 2002 to present, with significant parts of this being relevant to this s36 application. Set out below is a review and summary of other environmental effects, which includes consideration of
the relevant assessment work recently undertaken on the Power Park and Link Road applications.

5.2 **Air Quality and Climate Change**

**Background**

5.2.1 As the s36 application involves a proposed increase in output of the consented station from 430 MWe to 900 MWe, with the initial firing of the turbines on natural gas (Combined Cycle – CCGT), an updated assessment has been undertaken to account for the increased plant size. This addresses the effect of the proposed plant on local air quality. It includes assessment of the impact on local ecology, through the potential deposition of nitrogen and sulphur on the Hatfield and Thorne Moors, both designated as Special Areas of Conservation (SACs). Consideration is also given to potential effects of climate change.

5.2.2 A copy of the Report covering the “Air Quality and Climate Change Impact Assessment” prepared by Jacobs in February 2008 is contained in the Technical Appendices to this Environmental Statement.

5.2.3 Set out below is a summary of the main points that have been dealt with in the report.

**Legislative and Policy Context**

**Air Quality**

5.2.4 The main legislation and policies relevant to air quality considerations are as follows:

- Environment Act 1995, Part IV
- The Air Quality Standards Regulations 2007
- The Air Quality Strategy (AQS) for England, Wales and Northern Ireland, 2007
- The Environmental Permitting Regulations (England and Wales) 2007

5.2.5 The legislation sets a number of Air Quality Standards and Objectives as well as Environmental Assessment Levels that are expected to be met. The thrust of these
standards, objectives and levels is to minimise the effect of pollutants on human health and the environment.

5.2.6 The air quality impact of the proposed development plant also needs to be considered in relation to Natura 2000 designated sites. The Thorne and Hatfield Moors Special Areas of Conservation (SAC) sites lie within 10km of the proposed development and therefore may be impacted by emissions from the facility.

5.2.7 Thorne Moor (together with Goole Moor and Crowle Waste) is the largest remaining area of raised bog in England, with Hatfield Moor being the second largest. Both areas are remnants of a once extensive area of lowland raised bog.

5.2.8 The assessment criteria for Hatfield and Thorne Moors has been based on critical load and critical level information for the habitat, as discussed with Natural England. Critical loads can be defined as quantitative estimates of an exposure to one or more pollutants, below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge (Nilsson & Grennfelt 1988). Critical loads refer to deposition rates, while critical levels refer to atmospheric concentrations.

5.2.9 As part of the PPC permitting process for the UK power stations, the Environment Agency has undertaken Appropriate Assessments in accordance with the Habitats Regulations into the impacts on Hatfield and Thorne Moors.

5.2.10 In terms of undertaking an Appropriate Assessment, it is normal practice to set a screening level of 1% of the critical load or critical level as being significant. For predicted impacts above 1%, then the impact of an installation is considered to be potentially significant and it would be necessary to proceed to an Appropriate Assessment under the Habitats Regulations. For impacts predicted to be less than 1% of the critical load or critical level, no further assessment would be necessary.

5.2.11 With regard to the original 430MWe power station application, Natural England and the Environment Agency agreed that the Appropriate Assessment should be undertaken at the time of the PPC (now Environmental) permit application for the plant.

**Climate Change**

5.2.12 It is agreed by the UK government that there is a global requirement to reduce the emissions of greenhouse gases, especially carbon dioxide, to reduce and avoid the effects of damaging climate change. As such, the UK government was a signatory to the Kyoto Protocol, and party to an agreement to stabilise and reduce greenhouse gas emissions. It made a commitment as part of the EU to reduce emissions by 12% over 1990 levels by 2012. The UK made an individual
commitment to make reductions of 20% over the period. The UK is looking likely to achieve this target, largely by burning natural gas instead of coal in electricity generating stations.

5.2.13 The Climate Change Bill, currently passing through parliament, is to formalise a commitment to reduce emissions by 60% by the year 2050. The Bill puts into law UK targets to reduce carbon dioxide emissions by at least 60% by 2050 and 26-32% by 2020, against a 1990 baseline.

**Consideration of the Potential For Impact**

**Air Quality**

5.2.14 Impacts due to construction and decommissioning are essentially transitory in nature, limited largely to concerns related to dust deposition nuisance and can be appropriately mitigated to ensure that no nuisance occurs. For this reason, only a qualitative assessment of these potential impacts has been undertaken and an appropriate mitigation strategy proposed.

5.2.15 For operational aspects, all potential sources of emissions to air have been reviewed and an assessment made of their potential significance. For significant emissions, an atmospheric dispersion model has been utilised to provide predictions of the power station’s contribution to ambient pollution levels.

5.2.16 Separate baseline information has been provided for the local area around the site for human health impacts, and for the Hatfield and Thorne Moors for ecological impacts.

5.2.17 Consideration has been given to the following baseline information and factors:

- The location of the development.
- The absence of any local PPC Part A processes.
- The presence of five coal fired power stations further afield from the site; three to the north (Ferrybridge, Drax and Eggborough) and two to the south (West Burton and Cottam). The emissions from these power stations were assessed in the Stage 2 Air Quality Review and Assessment undertaken by DMBC. It was concluded that the maximum predicted impacts of the power stations would be unlikely to lead to exceedances of AQS Objectives.
- The only PPC Part B process which could have an effect on local air quality is the current Hatfield colliery. The impacts of the colliery operation can
reasonably be expected to be incorporated in any local baseline air quality measurements.

- In addition to the industrial sources of pollutants, the M18 and M180 motorways run close to the site and these may affect the ambient pollution profile of the site and its environs.

5.2.18 An assessment of the condition of both Hatfield and Thorne Moors was undertaken as an 'Appropriate Assessment' for the PPC Permit\(^1\) for the West Burton Power Station.

5.2.19 In summary, Hatfield Moor SAC was assessed as having a conservation station grade ‘C’ due to peat cutting and water abstraction at the time of designation. A ‘C’ grading is deemed as ‘average or reduced conservation status’. The SSSI condition summary (compiled 20th July 2004) designated 49% of the SSSI as being unfavourable recovering, 10% unfavourable no change, and 41% unfavourable declining.

5.2.20 Thorne Moor SAC is also designated as grade C conservation status due to peat cutting and water abstraction at the time of designation. The SSSI condition summary (20th July 2004) designated 70% of the SSSI as being unfavourable recovering, 20.65% unfavourable no change, and 9.19% unfavourable declining.

5.2.21 In order to estimate the baseline pollutant concentrations in the vicinity of Hatfield and Thorne Moors, data has been obtained from the following sources:

- The NETCEN UK Air Quality Archive, including acid deposition data;
- The Finningley Airport Public Inquiry;
- The Appropriate Assessments undertaken by the Environment Agency for Cottam and West Burton Power Stations;
- The UK Air Pollution Information System (APIS) website.

5.2.22 To assess the potential impacts of the development a series of sensitive receptors were identified which includes locations in the vicinity of the site as well as locations for Thorne and Hatfield Moors.

5.2.23 An assessment of potential impacts arising from the Power Station construction and decommissioning has confirmed that in general, it is likely that only areas within about 200 m of the proposed site would suffer any potential nuisance from

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\(^1\) Annex 5 of West Burton PPC Permit Decision Document – SP3935LW (30th October 2007) Appropriate Assessment
deposited dust in the event of unmitigated construction practice. For the proposed
development, it is considered likely that this would only include properties around
the edge of the site.

5.2.24 The emissions arising from the main stack during operation of the Power Station
have been modelled using the ADMS-4 Atmospheric Dispersion Model.

5.2.25 In terms of local human health impact the following conclusions are reached:

- For Nitrogen Oxide it is unlikely that the Air Quality Objective (AQO) would
  be compromised by the proposed Power Station.

- For Carbon Monoxide the effects are predicted as being only just above
  values that would be regarded as trivial.

- For Sulphur Dioxide no issues are expected to arise and the level of impact
  can be considered trivial.

- A review of the previous assessment work on the potential impact of traffic
  related emissions concludes that the findings are still valid, taking account
  both of traffic using the existing highway network as well as the development
  of the new motorway link road, and that no exceedances of relevant air
  quality objectives are predicted at indentified sensitive receptors.

5.2.26 The impact on the Thorne and Hatfield Moors, in relation to the critical levels of
oxides of nitrogen and sulphur dioxide concentrations, is very, very small. The
greatest predicted process contribution to NOx levels at the Moors is only 0.36% of
the 30 µg/m3 objective for NOx, for the protection of vegetation and ecosystems.
The percentage contribution of the sulphur dioxide objective is less than 0.1%.
These can reasonably be considered to be insignificant.

5.2.27 Very small increases in background concentrations of oxides of nitrogen and
sulphur dioxide have been predicted by the modelling. Correspondingly low
increases in deposition of nitrogen and sulphur onto the Moors can therefore be
expected.

5.2.28 In terms of critical loads, the contribution of the proposed generating station is
predicted to be of a similar order of magnitude, for nutrient nitrogen deposition: that
is to say, less than 1% of the critical load at either SAC. For nitrogen acid
deposition, the predicted contribution is also below 1% of the critical load. For
nitrogen deposition therefore, it would not be necessary to proceed to an
Appropriate Assessment for the predicted level of impact.
5.2.29 At Thorne Moors, sulphur acid deposition on SYNGAS operation is predicted to be just over 2% of critical load. In terms of sulphate concentrations on the Moors, high sulphate concentrations in the surface water are more closely related to site water levels, rather than sulphur deposition. The Environment Agency Appropriate Assessments of Cottam and West Burton coal fired power stations, concluded that these coal fired power stations were not adversely impacting the SACs. The proposed development will have lower deposition rates than these existing stations and therefore a lower impact.

5.2.30 It can therefore be concluded that the proposed power station will have a minor adverse impact on the Hatfield and Thorne Moors, but that the impact is unlikely to compromise the conservation status of the habitat.

5.2.31 Due to current initiatives for reductions in emissions of oxides of nitrogen and sulphur dioxide in general, atmospheric concentrations of these pollutants may be expected to decline significantly in the future. This decline in background concentrations will more than offset any minor increase in concentrations from the development.

**Climate Change**

5.2.32 The UK electricity generation mix has been reported by DEFRA to emit 0.52 kgCO2/kWh. National greenhouse gas emission statistics are compiled by DEFRA2. Out of a total of 652.3 mtCO2e emitted in the UK in 2006, 554.5 were net fossil CO2 emissions. Of these, 183.7 mtCO2e, or 33.1% were from public electricity and heat generation, the largest of any sector. This sector therefore offers the greatest opportunity for reductions.

5.2.33 When generating electricity from natural gas, which is approximately 90% methane or CH4, emissions of fossil CO2 will occur. The generating efficiency of the station operating on gas is predicted to be in excess of 50%, depending on detailed design. This will result in approximate emissions per kWh of 0.36 kgCO2, significantly better than the current/recent generating mix of 0.52 kgCO2/kWh. A typical coal-fired station will emit more than 1 kgCO2/kWh. Annually, the station will emit two and half million tonnes of CO2 when operating on natural gas.

5.2.34 The proposed generating station has been designed with a view to capturing carbon dioxide before combustion. At a 90% capture rate, the plant will avoid the emission of more than 4 million tonnes of CO2, as a single facility saving more emissions than the Carbon Reduction Commitment proposed in the Climate Change Bill. It should be noted that per unit of energy, coal contains more carbon than natural gas, giving rise to greater emissions. A SYNGAS plant operating with carbon capture will

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generate electricity with an emission factor approaching 0.025 kgCO2/kWh, at an efficiency of 42%. This emissions factor is substantially better than the current electricity generation mix. A SYNGAS plant with carbon capture will make a significant contribution towards the UK’s goal of a 60% reduction in emissions by 2050, by replacing more polluting generating stations.

5.2.35 The Norwegian national oil company Statoil began the first industrial scale disposal of fossil carbon dioxide in 1996 at their Sleipner West field3 in the North Sea. A million tonnes of CO2 per annum is removed from natural gas being extracted there and re-injected into a saline aquifer in the Utsira sandstone formation 1000m below the seabed. This is done to avoid paying substantial amounts in tax, owing to a carbon dioxide tax levied in Norway.

5.2.36 In other areas of the world, carbon dioxide is used in Enhanced Oil Recovery (EOR), and there is likely demand for it to be used in the same way in the North Sea.

5.2.37 Yorkshire Forward, the regional development agency in Yorkshire, is backing a pipeline to collect CO2 in the region for disposal in the North Sea. The region is particularly suited to the establishment of infrastructure of this kind, having a number of very large industrial emitters of CO2, including major coal and gas fired power stations, an integrated iron and steelworks and two oil refineries. The proposed SYNGAS plant would be connected to this pipeline for CO2 disposal.

Consideration of Potential Mitigation

5.2.38 Construction and decommissioning - The impacts arising from such sources can be mitigated to an acceptable degree via the implementation of a Contractor’s Code of Practice. The measures contained in the Code of Practice would seek to:

- Minimise fugitive dust emissions from material storage and concrete batching.
- Minimise dust from vehicle movements.
- Implement cleaning of the public highway.
- Ensure good communication with the local community.

Ensure that monitoring is carried out.

5.2.39 Air quality effects arising from the operation of the Power Station have been analysed and are only likely to arise from the combustion gases emitted from the main stack. Other emissions to air can be regarded as trivial. The emission stack height has been chosen to ensure adequate dispersion of the combustion emissions. The atmospheric dispersion modelling exercise has demonstrated that relevant AQS Objectives are unlikely to be compromised, even when the emissions are considered at their maximum levels and in a way which is likely to overestimate their magnitude. The resulting residual impact can therefore be regarded as minor.

5.2.40 As a Part A1 activity, the proposed power station will be subject to an Environmental Permit issued and regulated by the Environment Agency. This permit will set emission limit values for a variety of air pollutants from the potential air emission sources associated with the plant. It is anticipated that such a permit will necessitate the application of appropriate processes and pollution control technologies. The operator will comply fully with the requirements of the permit and put in place appropriate mitigation measures so as to meet these requirements. At this stage, it is not possible to provide a definitive schedule of mitigation options to be deployed. However, it is anticipated that the following general measures will be implemented. Mitigation measures will include:

- appropriate control technologies inherent to the gas combustion process will be implemented to ensure that authorised emission limit values are achieved;
- in the event of abnormal emissions, prompt action will be taken to minimise emissions and regain normal operating conditions;
- appropriate staff will receive training in environmental matters;
- an appropriate environmental management policy will be implemented throughout the power station facility.

Conclusions

5.2.41 Impact on local air quality arising from construction and decommissioning is capable of being controlled to acceptable levels through the implementation of a code of practice containing actions and measures, along with monitoring and public relations.
5.2.42 The impact of the traffic either using the existing highway network or via the proposed Link Road to the Power Park development is shown to be minor with no exceedances of AQS Objectives predicted by using the DMRB screening methodology.

5.2.43 During operation of the Power Station with a stack height of 88 m, and under the assumptions included within the atmospheric dispersion modelling, no exceedances of the Air Quality Objectives are predicted as a result of the operation of the generating station, burning either natural gas or SYNGAS. These results are based on a series of assumptions that will have overestimated the likely eventual contribution from the plant. Actual operating impacts are likely to be significantly below those predicted.

5.2.44 No substantial adverse impacts are predicted for the Hatfield and Thorne Moors, on the basis that the emissions will make a marginal increase to acid gas deposition there. Given that much larger contributions to the deposition loads at the Moors from nearby coal-fired stations are considered by the Environment Agency to cause no significant harm to them, it can only be concluded that a very much smaller contribution from the proposed station will also cause no significant harm.

5.2.45 The operation of the generating station will result in only a minor direct adverse environmental impact. Regional benefits from the proposed development in terms of air quality are likely to arise from the use of modern, high efficiency technology which can realistically be expected to displace older, less efficient coal burning power stations in the electricity generating mix in the UK. This would lead to a net reduction in atmospheric emissions of key pollutants such as carbon dioxide and sulphur dioxide.

5.2.46 Operational permitting of the proposed plant will set emission limit values and monitoring criteria. The operator of the plant will put in place all necessary measures to ensure that the terms of the Environmental Permit are complied with.

5.2.47 Overall, the local environmental impact on air quality of the station operating on natural gas is considered to be minor adverse, since it will cause just detectible changes in annual mean nitrogen dioxide levels. On SYNGAS operation, ground level concentrations are predicted to be slightly higher, and still classed as minor adverse.

5.2.48 Taking into account the potential displacement of older, less efficient coal fired plant which emit higher concentrations of acid gases and much larger tonnages of carbon dioxide, the IGCC development may be considered to bring minor positive benefits to air quality from a regional and global perspective.
5.3 Noise And Vibration Assessment

Background

5.3.1 An assessment has been made of the potential noise and vibration impacts associated with the proposed 900 MW natural gas and clean coal power station, to be located on the Hatfield Power Park site to the south of Stainforth, near Doncaster.

5.3.2 The site already has a Section 36 (s36) Consent for a 430 MW clean coal power station on the Hatfield Power Park site. The overall Power Park facility would consist of a mixed use development comprising coal mining development (at the associated colliery), new infrastructure, environmental improvements and a business park.

5.3.3 Unlike the existing s36 Consent, which covers a single site, this application for a larger 900 MW power station proposes two development areas, set within a larger overall application site. Within this document, the more westerly area is referred to as the Main Power Station area and the second area, to the east of Hugh Hill Lane, is referred to as the Air Separation Unit (ASU) area.

5.3.4 This assessment has considered the potential construction and operational phase impacts arising from the proposed power station.

Policy Context

5.3.5 In terms of the policy and legislative framework the principal documents are the Environmental Protection Act 1990, the Control of Pollution Act 1974 and Planning Policy Guidance Note (PPG24) Planning and Noise.

5.3.6 The main thrust of the policy and legislative framework in terms of noise is to ensure that development proposals do not cause unacceptable levels of disturbance. PPG 24 outlines the considerations to be taken into account in those activities that generate noise and advises on the use of conditions to minimise the impact upon noise sensitive locations.

Consideration of the Potential For Impact

Methodology

5.3.7 Weekday and weekend noise surveys have been undertaken at key sensitive receptors in the vicinity of the development site to determine existing baseline noise levels in the vicinity of the proposed development. Baseline data collection was
gathered for both the construction period and the continuous operation of the power station.

5.3.8 In assessing the potential noise and vibration impact from construction activities, reference has been made to British Standard 5228: 1997 - Noise and Vibration Control on Construction and Open Sites, Part 1, ‘Code of Practice’ for basic information and procedures for noise and vibration control and the DEFRA publication ‘Update of Noise Database for Prediction of Noise on Construction and Open Sites’, 2006.

5.3.9 Given that the DEFRA document has more up to date information than BS 5228, it has been used wherever possible. Furthermore, the DEFRA Update provides octave band levels which allow more accurate predictions to be undertaken.

5.3.10 BS 5228 provides information on the factors which affect the acceptability of site noise, guidance on the degree of noise control necessary and guidance on possible mitigation measures.

Nearby Sensitive Receptors

5.3.11 In terms of the construction period the closest properties to the two site areas have been chosen to ensure the report reflects the greatest potential impact of the construction work on nearby residents. The closest properties are located on the far side of Kirton Lane, to the north of the power station. The closest properties to the main power station area are 7-12 Kirton Lane, 1-4 Mayfield Avenue and 34-37 Mayfield Avenue, all to the north and at a distance of approximately 140 m. The closest properties to the ASU area are Gracelands, un-named Barn Conversion, Mayfield House and Tudor Rose, again all to the north and at a distance of approximately 75 m.

5.3.12 Given these distances to the closest sensitive receptors, and experience with other similar schemes, vibration is not considered likely to be an issue and, as such, is not considered further in terms of the assessment work.

5.3.13 The chosen closest noise sensitive receptors in relation to the continuous operation of the power station are located in Stainforth, to the north and west of the proposed Power Park development site. As we are predominantly concerned with the night-time operation of the IGCC facility, residential properties, where people are sleeping, are likely to be the most sensitive receivers.
Noise Modelling

5.3.14 Noise modelling has been used to estimate the potential construction emissions and the continuous operation of the proposed power station. This was undertaken using CADNA-A Noise Modelling Software.

Assessment Criteria

5.3.15 In determining the significance of the potential noise impacts associated with the development, consideration has been given to a number of standards and guidance documents, as detailed below.

5.3.16 The Institute of Acoustics and Institute of Environmental Management and Assessment have produced draft guidance on noise impact assessment (Guidelines for Noise Impact - Consultation Draft, April 2002);

5.3.17 British Standard (BS) 4142: 1997 - Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas is used to assess the level of industrial noise affecting mixed residential and industrial areas;

5.3.18 World Health Organisation (WHO) guidance - most recent revision being the document titled ‘Guidelines for Community Noise’, published by the WHO in 2000,

Baseline Conditions

5.3.19 The proposed development site is located between the towns of Stainforth and Hatfield, South Yorkshire, to the west of junction 5 of the M18. To the north of the proposed development site is Kirton Lane / Thorne Road, which runs in an east west direction. The most densely populated residential areas are located to the west and north-west of the proposed development. South of the site the area becomes more rural and is dominated by open countryside.

5.3.20 The noise climate is predominantly influenced by noise from road traffic, with contributions from rail movements, aircraft movements, birdsong and local activities such as children playing and people cycling.

5.3.21 Although baseline noise monitoring was undertaken in January and February 2002, there is the potential for the noise climate in the area to have changed over the intervening years. As such, an updated noise survey has been undertaken.

Baseline monitoring

5.3.22 In order to establish the existing noise baseline against which the potential impacts of the proposed power station can be assessed, two baseline noise monitoring
surveys have been undertaken, one during the week and one at the weekend. Both surveys were carried out over a 24 hour period.

**Weekday Survey Results**

5.3.23 Noise levels were affected by the presence of construction plant on the former colliery site. Daytime ambient noise levels varied considerably between locations, ranging from 46 dB LAeq (at 53 Bootham Crescent) to 67 dB LAeq (at Bootham Lane), with an averaged level of 55 dB LAeq. Daytime background noise levels also varied considerably between locations, ranging from 39 dB LA90 (at 51 Chestnut Avenue) to 50 dB LA90 (at Waggons Way), with an averaged level of 43 dB LA90.

5.3.24 Night-time ambient noise levels varied considerably between locations, ranging from 40 dB LAeq (at 53 Bootham Crescent) to 58 dB LAeq (at Waggons Way), with an averaged level of 47 dB LAeq. Night-time background noise levels also varied considerably between locations, ranging from 36 dB LA90 (at 59 Coronation Road) to 44 dB LA90 (at Measham Drive), with an averaged level of 39 dB LA90.

**Weekend Survey Results**

5.3.25 Weekend noise levels were reasonably consistent with those recorded during the weekday survey.

5.3.26 Daytime ambient noise levels varied considerably between locations, ranging from 46 dB LAeq (at 86 Beech Crescent) to 64 dB LAeq (at Measham Drive and Waggons Way), with an averaged level of 54 dB LAeq. Daytime background noise levels also varied considerably between locations, ranging from 40 dB LA90 (at 53 Bootham Crescent) to 48 dB LA90 (at Waggons Way), with an averaged level of 44 dB LA90.

5.3.27 Night-time ambient noise levels varied considerably between locations, ranging from 41 dB LAeq (at 53 Bootham Crescent) to 59 dB LAeq (at Waggons Way), with an averaged level of 49 dB LAeq. Night-time background noise levels also varied considerably between locations, ranging from 33 dB LA90 (at 51 Chestnut Avenue) to 45 dB LA90 (at Bootham Lane), with an averaged level of 39 dB LA90.

5.3.28 A public bridleway runs adjacent to the south eastern boundary of the proposed power station site. Beyond and running parallel to the bridleway is a busy train line. At this location, the line comprises a 4 track railway, with an approximate speed of 60 mph in either direction. The line is heavily used, with typically in the region of 80 train movements in each direction per 24 hour period. As such, the public bridleway is not considered to represent a quiet amenity space and is therefore not considered to be a sensitive receptor.
Assessment of Potential Impacts

Construction

5.3.29 For the initial Power Island, construction activities will focus on the north eastern half of the main Power Station site, including the Cooling Tower, Turbine Hall and associated Utilities. The ASU area will not be developed at this stage. During the construction and commissioning of the coal gasification and SYNGAS elements, construction activities will be split between the two power Station areas. Re-profiling of the spoil heap on the ASU area will be required.

5.3.30 With all construction plant and equipment located towards the northern boundary of the main power station area, the highest noise levels predicted were in the order of 50 dB (at Tudor Rose). Noise levels at other receptors were predicted to be 40 dB or less. This is largely due to the effective screening provided by the raised Power Park site between the power station and nearby sensitive receptors.

5.3.31 With the construction plant split between the main power station and ASU areas, predicted noise levels were again low, with the greatest noise level of 41 dB predicted at Tudor Rose. Noise levels at other receptors were predicted to be 40 dB or less. This is again largely due to the effective screening provided by the raised Power Park site between the power station and nearby sensitive receptors. These predicted noise levels are well below the noise limits normally set by Local Authorities for construction noise.

Traffic & Transport – Construction Works

5.3.32 For the initial Power Island phase of the construction works, it is anticipated that construction traffic would be less than that assumed during the previous assessment. The Power Island is significantly less complex (a small number of very large equipment items plus infrastructure, compared to lots of small and large equipment steel structures, pipe racks, etc) and covers a much smaller area than the IGCC.

5.3.33 During the first construction period (initial Power Island), construction traffic would be routed through the local road network, as per the original application and traffic assessment. However, for the second phase of construction (coal gasification) there is a reasonable possibility that the motorway link road route (even if this has not been fully completed) could be used as an overland haul route directly to J5 of the M18. On the basis that there would be half the number of construction HGVs required for the initial Power Island construction, the likely noise impact is likely to be significantly below that predicted for the original 430 MW installation.
5.3.34 On the basis that an overland haul route direct to J5 of the M18 would be available for the second phase of construction (coal gasification), the likely noise impact from construction traffic is likely to be significantly reduced over that predicted previously, as the vast majority of construction vehicles would no longer pass near to sensitive receptors in the area.

Anticipated Noise Impact

5.3.35 Based on the noise levels predicted in this preliminary construction noise assessment, and the likely reduction and re-routing of construction traffic, the anticipated noise impact associated with construction would be Minor Adverse and Temporary.

Operational Noise

5.3.36 The initial Power Island facility would operate using natural gas. It is anticipated that, following changes to the carbon market set to occur in 2013, and the anticipated development of regional infrastructure for carbon collection and distribution, the clean coal power generating elements would be constructed and brought into operation shortly after.

5.3.37 A number of noise sources would not be in operation during the initial phase of operation, when natural gas is used as the fuel source. However, as a worst-case it has been assumed that all noise sources associated with the power station would be in operation simultaneously.

5.3.38 The noise emissions from the power station are likely to be reasonably consistent throughout the day, evening and night-time periods. Based on discussions with the project engineers and previous experience of power station noise emissions it is not anticipated that noise from the power station would tend to attract attention at the surrounding sensitive receivers. On this basis, no acoustic feature correction has been applied in the BS 4142 Assessment undertaken.

Noise Modelling & Predictions

5.3.39 Noise modelling was undertaken to assess the potential impact of industrial noise sources (mainly the operation of the power station) and road traffic sources (the proposed two main access roads).

5.3.40 Noise predictions have been calculated of the proposal during normal operations and during intermittent activities. Predicted noise levels during normal operations at the nearest noise sensitive receptors, together with the existing baseline and background noise levels have been calculated. Since the noise emissions from the power station are likely to be consistent throughout the day and night, consideration
has been given to the potential impacts during the night-time period as this will be the more sensitive period.

5.3.41 A number of potentially intrusive noise sources could operate intermittently during start up, shut down or emergency situations. These include the flare located towards the southern part of the site and safety valves associated with the pressurised steam systems. Other potential noise sources that could operate intermittently during start-up, shut-down or operational upsets on the plant include venting of steam by the safety valves and emergency sirens or alarms.

5.3.42 The safety valves will be operated for short periods during plant commissioning and during annual testing. These events will be controlled and scheduled for the daytime. The safety valves, along with emergency sirens and alarms, will be triggered automatically during certain operational upsets on the plant. By their very nature the noise impact is likely to be for short durations and during isolated incidents. The noise emissions from these potential sources will need to be minimised to ensure they do not lead to excessive noise levels at nearby sensitive receivers.

**BS 4142 Assessment**

5.3.43 Consideration has also been given to BS 4142, in determining the likelihood of noise complaint from operation of the proposed power station. As a worst-case assessment, the minimum background LA90 noise levels recorded over both the weekday and weekend noise surveys have been used as the basis of the assessment.

5.3.44 Based on the BS 4142 assessments work, it is concluded that noise complaints are possible for properties on Coronation Road. The rating noise level is 6 dB over the existing background noise level, which is slightly worse than a marginal situation. Noise complaints are not predicted for any of the other noise sensitive receptors considered in the vicinity of the proposed power station. Examination of the Partial Noise Levels for 59 Coronation Road indicated that the SRU Compressor, Gasifier Structure Train, Coal Milling and Drying Building and Utilities and Water Building were the main noise contributors for this location. Consideration is given therefore to appropriate mitigation measures to minimise this potential.

**Cumulative Impact**

5.3.45 An assessment of the potential noise emissions from road traffic on the proposed M18 motorway link road was undertaken by Scott Wilson in 2004. Various assumptions were made, including that the terrain was flat between the proposed link road and receptors in the area. Since this assessment was undertaken, further
detail has become available with respect to the proposed site layout, topography and bunding / screening. Noise modelling has therefore been undertaken to take these measures into account. The predicted LA10,18hr noise levels have been converted into day, evening and night-time LAeq noise levels.

5.3.46 Incorporating the updated topography and earth bunding / screening into the model has led to a reduction in the noise levels predicted at all receptors considered.

Night-time Cumulative Impact

5.3.47 Overall predicted cumulative noise levels and cumulative impacts from both the power station and Link Road have concluded that predicted night-time cumulative impact varies between Slight Adverse and Moderate Adverse. However, this should be put into context. Where a Moderate Adverse Impact is predicted, ambient night-time noise levels would remain low and would be less than 45 dB. As such, the WHO requirements to minimise the risk of sleep disturbance would be met. Furthermore, the major noise contribution is from road traffic on the link road as opposed to power station noise emissions.

Day-time Cumulative Impact

5.3.48 The predicted day-time cumulative impact varies between Slight Adverse and Moderate Adverse. Again, this should be put into context. Where a Moderate Adverse Impact is predicted, ambient daytime noise levels would be at or below 50 dB. As such, the WHO requirements to minimise the risk of moderate annoyance would be met. As for the night-time situation, the major noise contribution is from road traffic on the link road as opposed to power station noise emissions.

Anticipated Noise Impact

5.3.49 The potential operational noise impact of the Power Station facility alone is predicted to be minor adverse to negligible, according to the IOA/IEMA Noise Impact Assessment Guidelines. Consideration of BS 4142 supports this rating, with a low likelihood of noise complaints for the vast majority of receptors.

5.3.50 Consideration of the cumulative noise impact, with inclusion of road traffic on the proposed link road, leads to a slight to moderate adverse impact at the potentially worst affected receptors. However, it should be noted that the major noise contribution is from road traffic on the link road as opposed to power station noise emissions.
Consideration of Potential Mitigation

5.3.51 The assessment undertaken has highlighted the need for appropriate noise mitigation measures for certain activities and noise sources on site. The following mitigation measures are therefore proposed.

Construction

5.3.52 All construction work would be undertaken to the guidance in British Standard 5228: 1997 - Noise and Vibration Control on Construction and Open Sites, Part 1, ‘Code of Practice’ for basic information and procedures for noise and vibration control. In addition construction activities would be restricted to daytime hours only.

5.3.53 The intervening area of the Power Park, between the power station and residences in Stainforth, is in the process of being profiled so that it is raised above the height of the power station and the residences in Stainforth. This provides a very effective acoustic screening effect, further enhanced by the construction of an elevated earth bund around the edge of the site, adjacent to residential properties.

5.3.54 Similarly, the elevated sides of the existing spoil heap (to the east of Hugh Hill Lane) will be retained as much as possible during the construction of this area of the power station site. These elevated sides again provide an effective acoustic screen for properties to the north of this area. As necessary, further localised screening and mitigation measures will be implemented to ensure acceptable noise levels at nearby sensitive receptors during construction works.

Operational Noise

5.3.55 It is proposed to introduce mitigation measures for a number of noise source emissions to ensure that predicted noise levels lead to a Marginal Situation or better (when assessed to BS 4142) at all nearby sensitive receptors.

5.3.56 Consideration has been given to the location and orientation of buildings and plant on site to maximise the distance and screening effect from tall buildings and plant between significant noise sources and sensitive receivers in the vicinity of the site.

5.3.57 The best and most cost effective method of noise mitigation is to minimise the noise emissions at source through appropriate plant selection and design. This approach has been utilised throughout the preliminary design process through close liaison between the environmental and engineering design teams in order to ensure that noise levels are acceptable at nearby residential properties. Proposed mitigation measures include:
• SRU Compressor – to be housed within a purpose built building / acoustic enclosure providing an insertion loss of at least 10 dB;

• Gasifier Structure Train – Building facades to provide an additional insertion loss of 5 dB (15 dB in total);

• Coal Milling and Drying – Building facades to provide an additional insertion loss of 5 dB (15 dB in total);

• Utilities and Water – Building facades to provide an additional insertion loss of 10 dB (20 dB in total).

5.3.58 Many of the noise sources on site have been housed within buildings or within self contained units, such as compressor houses, where the building fabric limits noise propagation outside. In addition, many potential noise sources benefit from the provision of thick thermal lagging which is predominantly concerned with heat insulation but doubles as an effective acoustic cladding. Where necessary, additional layers of cladding, increased density of linings or alternative methods of mitigation will be utilised to ensure acceptable noise levels. Over and above these reductions to noise emissions at source, a number of other measures have already been included into the site layout and design.

5.3.59 As noted for construction noise, the raised intervening area of the Power Park, between the power station and residences in Stainforth, provides a very effective acoustic screening effect, further enhanced by the construction of an elevated earth bund around the edge of the site, adjacent to residential properties. Similarly, the elevated sides of the existing spoil heap (to the east of Hugh Hill Lane) will be retained as much as possible following construction of this area of the power station site. These elevated sides again provide an effective acoustic screen for properties to the north of this area.

**Intermittent Activities**

5.3.60 As noted previously, a number of potentially intrusive noise sources could operate intermittently during start up, shut down or emergency situations. These include the flare located towards the southern part of the site, safety valves associated with the pressurised steam systems and emergency sirens or alarms.

5.3.61 Careful consideration has been given to the flare design. A low velocity, low luminosity flare could be used which would have no significant impact on noise levels at nearby properties during its operation, even during the quieter night-time period.
5.3.62 By their very nature the noise impacts from venting of steam by the safety valves and emergency sirens or alarms are likely to be for short durations and during isolated incidents. When their operation can be controlled, such as during plant commissioning or annual testing, these sources will be operated during the daytime. However, they will also be triggered automatically during certain operational upsets on the plant. The noise emissions from these potential sources will be minimised through appropriate design, enclosing and silencing the sources where possible, and through effective operator training to minimise the number of potential occurrences. Where safety valves, alarms or sirens are located externally they will be appropriately mitigated to ensure that noise levels are acceptable at the surrounding sensitive receivers.

**Noise Management Plan**

5.3.63 A noise management plan will be produced. The plan will detail responsibilities for noise and vibration control at the site and the systems that will be put in place.

**Conclusion of Predicted Impacts**

**Construction**

5.3.64 Based on this preliminary construction noise assessment, the likely noise impact would be minor adverse and temporary for those receptors located closest to the site. The worst-case piling / earthworks phase has been considered here, with other phases of construction likely to be significantly quieter.

**Operation**

5.3.65 Following implementation of the mitigation measures considered above, noise levels at the surrounding sensitive receptors would be reduced. Of particular concern were properties located on Coronation Road, where the greatest noise impact and possibility of noise complaint were identified.

5.3.66 With the incorporation of the proposed mitigation measures at source, the residual night-time LAeq noise level at 59 Coronation Road would be reduced by approximately 2.8 dB. The predicted free-field night-time noise level at first floor (bedroom window) height for 59 Coronation Road is provided below:
<table>
<thead>
<tr>
<th>Receptor</th>
<th>Existing Baseline LAeq Noise Level</th>
<th>Predicted LAeq Noise Level (Power Station Only)</th>
<th>Overall LAeq Noise Level with Power Station</th>
<th>Resultant Increase in LAeq Noise Level</th>
<th>Significance (IOA/IEMA Criteria)</th>
</tr>
</thead>
<tbody>
<tr>
<td>57 - 63 Coronation Road</td>
<td>41</td>
<td>35.5</td>
<td>42.1</td>
<td>1.1</td>
<td>Slight</td>
</tr>
</tbody>
</table>

Predicted Night-time (23:00 - 07:00) LAeq Noise Levels and Noise Level Increases

5.3.67 The resultant increase in ambient noise levels is reduced, although a slight adverse noise impact remains. The BS 4142 Assessment has also been revisited for this receptor, as follows:

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Minimum Background LA90 Noise Level</th>
<th>LAeq Noise Contribution from site</th>
<th>Difference</th>
<th>Significance (BS 4142)</th>
</tr>
</thead>
<tbody>
<tr>
<td>57 - 63 Coronation Road</td>
<td>32</td>
<td>35.5</td>
<td>+ 3.5</td>
<td>Less than Marginal Situation</td>
</tr>
</tbody>
</table>

BS 4142 Assessment for Night-time period (No Acoustic Feature Correction)

5.3.68 On the basis of the residual night-time noise level, the likelihood of noise complaint from properties on Coronation Road has been decreased, to below a marginal situation. All other receptors would be affected to a lesser extent. Based on this operational noise assessment, the likely residual noise impact would be minor adverse with a low likelihood of noise complaint.

Summary & Conclusions

5.3.69 The proposal has been assessed against the most relevant policy and legislative documents which are considered to be the Environmental Protection Act 1990, the Control of Pollution Act 1974 and Planning Policy Guidance Note (PPG24) Planning
and Noise. The assessment has considered the noise and vibration impacts of both the construction and operation phases of the proposed development. In the light of the following conclusions the proposal is considered to accord with the policy and legislative framework.

Construction

5.3.70 In terms of construction a predicted of noise levels at nearby sensitive receptor locations have been made using noise modelling software. The highest construction noise levels predicted were in the order of 50 dB (at Tudor Rose). Noise levels at other receptors were predicted to be 40 dB or less. This is largely due to the effective screening provided by the raised Power Park site between the power station and nearby sensitive receptors. These predicted noise levels are well below the noise limits normally set by Local Authorities for construction noise.

5.3.71 For the initial Power Island phase of the construction works, it is anticipated that construction traffic would be in the order of half that assumed during the previous assessment. During this first construction period, construction traffic would be routed through the local road network, as per the original application and traffic assessment.

5.3.72 Construction of the coal gasification and SYNGAS elements would involve an increased number of HGV movements over the original application. However, for this second period of construction, there is a reasonable possibility that the motorway link road route (even if this has not been fully completed) could be used as an overland haul route directly to J5 of the M18. On the basis of the above, the likely construction noise impacts from construction traffic are likely to be significantly below that predicted for the original 430 MW installation.

5.3.73 Based on the noise levels predicted in this preliminary construction noise assessment, and the likely reduction and re-routing of construction traffic, the anticipated noise impact associated with construction would be Minor Adverse and Temporary.

Operation of the Power Station

5.3.74 As would be expected from a large industrial development such as this proposed power station, a large number of potentially significant noise sources are associated with the facility. Under normal operating conditions, it is anticipated that the noise sources associated with the power station will generally be in operation continuously. As such, noise emissions from the power station are not anticipated to vary significantly throughout the day, evening and night-time periods. On this basis, particular attention has been paid to the night-time period when ambient and
background noise levels are at their lowest and the potential impact from the power station is likely to be greatest.

5.3.75 In order to estimate the potential noise levels at the nearest sensitive receptors, computer based noise modelling was used. The predicted free-field night-time noise levels at first floor height for each of the sensitive receivers have been assessed. Based on the assessment criteria within the IOA/IEMA Guidance, a negligible or slight adverse noise impact is predicted based on the overall night-time noise changes for each of the receptors considered. As ambient noise levels during the daytime are higher, the potential noise impact would be even less during the daytime period.

5.3.76 Consideration has also been given to BS 4142, in determining the likelihood of noise complaint from operation of the proposed Power Station. As a worst-case assessment, the minimum background LA90 noise levels recorded over both the weekday and weekend noise surveys have been used as the basis of the assessment.

5.3.77 The BS 4142 Assessment identified that, without mitigation, noise complaints were possible for properties on Coronation Road. A number of mitigation measures are identified, as detailed in in the main Noise and Vibration Report contained in the Technical Appendices to the Environmental Statement. Following implementation of the mitigation at source measures, the predicted noise levels at nearby receptors were reduced. The BS 4142 Assessment for properties on Coronation Road was revisited and a less than marginal situation with regard to noise complaint was identified.

5.3.78 Preliminary calculations suggest a daily traffic flow of between 45 and 54 HGVs attributable to operation of the proposed power station (based on the delivery of raw materials and export of waste materials – see Review of Power Station Traffic under the Chapter – Review of Other Potential Effects). It is anticipated that the power station will have a permanent workforce of 150 personnel. These employees will operate in 3 shifts, such that there will be around 112 staff on site at any one time.

5.3.79 During operation, HGVs will utilise the new link road to J5 of the M18 to avoid passing through nearby residential areas. An anticipated AAWT 18-hour traffic flow of in the order of 20,000 vehicles is predicted for the link road, so the small number of HGVs associated with operation of the power station would not be perceptible in the wider traffic flow on this road.
5.3.80 A cumulative noise impact assessment, incorporating the noise contribution from road traffic on the link road as well as the noise emissions from the power station is provided in Section 5.2.4.

5.3.81 The predicted night-time cumulative impact varies between Slight Adverse and Moderate Adverse. However, this should be put into context. Where a Moderate Adverse Impact is predicted, ambient night-time noise levels would remain low and would be less than 45 dB. As such, the WHO requirements to minimise the risk of sleep disturbance would be met. Furthermore, the major noise contribution is from road traffic on the link road as opposed to power station noise emissions.

5.3.82 The predicted day-time cumulative impact varies between Slight Adverse and Moderate Adverse. Again, this should be put into context. Where a Moderate Adverse Impact is predicted, ambient daytime noise levels would be at or below 50 dB. As such, the WHO requirements to minimise the risk of moderate annoyance would be met. As for the night-time situation, the major noise contribution is from road traffic on the link road as opposed to power station noise emissions.

5.3.83 Based on this operational noise assessment, the overall likely residual noise impact from the power station would be minor adverse with a low likelihood of noise complaints.

5.4 Effects on the Water Environment

Background

5.4.1 An independent assessment has been undertaken to report on the potential impacts of the construction and operation of the proposed 900MW power station on the water environment. The assessment is constrained to assessing the impacts on water abstracted for, and discharged from, the gasification plant and associated power station. It does not consider the environmental impacts from any necessary water supply / discharge pipelines that may be necessary to convey water to and from the development site. As necessary, these may be subject to separate planning applications and environmental assessment.

5.4.2 The report is accompanied by a water flow diagram which shows the key process requirements of water for the main processes on site. For natural gas operation, water will only be required for the power station elements of the design and will be approximately one-third of the demand for the IGCC, around 800 m3/hr. For operation on SYNGAS, additional water will be utilised in the gasification process.
In total, 2,379 m³/hr is estimated to be needed with approximately 1,326 m³/hr discharged to air and 994 m³/hr to be discharged to water.

**Policy Context**

5.4.3 In regional terms the Yorkshire and Humber Regional Spatial Strategy (RSS) 2004 requires that high water quality standards be maintained by ensuring an adequate sewage and wastewater treatment system in line with the Water Framework Directive (Policy R3). Development should seek to avoid locations where water supply and/or drainage provision is likely to be unsustainable (Policy R3). Policy R2 sets out a strategic approach to flood risk and requires development in flood risk areas to be subject to a flood risk assessment. The emerging Yorkshire and Humber Plan supports the adopted RSS and states the Region will maintain high standards of water quality and minimise development that could pollute surface and underground water resources (Policy ENV3).

5.4.4 On a local level the Doncaster Unitary Development Plan (UDP) 1998 seeks to ensure that unacceptable levels of pollution will not be permitted (policy ENV65) and that developers proposing to develop on contaminated land will “need to demonstrate that their proposals will not cause or increase pollution of watercourses and groundwater resources” (policy ENV69).

5.4.5 The main national planning guidance which relates to the proposal in terms of protection of the water environment is Planning Policy Statement 25 (PPS25): Development and Flood Risk (2006) and Planning Policy Statement 23 (PPS23): Planning and Pollution Control (2004). PPS25 provides clear guidance as to the type of development that should be permitted within flood affected areas. The primary aim of the document is to steer vulnerable development (e.g. residential development) away from areas that may be subject to flooding. PPS23 provides guidance on the protection and enhancement of surface water and groundwater in regard to pollution.

5.4.6 The main of objective of the development plan and national planning guidance therefore aims to protect the water environment through the protection of water quality and biodiversity, the management of water resources and the reduction in the effects of flooding.

**Consideration of the Potential For Impact**

5.4.7 In accordance with development plan policy and national planning guidance an assessment of the potential impact of the proposal on the water environment has been undertaken covering both the construction phase and its operation. The initial assessment did not consider the use of mitigation measures.
5.4.8 The magnitude of a potential impact is independent of the importance of the feature and is estimated based on there being no mitigation measures implemented. The significance of a specific potential impact has been derived from both the importance of the feature and the magnitude of the impact using the assessment criteria in Tables 3-A to 3-C below.

### Table 3-A  Sensitivity and Importance Criteria for the Water Environment

<table>
<thead>
<tr>
<th>Sensitivity &amp; Importance</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>RE1 grade river</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GQA chemistry grade A / B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salmonid fishery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floodplain with extensive development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquifer providing potable water to a large population</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RE2/3 grade river</td>
<td></td>
<td></td>
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<tr>
<td>GQA chemistry grade C / D</td>
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<td></td>
<td></td>
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<tr>
<td>Cyprinid fishery</td>
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<td>Floodplain with development pressure</td>
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<tr>
<td>Aquifer providing abstraction water for agricultural or industrial use</td>
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<tr>
<td>No fisheries designations</td>
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<tr>
<td>GQA chemistry grade E / F</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Floodplain with limited development</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Minor aquifer or non-aquifer</td>
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</tr>
</tbody>
</table>

### Table 3-B  Magnitude Criteria

<table>
<thead>
<tr>
<th>Magnitude</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Loss of attribute e.g. salmonid fishery, river grade reduction, increase in flood risk, pollution of potable source of abstraction</td>
</tr>
<tr>
<td>Medium</td>
<td>Loss of part / reduction in integrity e.g. loss of fishery production, increase in effluent but no change in river grade</td>
</tr>
<tr>
<td>Low</td>
<td>Minor impact e.g. measurable change but limited in size / proportion</td>
</tr>
<tr>
<td>Negligible</td>
<td>Impact but use / integrity unaffected e.g. discharges but no loss in quality, no increase in flood risk</td>
</tr>
</tbody>
</table>
Table 3-C  Significance Criteria

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Major</td>
<td>Moderate / major</td>
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<tr>
<td>Medium</td>
<td>Moderate / Major</td>
<td>Moderate</td>
<td>Moderate / minor</td>
</tr>
<tr>
<td>Low</td>
<td>Moderate</td>
<td>moderate / minor</td>
<td>Minor</td>
</tr>
<tr>
<td>Negligible</td>
<td>Minor</td>
<td>Minor / No</td>
<td>No significance</td>
</tr>
</tbody>
</table>

**Construction**

5.4.9 During the construction phase there is the potential for activities to temporarily impact on local surface water resources. The effects could be felt on drainage ditches on-site and ditches and streams off-site. It is predicted that, without mitigation, there would be moderate effects from construction activities.

**Operation**

**Water Supply**

5.4.10 The operation of the power station complex will require a constant supply of water. During the design process, options for reusing and reducing water use will be considered and the facility will minimise water use where practicable.

5.4.11 Five options for water supply were considered. The preferred option is to take water from the River Don and abstract it from the Stainforth & Keadby Canal. Consultation has been undertaken with the Environment Agency and British Waterways about this option. Agreement in principal has been reached and has confirmed that infrastructure would need to be constructed to facilitate water abstraction and transport the water from the canal to the site. Flow rates in the River Don are expected to be sufficient to supplement flow in the canal and therefore supply of water is predicted to have a low effect on the canal without mitigation.

**Water Discharge**

5.4.12 There will be a number of effluent discharges from the operation of the proposed power station (e.g. foul water/sewage, surface water discharge, outflow from gasifier effluent treatment plant etc). Various options have been considered and following consultation with the Environment Agency the preferred option would be to
discharge all effluent into a saline reach of the River Don further downstream towards Rawcliffe Bridge, effectively negating the effects of the saline nature of the discharge. This is predicted to have a moderate to low effect without further mitigation.

5.4.13 In terms of thermal loading the temperature of the discharge streams has not yet been calculated, but is likely to be less than 40°C. Whether the effluent streams are discharged at Rawcliffe Bridge or directly to the canal or river in the vicinity of the site, the effluent will have to travel through pipelines prior to discharge, thereby reducing its temperature. Thermal loading is therefore predicted to have a low effect without further mitigation.

**Surface Water Drainage**

5.4.14 Runoff and drainage will have been altered locally by the construction of the Power Park development. The pre-development topography was of a domed tip of colliery spoil. Colliery spoil, when compacted, can achieve a low permeability and it is thus likely that much of the rain falling on the spoil tip would have become run-off and entered the local surface water drainage system. The Power Park development drainage system will be installed prior to construction of the proposed power station. Although impermeable surfacing and buildings will cover much of the proposed power station site, it is considered unlikely that the run-off will be significantly more than from the colliery tip. However, calculations will be made to ensure that the design of the surface water drainage at the power station will be adequate.

5.4.15 Surface runoff from roofs, roads and car parks may become contaminated with oil and fuel from spillages and leaks. Discharge of this runoff directly into the adjacent watercourse may lead to contamination of the watercourse, with a moderate adverse effect on water quality.

5.4.16 The Environment Agency response to the 2002 Section 36 application noted that the applicant intended to develop a sustainable drainage system. As such, the Agency would wish to be consulted on design and details of proposed surface water discharges. As the design develops it is recommended that the Agency is consulted to produce the optimum surface water drainage design.

5.4.17 Without adequate design measures being implemented it is considered that there would be a moderate effect on surface water drainage from the proposed development.

**Flooding**

5.4.18 The Environment Agency response to the 2002 Section 36 consent application noted that the site lies within the floodplain of the River Trent, and therefore
suggested mitigation construction methods. It should be noted that the proposed site ground levels are 7m AOD which is higher than the natural ground levels surrounding the site. Flood Risk Assessments conducted for the Link Road and Phase II Power Park (which includes the proposed power station development site) planning application concluded that flooding was not an issue for the Power Park. With no further mitigation beyond siting the development plateau at 7m AOD, it is considered that there are minor effects on flood risk from the proposed development.

*Handling, storage, leaks and spills*

5.4.19 The storage of potential hazardous and polluting materials on-site increases the risk of contaminants entering the surface drainage system through spillage which may result in moderate adverse effects on local land drains.

**Consideration of Potential Mitigation**

5.4.20 In order to mitigate the potential adverse impacts on the water environment the proposal will be constructed and operated in accordance with best practice. To prevent adverse impacts on the surface water resources during all phases of the proposal the surface water drainage design will incorporate best practice to minimise environmental risk and risk of pollution.

*Construction*

5.4.21 The drainage system for the operational plant will be developed early in the construction process to ensure its efficacy in reducing the risks of pollution to the adjacent land drains during this phase. In order to mitigate potential adverse impacts from carrying out works near the local drains, Environment Agency consent will be sought and standard precautions will be implemented as outlined in the EA’s Pollution Prevention Guidance PPG5.

5.4.22 The risks from potential spillages and leaks of fuel and oil from plant machinery can be avoided through the implementation of good site practice and management in accordance with guidance, in particular PPG21 (Pollution Incident Response Planning). In doing so all fuel, oil and chemicals will be stored in accordance with the requirements of the Control of Pollution (Oil Storage) Regulations and recognised good practice.
Operational Effects

5.4.23 The facility will operate under an Environmental Permit issued by the Environment Agency which will regulate activities at the facility to minimise adverse effects on the environment. Prevention of environmental harm through the application of Best Available Techniques (BAT) is a key concept in the regulations, and the facility will be designed in accordance with BAT for the combustion and gasification sector, and this will apply to water usage and control of emissions to surface water.

5.4.24 The surface water drainage system will collect and segregate run-off according to whether there is a likelihood of pollution of the source. Without adequate design measures being implemented, there would be a moderate effect on surface water drainage from the proposed development.

Water Supply

5.4.25 The Environment Agency and British Waterways will be consulted to ensure that abstraction from the river and canal is done in an environmentally sensitive way. Abstraction quantities will be limited to ensure adequate base flow remains in the watercourse.

Water Discharge

5.4.26 The discharge quantity and quality is not confirmed yet, but the preferred mitigation measure proposed by the Agency is currently to discharge at Rawcliffe Bridge. Suitable outfall structures will be designed for discharges to river or canal to ensure full mixing. Discharge temperature will be taken into consideration during the design process to ensure that the deviation from ambient temperatures is kept to a minimum and that recommended maximums are not exceeded at point of discharge.

Surface Water Drainage

5.4.27 The masterplan planning permission for development of the Power Park imposed a number of conditions some of which relate to the protection of the water environment. These conditions require schemes to be submitted and approved prior to the construction of the power station complex. Given that the design of the proposal is at a preliminary stage, it is proposed that details of surface water drainage and containment of storage are submitted to the LPA for approval prior to the commencement of development. Such details could be required by planning condition(s) on the basis that consent is approved for the proposal.
Flooding

5.4.28 No further mitigation measures are required as construction will take place on a plateau above the existing ground level.

Handling, Storage, Leaks and Spills

5.4.29 The risks from potential spillages and leaks of fuel and oil from plant machinery can be avoided through good site practice and management in accordance with PPGs. In doing so, all waste fuel, oil and chemicals will be drained into sealed containers and then stored in accordance with good practice in appropriately bunded facilities before being tankered off-site to a suitably licensed / permitted waste facility. Management procedures will be developed to include regular monitoring of the site's drainage sumps condition and contents, together with water quality monitoring of the contents of the balancing lagoon, to ensure that there will be no significant effect on the adjacent land drains during the operation of the facility, and that discharge consent requirements are not exceeded.

Conclusions

5.4.30 The development plan and national planning guidance seek to ensure that development proposals do not have an adverse impact on the water environment or pose concerns over increased flood risk. Having assessed the proposal against policy objectives it is concluded that the proposal is unlikely to give rise to adverse impacts.

5.4.31 During construction of the proposal, with the implementation of good environmental management, it is predicted that no adverse impacts on water will arise.

5.4.32 A drainage system will be designed to ensure that, during operation, run-off is appropriately treated and attenuated prior to discharge and, as a result, no significant residual effects in terms of pollution risk and the capacity of land drains both in the vicinity of the site and further downstream within the catchment are predicted. It is also predicted that compliance with best practice will ensure that minor/no significant impacts will result in relation to water supply, water discharge, surface water drainage, flood risk and the handling and storage activities on the site.

5.4.33 In the light of the above it is concluded that the proposal will not give rise to significant adverse impacts upon the water environment and it is therefore considered to be compliant with current and emerging development plan policy and national planning guidance.
5.5 Landscape and Visual Impact

Background

5.5.1 An assessment of the effects of the proposed development on landscape character, the physical landscape features and the visual amenity of the study area has been carried out. It begins by setting out the methodology used to assess the potential impacts of the proposed increase in the capacity of the Power Station, followed by a description of the existing landscape and visual characteristics of the study area (or baseline conditions). The assessment of the anticipated potential impacts is then presented both with and without mitigation.

5.5.2 The assessment has focussed on the likely landscape and visual effects that would occur in addition to those effects that would otherwise occur from the development of the 430 MW Power Station that currently has s36 consent, which form a part of the baseline against which the assessment is set.

5.5.3 A copy of the report covering “Landscape and Visual Impact Assessment” prepared by Jacobs in February 2008 is contained in the Technical Appendices to this Environmental Statement.

5.5.4 Set out below is a summary of the main points that have been set out in the report.

Policy Context and Relevant Guidance

5.5.5 The Development Plan for the area – consisting of the Regional Spatial Strategy and the saved policies of the Doncaster UDP 1998 - is important to the consideration of landscape and visual effects of the proposed Power Station development. The most potentially relevant policies in terms of landscape and visual impact are as follows:

- RSS Policy N3
- UDP Policy GEN3 – Regeneration Priority Areas
- UDP Policy GEN5 – The Countryside
- UDP Policy ENV4 – Countryside Policy Area
- UDP Policy M15 - Collieries
- Policy SPU1 – Public Utilities
5.5.6 Besides the planning policy for an area set out in the Development Plan, decisions to grant planning permission can, effectively, revise such policies/plans, particularly where the Development Plan is somewhat dated. In this case the recent decisions by DMBC and the resulting developments that are of key relevance are as follows.

5.5.7 The granting of planning permission in 2003 by Doncaster MBC for a Masterplan of regenerative uses for the colliery site, the colliery tips, and land to the south of the railway line. This permission provides for the development of the Hatfield Power Park, including the following: development of a Power Station; development of a Business Park and associated infrastructure; carrying out further colliery spoil disposal; the carrying out of screening, restoration and environmental improvement work; and the continued long-term operation of the colliery.

5.5.8 The proposal that is the subject of this landscape and visual assessment is situated within this area of permitted development and the proposals to increase the capacity of the Power Station must be judged in the context of the landscape and visual change permitted by and now being carried out under the Masterplan permission.

5.5.9 A material consideration in landscape and visual terms is the decision by Doncaster MBC in July 2007 to grant planning permission (subject to a s106 agreement) for a new motorway link road for Stainforth and Hatfield in conjunction with an extension to the Power Park business uses (Phase II) and business development adjacent to J5 of the M18. The link road would provide for direct access to the Power Park and Power Station site. The granting and implementation of this permission will therefore bring about landscape and visual change to the locality of the current proposal.

5.5.10 In terms of the Emerging Development Plan the most significant points of relevance to the landscape and visual considerations are as follows.

5.5.11 A commitment in the Doncaster LDF Core Strategy Preferred Options – 2005 that the Countryside Policy Area (in the eastern half of the borough) will mainly be retained but amended as necessary to accommodate new development allocations. The most notable proposals that are of relevance are:

5.5.12 The development of the Stainforth/Hatfield Motorway Link Road, which would provide access to the Power Park and Power Station

5.5.13 The identification of a Preferred Area of Search for a Strategic Employment Site on land to the south of the Power Park
5.5.14 The designation of Stainforth and Dunscroft as potential growth settlements

5.5.15 These emerging policies give an indication of the potential for future development of a significant scale and the potential therefore for further landscape and visual change in this locality.

5.5.16 The key guidance applicable to landscape and visual impact assessment (LVIA) is the ‘Guidelines for Landscape and Visual Impact Assessment’ (GLVIA) (Landscape Institute & IEMA, 2002). Landscape and Visual Assessment was undertaken in line with this relevant guidance.

**Consideration of the Potential For Impact**

**Background**

5.5.17 The existing landscape has been appraised in order to form a baseline against which an assessment of effect can be made. The baseline includes reference to the local development plan, landscape character assessments held by bodies such as DMBC and Natural England and existing planning consents and planning committee decisions. In addition to this, site visits were made to assess the site and surrounding area, as well as meetings with officers of DMBC to gather information and agree viewpoints.

**Baseline**

5.5.18 The landscape surrounding the site is broadly typical of the area described by the Countryside Agency’s Joint Character Area Assessment, being flat and containing features such as motorway corridors and large structures such as Thorpe Marsh power station, a raised landfill tip and colliery facilities. The area has a degraded character due to the presence of such detractors.

5.5.19 The site is in an area to the north of Doncaster which the assessment identifies as being more enclosed and vegetated unlike the larger scale agricultural areas found elsewhere, with their correspondingly longer views.

5.5.20 The DMBC Landscape Character Assessment describes the area immediately surrounding the site as ‘not highly distinctive’ due to its intrusive and diverse elements and describes the area as “disturbed”. It identifies urban edges to the east, west and south-west and indicates that there are more urban influences on the edge of Stainforth where there are degraded areas. Deep coal mining is a highly evident historic activity, with the views of the former collieries and spoil heaps. The
area is physically divided by many elevated transport routes including railway lines and two motorways which enclose the landscape and cut off views.

5.5.21 The DMBC assessment also states that there is a good public rights of way network and that arable areas to the west are relatively intact. However, it also states that the area does lack a sense of remoteness and tranquillity. As indicated in the Policy section above DMBC have also granted planning permission for a masterplan of new uses on the colliery site and adjacent land and have resolved to grant permission, subject to a s106 agreement, to construct a link road (with associated business uses) through the land to the south of the proposal site.

5.5.22 Assessment takes into account the existing consent for the power station, Power Park phases 1 & 2 and the link road as a baseline and therefore assesses the affects of construction over and above this. Mitigation works, such as screen mounding and woodland planting that formed part of these elements are also considered as part of the baseline.

5.5.23 The surrounding landscape is flat in nature with intermittent vegetation, which leads to an indistinct visual envelope which is difficult to accurately delineate. There is an absence of local high ground affording views over the surrounding landscape and clear long range views are few. Man made features, in the form of built settlement, woodland planting, industrial use, landfill and transportation corridors also serve to restrict views within the surrounding area. The remodelled tip, which now forms screening mounds that line the site boundary, remains visible in the surrounding landscape, but also serves to screen much of the activities and structures within the site.

5.5.24 It has also been found that the landscape within which the site lies is not designated for any landscape quality or value. There are no trees protected by Tree Preservation Orders that would be affected by any of the proposals. There are no historic hedgerows that would be affected by the proposals.

5.5.25 As stated in the methodology, landscape sensitivity is defined as ‘The extent to which a landscape can accept change of a particular type and scale without unacceptable adverse effects on its character.’ (GLVIA Guidelines). The sensitivity of a landscape receptor is therefore based on the character and quality of the landscape and its ability to accommodate change. As has been described, this landscape character area is not highly distinctive, is defined by intrusive and diverse elements and is identified as ‘disturbed’, with a high capacity to accept change. Therefore, the sensitivity to this type of development at this location is low.
Potential Impact on Visual Amenity

5.5.26 As part of the landscape and visual assessment a “visual envelope” for the proposal site and the main “visual receptors” – eleven in number - have been agreed with the Planning Authority. The visual envelope and the consideration of the views from the sensitive receptor site assist in the consideration and assessment of the impact of the larger Power Station development on visual amenity.

5.5.27 Set out below is a summary of the predicted effects of the proposed 900 MW Power Station on visual amenity, using winter views, having regard to the impact during construction – without any screen planting, the impact when operational – with some mitigation through establishing screen planting, and, residual impact – with mitigation from screen planting 15 years after construction.

Construction Period

5.5.28 From 1 viewpoint there would be major adverse visual effects. From 6 viewpoints there would be moderate adverse visual effects. From 4 viewpoints there would be minor adverse effects.

5.5.29 Much of the impact would result from the presence of cranes and the construction work at higher levels. Some mitigation could be achieved through screen/earth mounding.

Operational

5.5.30 Removal of cranes along with the reduction in construction traffic would reduce the visual effects on visual receptors.

5.5.31 Mitigation of impact on the sensitive receptors can be achieved through plume suppression, careful siting of structures, use of suitably coloured building cladding and the use of screening earthworks. The resultant impact would be as follows. At 2 viewpoints there would be major adverse visual effects. At 5 viewpoints there would be moderate adverse visual effects. At 4 viewpoints there would be minor adverse visual effects.

Residual Effects, fifteen years after construction

5.5.32 Residual visual effects are the result of views of the development that would be possible fifteen years after the construction period, meaning that the planting would have had time to mature. The location of the scheme and likely soil conditions, high planting specification and landscape management have been taken into account when predicting the growth rate of planting. Residual effects also take into account
the growth of other non-mitigation vegetation within the view that might also mature and grow.

5.5.33 With mitigation to screen views of the development, fifteen years after completion of construction, there would be 2 viewpoints with major adverse visual effect. There would be 2 viewpoints with moderate adverse visual effects. There would be minor adverse visual effects to 3 viewpoints.

**Visual amenity**

5.5.34 Within close proximity to the site, views would be relatively restricted due to screen mounding and even more significantly after the growth of planned and proposed woodland planting.

5.5.35 The visual envelope within the surrounding area is often fragmented due to flat landscape with intermittent vegetation. Views of the development within the surrounding area would tend to be filtered by vegetation and viewers travelling within the surrounding area would be unlikely to be exposed to a consistent view of the power station. Most open or direct views would be within the immediate surrounding area to the north and to the west as far as Fishlake and Barnby Dun, though there are relatively few visual receptors within these areas. The view from major adverse from Fishlake would be from the Thorne Round Walk at its southern edge, due to the open view and contrast with horizontal horizon. The view from Barnby Dun is variable and largely dependant upon intervening woodland.

5.5.36 Long distance views of the power station would also be possible due to its height. The assessment of these views is difficult due to the vegetated nature of the surrounding landscape. No views were identified as a cause for concern by DMBC officers. Though longer range views would be possible, they would also be viewed in the context of a significant number of detractors within the surrounding area, such as Thorpe Marsh, colliery spoil heaps, motorways and embankments, pylons etc.

**Potential Impact on Landscape Elements**

5.5.37 The proposed power station occupies largely the same site as the consented one and therefore impacts upon landscape elements are limited to the extension area to the east, which is currently an un-restored spoil heap with regenerated scrub vegetation and a lack of soil structure.

**Construction Period**

5.5.38 Construction of the Power Station would involve the partial removal of part of the existing eastern spoil tip. This would not be obvious within the surrounding landscape but would constitute a minor beneficial effect. There would be minor
adverse effects to landscape pattern due to an enlargement of the Power Station and to vegetation due to the some minor removal in the construction of the eastern plant area.

**Operational**

5.5.39 The operational phase of the power station would result in the same moderate beneficial effect due to the removal of spoil and restoration of the spoil heap, a minor beneficial effect due to the immature planting of woodland around the eastern plant area and a continued minor adverse effect to landscape pattern due to the presence of the enlarged of the Power Station.

**ResidualEffects, 15 years after construction**

5.5.40 At fifteen years following the completion of construction works there would remain a moderate beneficial effect due to the removal of spoil and the minor adverse effect to landscape pattern due to the extension of the Power Station, but there would be a moderate beneficial effect due to the maturing woodland planting.

**Potential Impact on Wider Landscape Character**

**Construction Period**

5.5.41 Taking into account the benefit of mitigation in the form of screen mounding and the careful siting of structures, the magnitude of landscape change would be moderate with a corresponding minor adverse effect upon landscape character over and above that of the existing s36 consent for a 430 MW Power Station.

**Operational**

5.5.42 Taking into account the benefit of mitigation in the form of plume suppression, careful plant siting, screen mounding and colouring the magnitude of landscape change would be relatively moderate with a corresponding moderate to minor adverse effect upon landscape character over and above that of the existing s36 consent.

**Residual Effects, fifteen years after construction**

5.5.43 Taking into account the benefit of mitigation in the form of plume suppression, careful plant siting, screen mounding and colouring and the additional benefit of woodland growth 15 following construction, the magnitude of change would be relatively moderate with a corresponding minor adverse effect upon landscape character over and above that of the existing s36 consent.
5.5.44 It is likely that there would be longer range views possible but these would be unlikely to be significantly adverse or alter the character of surrounding areas.

5.5.45 The development is not likely to cause a major adverse effect on landscape character due to its fragmented and diverse character which has a high capacity for accommodating change, combined with the relatively well vegetated nature of the surrounding landscape, as well as man-made elements such as motorways, spoil heaps and built development, which serve to filter and disrupt views.

**Consideration of Potential Mitigation**

5.5.46 Mitigation included the previous s36 consent, such as screen mounding and woodland planting have been taken into account as part of the baseline for this assessment as they have already been considered.

5.5.47 The process of determining mitigation was an iterative process with design taking place at the same time as the assessment process. Results of the assessment such as potential visibility could therefore be fed back into design changes.

5.5.48 Mitigation specific to new proposal include:

- Earthworks and Screen Mounding of the eastern extension area,
- Grassland seeding and woodland planting of native species in order to screen views and provide wildlife habitat,
- Siting and massing of buildings and structures to group them together and decrease their visible form,
- Cladding of structures in goose-wing grey to reduce their visibility when viewed against the sky, and
- Plume suppression, to decrease visibility of the cooling tower plume to only cold and wet days, which would greatly decrease the visibility of the power station from the surrounding landscape.

5.5.49 The assessment has taken into account the effects of the proposed power station both with and without mitigation, and demonstrates the effect of mitigation in terms of reducing many, what would have otherwise been, major adverse effects.
Conclusions

5.5.50 DMBC’s Landscape Character Assessment 2006 gives advice on the assessment of the capacity of landscapes to undergo change and guidelines for development of certain types. There is no category for a power station such as the one proposed, but there are for a range of other developments such as land raising, employment, housing, mineral extraction etc. For different forms of development there is common advice to ensure appropriate development. This is where:

- The existing urban edges or the adjacent landscape are not distinctive, are fragmented or in poor condition,
- Visual impacts would be lower due to the presence of screening, with minor changes in view compared to existing views or a limited numbers of sensitive viewers,
- The development would have limited impacts on recreational users or designated landscapes,
- Existing major busy roads could be used for access without the need for upgrading other roads, and
- The development would fit with existing large scale landscape elements and pattern.

5.5.51 The proposed development satisfies these requirements as follows;

5.5.52 The proposed power station is in an area identified by DMBC’s Landscape Character Assessment as ‘not highly distinctive’. It is diverse and degraded by multiple detractors within the landscape, and has undergone much recent change and is planned to go through more, recognising its capacity to accept change.

5.5.53 The proposed power station is larger in scale, which increases its visibility, but the local landscape character area also has few sensitive visual receptors and is recognised as being relatively well vegetated, which serves to disrupt and filter views. The site also already benefits from the screening effect of restored spoil heaps and the adjacent landfill site.

5.5.54 The proposals would not physically affect any designated landscapes, or cause significant harm to the character of, or compromise the objectives of designation of, designated landscapes in the surrounding area. The construction of the power station would have a limited effect on a recreational bridleway through its temporary closure during construction, but would result in permanent improvements.
5.5.55 The application site is situated within a wider context of large scale landscape elements. These include the former power station at Thorpe Marsh, Industrial units such as the IKEA distribution centre, the M18, M180 Junction 5 and the MSA, colliery spoil heaps, the landfill site, pylon lines etc. The power station would be visible from locations within the surrounding landscape, but it would be visible within this surrounding context.

5.5.56 The acceptability of a power station at this site has been demonstrated by the existing s36 consent. However, this assessment addresses the effect of an enlarged power station over an above the effects of the currently s36 consent which were deemed acceptable. It has identified that there would be adverse visual effects, but these would be moderate, with only relatively short sections of a long distance path affected to a major degree. There would also be minor adverse effects to landscape elements due to the extension of the plant site into the eastern tip area, but this would also bring about moderate benefit through its restoration and planting. There would be adverse effects to the landscape character of the surrounding area, which would be moderate to minor due to the low sensitivity of the area to this type of development, and no landscape designations would be significantly adversely affected.
6 REVIEW OF OTHER POTENTIAL EFFECTS

6.1 Introduction

6.1.1 Set out below is a summary review of other potential areas of impact that were not identified as potentially the most significant effects of increasing the capacity and changing the design of the Power Station. These matters have all been the subject of past consideration in the determination of the Power Park Masterplan and 430 MW Power Station proposals and the determination of the proposals for the motorway link road and associated business development. They are matters that have already recently been the subject of EIA.

6.2 Review of Power Station Traffic

Background

6.2.1 The existing s36 consent for a 430 MW Coal IGCC Power Station was granted permission in 2003. As part of the Environmental Statement that accompanied the s36 application a Traffic Impact Assessment (TIA) was included in the information package. Following negotiations with the Highway Authority (DMBC) further traffic information was submitted in September 2002 following which a decision was made by DMBC to grant planning permission for the Masterplan for the Power Park and to support the granting of s36 consent for the Power Station.

6.2.2 In reaching the decision the Highway Authority was mindful of the proposal contained in the Doncaster Unitary Development Plan (UDP) for a new (Stainforth/Hatfield) motorway link road, which has the potential to be directly connected to the Power Park site, including the Power Station. In the period leading up to the delivery and opening of the link road it was agreed that both construction and operational traffic associated with the 430 MW Power Station could be routed to and from the site via the local highway network in the vicinity of the site.

6.2.3 The subsequent planning permission and s36, along with the associated s106 agreement, included controls over HGV and construction traffic, including that associated with the Power Station.

TIA - Existing Masterplan Permission and S36 Consent

6.2.4 One of the key findings of the original TIA is that, although it is preferable to route Power Park Colliery and Power Station traffic via the motorway network and a new link road, the local highway network is not heavily trafficked at present. The local
network has accommodated significant flows of colliery HGV’s in the past and therefore has capacity to accommodate the proposed development traffic. There would though be impacts on local communities.

6.2.5 The TIA considered the traffic generation from each element of the Power Park Masterplan, including the Power Station. Particular emphasis was placed upon vehicle movements during the peak hours. In regard to Power Station traffic the main findings are quoted as follows:

6.2.6 “During the construction and commissioning period (18 months to 2 years) it is estimated that the site could employ up to 500 construction workers. 10% of workers would be administrative and supervisory staff working office hours. Most of the remaining workers are likely to arrive before 0800 before the start of the local road network traffic peak. Many construction workers are likely to choose to reside on site. It has, therefore, been assumed that a further 10% of the workers will also arrive during the peak. In the local road network PM peak, it is assumed that 40% of the construction workers will depart. Car occupancy rate for the workers has been assumed to be 1.2 persons per vehicle. Opposing flows of 10% have been assumed.

6.2.7 Deliveries of materials and equipment will also be made. 10 vehicles/hour have been allowed for in the AM peak and 5 vehicles/hour in the PM peak in each direction. It is planned that the construction phase would be complete by 2005.

6.2.8 During operation, the power plant will employ approximately 94 permanent staff. These employees will operate in three shifts so that at any one time it is likely that there will be up to 70 staff on site. A typical shift pattern is 0600 to 1400, 1400 to 2200 and 2200 to 0600. None of the shifts are likely to result in power plant workers commuting during the local network peak hours. In addition, a smaller number of engineers and managers would work a standard 0900-1700 day. 15 car trips in the predominant direction of flow and 3 car trips, in the opposing direction, have been allowed for in peak hours.

6.2.9 Slag and Sulphur would be by-products of the power generation process. Slag can be marketed for use by the construction industry, however, off-specification slag and other waste by-products would require off-site disposal. The power station would produce up to 150,000 tonnes/annum of slag and 24,000-tonnes/annum sulphur.

6.2.10 Assuming 20 tonne lorries operating 250 day/year, then 35 lorry trips would be generated per day. Evenly distributed over a 12-hour working day, then the flow during peak hours would be 3 vehicles per hour in each direction.
6.2.11 Visitors, services and supplies will also generate additional power plant related traffic. For the purpose of this assessment an additional 3 HGV trips and 3 car trips have been allowed for in the peak hours.

6.2.12 The site has the potential to accommodate further IGCC units at a later date.

Table 6.1 IGCC Power Plant Construction Traffic Generation

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<th>AM Peak</th>
<th>PM Peak</th>
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Table 6.2 IGCC Power Plant Operation Traffic Generation

<table>
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<tr>
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<th>AM Peak</th>
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<tbody>
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<td>Deliveries/ HGV</td>
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</tr>
<tr>
<td><strong>Total Vehicles (inc. HGV)</strong></td>
<td><strong>24 (6)</strong></td>
<td><strong>12 (6)</strong></td>
</tr>
</tbody>
</table>
Conditions and Controls - Existing Masterplan Permission and S36 Consent

6.2.13 Taking account of the capacity and nature of the local highway network, and the obvious concern over potential impacts on local communities, the following controls have been imposed.

Planning Permission

6.2.14 The Masterplan Planning Permission 02/1402/P/FULA contains conditions that cover:

- Opening of a new vehicular access to the Power Park site – Waggons Way
- The closure, after 3 years, of the original Colliery Access
- A potential HGV access onto Kirton Lane for colliery exports, subject to the agreement of details, including wheel cleansing facilities
- Control over mud and dust on the highway
- Limiting road borne exports of coal and colliery spoil to 250,000 tonnes per annum
- Limiting daily colliery exports to 110 vehicles per day and no more than 10 per hour
- Control over daily hours of operation for colliery exports

6.2.15 (N.B. At present all coal is exported by rail for Power Station use and with the development of the proposed Power Station on the Power Park a significant proportion of coal would be used in on-site gasification and energy generation)

S36 Consent

6.2.16 The s36 consent for the 430 MW coal IGCC contains conditions that cover:

- Sheeting of HGV’s
- Carrying out road cleansing
- Restriction on the times of construction work
6.2.17 The s106 entered into by the Power Park owners as part of the decisions to grant planning permission for the Power Park and s36 consent for the Power Station includes clauses that cover:

**HGV Management**

6.2.18 The HGV Management Plan includes:

- Limiting coal and spoil exports annually and daily
- Limiting daily hours of coal/spoil export
- Limiting colliery traffic to the Waggons Way access
- Undertaking an annual review of traffic management taking account of: performance of Waggons Way access; general highway issues; future development on the site; conditions on the highway network; and, development of the motorway link road
- HGV routeing and implementation of a Traffic Routeing Plan – TRP
- Agreement of access arrangements for construction traffic, including the use of the original colliery access road
- All contractors to comply with TRP
- Erection of site notices to confirm routes under TRP
- Appointment of transport manager
- Liaison with Town Council’s over TRP
- Restrictions on HGV flows to avoid convoys
- Monitoring HGV flows and routes
- Arrangements for exceptional loads and specific contracts
- Speed restrictions for HGV’s
- HGV sheeting and cleansing of roads
- Employment of traffic management measurements at any problem points on the network
• Convening of a twice yearly Liaison Committee

Green Travel

6.2.19 For the owners and developers to agree a green travel plan for the site, including:

• Promoting Public Transport usage
• Measures to reduce car usage
• Facilitating walking and cycling
• Improvements to access to the railway station
• Improvements to rights of way

Traffic Generation of the Proposed 900 MW Power Station

6.2.20 As referred to in the Description of the Development section set out earlier in this Environmental Statement, the development of the Power Station will take place in two phases. Firstly, the Power Island would be developed and the initial start up would be fuelled with natural gas. Following the commissioning and start up of the Combined Cycle Gas Turbines (CCGT) the Coal Integrated Gasification Combined Cycle (IGCC) plant would be constructed and commissioned.

6.2.21 In broad terms the phasing and timescales would be:

• Construction and commissioning of the CCGT – 2 years
• Construction and commissioning of the Coal IGCC – 3 plus years

Construction

6.2.22 For the first two years of the development, planned for 2009-2011 – the construction traffic for the construction and commissioning of the Power Island would be lighter than that predicted for the 430 MW coal IGCC as set out in the original TIA further information (set out above). The Power Island is a significantly less complex development than the coal IGCC, involving a small number of very large equipment items rather than a mix of small and large steel structures, pipe racks, etc. It is estimated that the construction traffic from this two year phase of development would be approximately 50% less than that predicted in the original traffic assessment.
6.2.23 The construction of the larger coal IGCC is planned to follow on from commissioning of the Power Island and would run from 2010-2013. In overall terms this phase of construction is anticipated to generate approximately 50% more traffic in total than that originally predicted in the traffic assessment referred to above. This would though be spread over a 3 plus year time period rather than the originally planned/assessed 18 months to 2 year period for the 430 MW coal IGCC. In broad terms it is anticipated that the flows of vehicles would be of a similar level to that predicted in the September 2002, but lasting for an additional year.

Operation

6.2.24 The operation of the Power Island, planned for 2011, will result in operational vehicle movements that would be less than those predicted for the 430MW coal IGCC. The staffing levels would be somewhat lower and there would be less in the way of operational HGV movements as there will be no slag or sulphur production and export. In terms of imports there would only be modest imports of caustic soda and hydrochloric acid.

6.2.25 Once the coal IGCC has been developed and commissioned, and the Power Station brought into full operation – 2013 and beyond, it is envisaged that the vehicle movements would generally be higher than those predicted for the 430MW coal IGCC, simply due to the increased size of the Power Station, although changes in design and improved efficiency can keep potential increases down.

6.2.26 The 430 MW Power Station was envisaged to produce up to 150,000 tonnes/annum of slag and 24,000-tonnes/annum sulphur a total of around 175,000 tonnes of material to be exported off site per year. The proposed 900 MW Power Station when completed will produce of the order of 125,000 tonnes of slag and approximately 42,000 tonnes of sulphur per annum. Therefore the material exports will be of a similar order. The imports for water treatment and chemicals will be greater in volume for the larger proposed Power Station. These would broadly involve the following:

- Limestone 70,000 tonnes per annum
- Caustic soda 60,000 tonnes per annum
- Hydrochloric acid 17,000 tonnes per annum

6.2.27 The numbers of movements related to the imports can be reduced simply by bringing material in using bigger loads.

6.2.28 In terms of workforce, this is envisaged to be higher than that predicted for the 430 MW permitted plant. For the 430 MW plant a total workforce of 94 was estimated.
For the proposed 900 MW plant a total workforce of around 150 is estimated. As for the original plant, around 75% of the workforce would be on site at any one time, based on the predicted shift pattern, which would not involve arrivals and departures during the peak hours. The previous TIA predicted – for a workforce of 94 – peak hour movements of 15 car trips in the predominant direction and 3 car trips in the opposing direction. Applying similar ratios a typical shift workforce would be 112 - again with movements outside of the peak hours. The peak hour movements are therefore predicted at 24 car trips in the predominant direction and 5 car trips in the opposing direction.

6.2.29 It is relevant though to give consideration to the potential mitigation of Power Station traffic having regard to timescales for plant commissioning and the routeing of traffic. These points are dealt with below.

Traffic/HGV Impact and Mitigation

Construction

6.2.30 During the construction of the Power Island in the first 2 years phase of the development the construction traffic would be less than that predicted for the permitted 430 MW Power Station. The construction work is programmed to commence in 2009 and will therefore be routed to the site via the existing local highway network in the manner previously envisaged.

6.2.31 In terms of mitigation of this first phase construction traffic and given the findings of the original TIA it would be appropriate if the mitigation and specifically the HGV management accorded with the requirements as set out in the existing Masterplan permission, the s36 consent and the s106 agreement. The same controls could be imposed and agreed for the current proposals as part of the granting of s36 consent.

6.2.32 A specific point that has been discussed recently with the Planning and Highway Authority – DMBC – under the auspices of the review required by the existing s106 agreement, is the potential use for construction traffic of both the new Power Park access via Waggons Way and the original colliery access. Since the opening of the Waggons Way access in late 2007 the original colliery access has been stopped up and it’s alignment within the Power Park adjusted for future usage as one of the green travel routes into the Power Park site. In discussion with DMBC it was acknowledged that it is potentially beneficial to split the construction traffic between the 2 access points – with the old colliery access potentially functioning as an access to the site only, prior to the new motorway link road being built and opened.
In this regard, and whilst there are currently constraints on re-opening the original colliery access as a result of the carrying out of engineering works for cable re-routeing - Powerfuel propose to re-open this access for construction traffic prior to the commencement of the first phase Power Station construction work programmed for Spring 2009. Therefore, this measure can be made the subject of either planning conditions or requirements of a legal agreement, which would include the submission and approval of detailed designs of the access to secure improvements being sought by the Highway Authority.

6.2.33 In terms of the second phase of construction of the coal IGCC elements of the Power Station from potentially 2010 onwards, there will be higher movements of construction traffic and a larger construction workforce. To a large degree the impact of this work, which is estimated to last approximately 3 plus years, can be mitigated through the measures provided for in the existing permission, consent and agreement and, as with the first phase works, are capable of being made requirements of the s36 consent and any associated agreements. The level of impact and the extent to which and the way in which the mitigation measures are applied is potentially affected, in combination, by the following:

- Firstly, the exact date and timing of the phase 2 construction works
- Secondly, the date and timing of the construction and the opening of the motorway link road

6.2.34 There is the potential for at least part of the construction period that the link road would be available for the routeing and access of Power Park traffic, thus avoiding local communities. The HGV Management Plan can therefore be adjusted to take account of such circumstances.

**Operation**

6.2.35 During the initial period of operation, potentially 2011 to 2013 the Power Station will give rise to a lower level of operational traffic than that estimated for the consented 430 MW station. Once coal IGCC elements are commissioned and operational from 2013 onwards the level of traffic movement is somewhat higher than that assessed for the 430 MW station.

6.2.36 In terms of mitigation the biggest potential beneficial effect is the opening of the new motorway link road for which planning permission is anticipated in the first part of 2008. Work on the delivery of the link road, including agreements with the Highways Agency, detailed design work, land acquisition and funding are all progressing. The road is anticipated as having a 2 years construction period. There is therefore a reasonable prospect in the light of the planning policy support and the resolution of
DMBC to grant planning permission for the link road to become available early in the operation of the proposed 900 MW Power Station.

6.2.37 In the event of unforeseen delay in the opening of the new link road the level of traffic movement following construction and commissioning of the Power Station is not of itself a significant/major volume of daily traffic and most of the traffic movements – both workforce and HGV’s – take place outside of the peak hours. Prior to opening of the link road the daily operational HGV traffic would need to be routed on the best available routes on the local highway network, but this network currently has capacity, and is not experiencing the daily movements of coal HGVs that have taken place in the past or the level of workforce movements compared to when the colliery employed a much larger workforce. In order though to keep impacts on local communities to a minimum and in the event of delays in delivering the link road, the HGV and traffic management measures required under the existing permissions and agreements would have to be maintained and consideration given to additional routes and access points as referred to in the s106 agreement.

6.2.38 Powerfuel are though making all efforts with the relevant bodies and agencies, as well as with other land owners and developers, to ensure the early delivery of the link road, which is important to the regeneration of this area.

Conclusions

6.2.39 In the light of the phasing of construction and the predicted vehicle flows, in combination with the implementation of the required and proposed mitigation, it is considered that the impacts of construction traffic can be kept to acceptable levels.

6.2.40 During the early stages of Power Station operation the impact of daily traffic will be less than that predicted for the existing 430 MW Power Station consented development. The development of the larger coal IGCC will in due course increase the levels of daily traffic, but there is a good prospect that the impact of this traffic will be minimal with the opening of the new motorway link road. In the event of delays with the opening of the link road, there is sufficient traffic mitigation and routing/management measures that can be employed to minimize the impact on local communities, particularly as the vehicle flows will be predictable and regular, with most movements outside the peak hours.
6.3 Archaeology

6.3.1 The original proposals (2002) for the masterplan for the Power Park and the s36 proposal for the 430 MW power station included archaeological assessment of the whole masterplan site – which subsumes the current s36 application area. This resulted in the imposition of planning conditions concerning further archaeological work on the undeveloped farm land to the north of the colliery and the recording of old colliery structures and building before demolition. Prior to the carrying out of the civil engineering works and internal spoil movements for the Power Park and Power Station the further archaeological work produced no findings. Recording has been carried out of a number of colliery buildings prior to their demolition.

6.3.2 The previous assessment and subsequent archaeological field work on undisturbed areas has demonstrated that the Power Station site, which consists of an area of colliery spoil tip – currently being excavated, has little or no potential for containing archaeological remains.

6.4 Local Ecology and Nature Conservation

6.4.1 The original proposals (2002) for the masterplan for the Power Park and the s36 proposal for the 430 MW Power Station (which covers the current s36 application site) included two ecological reports dealing with protected species and habitats of potential interest. A bat survey was also carried out in 2002. No significant impacts were identified subject to the imposition of planning conditions. The main area of control relates to water vole habitats on the site. In 2006 a further site assessment was carried out and confirmed that there had been no significant changes in circumstance. During 2007 various submissions were made to the LPA and then works undertaken to provide replacement water vole habitats and to then translocate water voles prior to the carrying out of the current civil engineering and internal spoil movements for the Power Park and Power Station areas.

6.4.2 The ecological/nature conservation survey and assessment work has not indicated any specific interest within or on the colliery tip material that occupies the Power Station site. The main interest relates to water vole habitats in a number of the drains on the colliery site and mitigation work has been carried out. The spoil excavation and earthworks are therefore already progressing within the masterplan site, including the excavation of the Power Station area.
6.5 **Flood Risk**

6.5.1 The application (2004) for a new link road off the M18/M180, along with proposals for phase II of the Power Park (which covers the current s36 application site) included, as part of the ES further information – submitted under regulation 19 of the EIA regulations, flood risk assessment reports. These, in turn, resulted in the Environment Agency (EA) removing their holding objection. The LPA, in resolving to grant permission for the development determined that the permission should include planning conditions requiring flood mitigation measures for the road construction and MSA development located to the south of the railway and that the s106 agreement should include a requirement for the applicants to supply, if needed, colliery spoil from the Power Park and Power Station site to be used in work by the EA to improve the flood defences along the River Don in the vicinity of Stainforth.

6.5.2 As a consequence of the past spoil tipping and the raised landform on the colliery/Power Park site there is little evidence from the flood risk assessments that the Power Station site is likely to flood. The wider concern for this locality is the need for remedial work to the River Don flood defences and in this regard it should be noted that there are significant volumes of colliery spoil available to assist with this work and that Powerfuel have made a commitment, which will be embodied in a s106 agreement (currently under preparation), to supply such material for these works.

**Surface Water Drainage**

6.5.3 The original proposals (2002) for the masterplan for the Power Park and the s36 proposal for the 430 MW Power Station included a desktop assessment of the potential surface water drainage impact from the development. No objections were received from either the EA or the Internal Drainage Board and the LPA subsequently imposed conditions requiring surface water details to be agreed in advance of development.

6.5.4 Given that the Power Station site in this application is similarly located within the masterplan site there are unlikely to be issues over surface water impact and planning conditions can be imposed to control and mitigate and potential impacts.

6.6 **Local Amenity**

6.6.1 The original proposals (2002) for the masterplan for the Power Park and the s36 proposal for the 430 MW Power Station and the application (2004) for a new link
road off the M18/M180, along with proposals for phase II of the Power Park (which both cover the current s36 application site) included assessments relating to construction noise and dust. These have led to the imposition of conditions relating to the control of these potential sources of nuisance. The applicants/developers have submitted both noise and dust action plans, which the Council’s Environmental Health Officers have accepted. The various measures and controls are currently being implemented as part of the civil engineering, spoil excavation and site screening works.

6.6.2 The Power Station site is well screened from the main residential areas and whilst there is the potential for construction work to give rise to nuisance to local residents, the implementation of noise and dust action plans should ensure that the temporary impacts are kept to a minimum.

6.7 Public Rights of Way

**Existing Rights of Way Situation**

6.7.1 The s36 application site – shown with a red line boundary on drawings PPL/HPL/S36/004 and 005 – is crossed by two public rights of way, whose routes are confirmed by the Doncaster MBC “Definitive Map” of public rights of way. The Definitive Map confirms the existence of the following:

- Bridleway No 4 – the diverted route of Bootham Lane through the Hatfield Colliery site.
- Bridleway No 5 – the route of Hugh Hill Lane through the Hatfield Colliery site.

6.7.2 The routes of these two bridleways through the site are shown on the Proposed Power Station Development Layout drawing PPL/HPL/S36/005. This drawing also shows Bridleway No 3 which lies outside of the application site but connects to Bridleway No 4 at the southern boundary of the site.

6.7.3 Bridleway No 4 runs parallel with and adjacent to the Power Station site and the existing railway line for a distance of approximately 450 metres. It then turns northwards and joins Bridleway No 5 – Hugh Hill Lane – approximately 140 metres to the north of the railway line.

6.7.4 Bridleway No 5 – Hugh Hill Lane – runs through the application site in a southerly direction from Kirton Lane (which is at the northern boundary of the application site), between the 2 colliery spoil tips, to its junction with Bridleway No 4, where it then
heads in an easterly direction before crossing the railway line via an over bridge. It then heads towards Hatfield in a south-easterly and then southerly direction.

**Current Planning Position and Rights of Way**

6.7.5 As can be seen from drawing No. PPL/HPL/S36/003 (A and B) there is a considerable amount of development already permitted and taking place on the application site, including: mining development; environmental improvements/screening; civil engineering works and infrastructure; the Power Park employment development; and, the development of a Power Station. A masterplan of such uses and operations was granted planning permission in 2003 – the key components of which are shown on drawing PPL/HPL/S36/003 (A and B).

6.7.6 In resolving to grant planning permission the Planning Authority received no objection from the Council’s Rights of Way Team, subject to the imposition of planning controls. As a consequence 4 planning conditions and 3 clauses of a s106 agreement apply to the development of the site under the masterplan permission. These cover the following matters:

- Keeping all rights of way free from obstruction.
- Segregating rights of way users from vehicles using haul routes in accordance with a scheme of details to also include surfacing, fencing and planting.
- The provision of recreational routes in restored areas.
- The provision of pedestrian and cycle routes into the Power Park employment site via Bootham Lane and Hugh Hill Lane in accordance with a scheme of details.
- The installation of access controls/barriers along the Bootham Lane bridleway (No3) between the landfill site and the Power Park.
- Improvements to Hugh Hill Lane if a new vehicular access is formed onto Kirton Lane.

**The Proposed Development, its Potential Effects on Rights of Way and Mitigation**

6.7.7 In simple terms the current Power Station proposal has a similar level of potential to impact on the two bridleways as that which is currently permitted and is therefore capable of being controlled through the imposition of planning controls/conditions. More specifically the following points have been taken into account.
6.7.8 Bridleway no 4 is immediately adjacent to the proposed surfaced haul road running along the southern edge of the Power Station and there is the potential for some conflict between bridleway users and the HGVs that will use this route. Although the flow of HGVs is likely to be relatively low – x10 per day average - it is considered appropriate to carry out the following mitigation, which can be made the subject of planning conditions:

- Ensuring an adequate width for the hard surfaced haul road – 7.5 – 8.0 metres width.
- Ensuring an adequate width to the bridleway – minimum of 3 metres width.
- Separation of the haul road from the bridleway through erection of suitable fencing.
- Erection of direction signs on the bridleway.
- Surfacing of the bridleway with a suitable hard, loose, free draining surface material.

6.7.9 During construction of the Power Station there will be periods when large items of plant are installed and/or major earthworks carried out. During these periods it may be necessary to temporarily close both bridleways no 4 and 5. In such situations the developer would apply to the Council's Rights of Way Team through the normal channels. It may be possible in this instances to seek a temporary diversion and the developer again would pursue this with the Council under the appropriate highways legislation.

6.7.10 As the proposal entails the siting of part of the Power Station development on the eastern side of bridleway no 5 – Hugh Hill Lane – it will be necessary for vehicles to cross from the main Power Station site to this area both during construction and once operational. In this regard it should be noted that there is a vehicular overbridge crossing over Hugh Hill Lane that is used by colliery tip traffic. This has the potential to be utilised for cars and vans and therefore some of this traffic can be segregated from rights of way users. For larger items of plant and major earthworks it is more likely that an at-grade crossing will be needed and the following mitigation will be employed:

- Construction of a hard surfaced crossing point for construction vehicles to cross Hugh Hill Lane
- Erection of warning and directional signs for users of the bridleway.
- Erection of warning signs and speed signs for construction traffic
6.7.11 At times when major plant items have to be installed or earthworks undertaken a temporary closure will be sought via the Council’s Rights of Way Team. In doing so consideration will be given to the provision of a temporary diversion route if this is practically possible. If considered appropriate a temporary diversion will be pursued through the highways legislation.

6.7.12 Once the eastern area is commissioned pipelines will connect this area of plant to the main site probably via the over bridge. The site will also be fenced off with security fencing. Any day to day traffic will use the over bridge to access and egress the site. Therefore once operational there should be minimal potential for conflict with users of the Hugh Hill Lane bridleway.

6.7.13 As noted from the drawings, Hugh Hill Lane continues via a railway over bridge to head southwards beyond the railway line. For a short section to the north of the over bridge and across the bridge itself there is some potential for conflict between colliery spoil traffic – approximately 10 HGV’s per day – and users of the bridleway. This is not strictly a matter related to this s36 application for the larger Power Station. Nonetheless it is proposed to ensure through this proposal and the construction of the haul road that any impact can be mitigated and to this end the developer is proposing to erect signs warning both HGV drivers and users of the bridleway of each other’s movements, also to carry out any necessary improvements to the surface and the drainage of Hugh Hill Lane. Instructions will also be given to all drivers to give priority to bridleway users and also to keep vehicle speeds low.

6.7.14 In overall terms it is considered that users of the two bridleways can be adequately protected during the construction period. As part of the carrying out of the Power Station development as well as the development of the Power Park more generally, these bridleways, that run through an industrial type site can be properly improved and signed such that users can safely travel along these routes. In this regard the proposals include the mitigation works set out above and such proposals can be embodied into planning conditions.

6.8 Socio-Economic Considerations

6.8.1 The original proposals (2002) for the masterplan for the Power Park and the s36 proposal for the 430 MW Power Station and the application (2004) for a new link road off the M18/M180, along with proposals for phase II of the Power Park, included assessment of the socio-economic impact of the overall development. These assessments have concluded that there are significant regenerative benefits to be gained for the Stainforth, Hatfield and Dunscliff areas as a consequence of
the Power Park development. The development of the Power Station in combination with the colliery operations and immediately adjacent employment site present an opportunity for the development of a new business cluster in the M18 corridor, which is a target area for regeneration and economic growth both for Doncaster Borough and also the Yorkshire and Humber region.
7 BEST AVAILABLE TECHNIQUES (BAT)

7.1 Introduction

7.1.1 In order to operate the new IGCC Plant, a permit under the Pollution Prevention and Control (PPC) Regulations will be required (implementing the European Integrated Pollution Prevention and Control (IPPC) Directive). The application for a permit will be required to be made to the Environment Agency (the Agency), and the application will require the project to demonstrate that Best Available Techniques (BAT) have been used in the design of the facilities (and will be used in their operation).

7.1.2 This section considers the operation of the proposed development as a natural gas fired power station (combined cycle gas turbine, or CCGT), and an integrated gasification combined cycle (IGCC) coal fired power station. The current project plan is to construct the CCGT element first, and then follow up with the IGCC. This essentially means that the gas turbines selected for the development must be capable of operating on both natural gas and synthesis gas from the IGCC. The implications of this are discussed in the document.

7.1.3 The IGCC element of the project would provide the ability to apply Capture Carbon and Storage (CCS) and therefore lead to a ‘clean coal’ power station. The IGCC Power Station is uniquely situated adjacent to Hatfield colliery and therefore has a secure supply of domestic fuel. Building the IGCC power station would help to consolidate the investment made in reopening the colliery as there would be a guaranteed demand for the coal.

7.1.4 The carbon capture element of the project would require infrastructure to be in place in order to transport the captured carbon to the North Sea, where it could be injected into geological structures for long term storage. The Yorkshire and Humber region, with 8,000MW of coal fired generating capacity in place, is an ideal location in the UK for the necessary pipeline infrastructure to be built.

7.1.5 The cost of the necessary infrastructure is indicated, from the Yorkshire Forward Study, to deliver a very low logistics cost per tonne of carbon. In order for this to go ahead however, there needs to be a stable pricing structure in place which recognises the true environmental costs of carbon emissions. A sustained carbon price in the region of Euro45/tonne would be necessary to justify the necessary investment in both the CCS infrastructure and IGCC element of the scheme. Political will at both the European and UK level will be required to see this happen, including a conducive regulatory framework, but given the stated desire of governments to significantly reduce carbon emissions, then it is considered likely
that policies will be put in place to achieve this. One such mechanism would be Phase 3 of the EU Emissions Trading Scheme (ETS), which is due to be implemented from 1st January 2013 and has been declared as a 100% auction phase. This will have a significant impact in bringing carbon into play as a major influencing factor on power station economics.

7.2 Background

Timing and Scope of the PPC Permit

7.2.1 The Agency will need to have issued a permit for the operation of the facilities in advance of their ‘beneficial operation’. However, it is normal practice to ensure that the permit is issued prior to commissioning of the facilities. At the time of writing, this is taken to be approximately 2011 for the CCGT station. Whilst the statutory period for determining a PPC permit application is 4 months, in practice, it often takes much longer than this. It is considered prudent to allow at least 12 months for the determination of the permit application which would indicate that the permit application should be made by the end of 2010.

7.2.2 The PPC permit covers the operation of the facilities, which includes both the equipment to be installed and how it is operated. The permit could therefore be designed to cover the operation of the installation as a CCGT station and an IGCC station, provided sufficient information was available at the time of the application for a permit. In this case, the permit may contain different emission limits to air and/or water depending on the mode of operation.

Sector Guidance

7.2.3 The Agency set out indicative BAT requirements in Sector guidance which is related to the type of installation being permitted. Both types of plant fit the definition of a combustion installation, i.e.:

- Section 1.1 – Combustion Activities. A(1) (a) Burning any fuel in an appliance with a rated thermal input of 50MW or more.

7.2.4 The relevant Sector guidance for a power station is therefore ‘Guidance for the Combustion Sector’, which is currently in consultation draft form, Version 6.1.

7.2.5 The gasification part of the IGCC process also fits the definition:

- Section 1.2 – Gasification, Liquefaction and Refining Activities. A(1) (d) Coal or lignite gasification.
7.2.6 The guidance document S1.02 Guidance for the Gasification, Liquefaction and Refining Sector is therefore also relevant. In the case of the IGCC station, as the primary purpose of the installation is to generate power, it will be classified as a combustion installation for regulatory purposes.

7.2.7 In terms of this BAT assessment, the starting point is to assess indicative BAT requirements as set out in the above guidance. Within this document, indicative BAT requirements from the guidance are summarised in bullet/italic form.

7.2.8 If it is proposed to adopt the techniques described in the guidance as ‘indicative BAT’, then there is no need to provide further justification of the design. However, the guidance does not cover every conceivable situation and may be conservative in many situations. It is therefore likely that a degree of design justification will be required for the permit application. In terms of minimising the permitting risk to the project, it is important to consider these issues now.

7.2.9 This BAT review is therefore intended to highlight the main issues to be considered during the front end engineering design (FEED) of the project so that any deviations from indicative BAT are highlighted in order that they can be appropriately considered.

7.3 Consideration of the Main Issues

7.3.1 A review has been carried out of the current design of the installation as set out in preliminary design documents. The documents have been reviewed in relation to ‘indicative BAT’ for the main process plant areas. In order that appropriate consideration of the requirements can be given, the ‘indicative BAT’ requirements are summarised below for the main areas of plant.

7.3.2 A preliminary assessment of compliance is then provided and this will be reviewed with the design team and client representatives. On completion of the review with the design representatives, a list of outstanding issues will be summarised in the conclusions for further consideration.

Energy Efficiency

7.3.3 Given the nature of the installation, energy efficient design is of paramount importance for the commercial success of the plant. The FEED for an IGCC plant is being undertaken at present, with the intention of optimising the CCS ready status of the plant with the highest energy efficiency profile.
7.3.4 In the case of Hatfield, the IGCC design is quoted as having an overall thermal efficiency of 42% within the Process Design Package (PDP), which is the starting point for the FEED. This drops to approximately 39% with the installation of CCS, which is significantly higher than supercritical coal plant with CCS. Without mechanisms in place to develop CCS, gas fired CCGT will remain the most efficient form of energy generation in terms of carbon emissions and therefore it is appropriate to begin operation of station as a gas fired CCGT, with conversion later. This is confirmed by a comparison of carbon dioxide emissions per kWh of electricity generated:

- Current UK generating mix – 0.52kgCO₂/kWh;
- Typical coal fired power station – 1kgCO₂/kWh;
- Hatfield CCGT – 0.36kgCO₂/kWh;
- Hatfield IGCC with carbon capture – 0.025kgCO₂/kWh.

7.3.5 The PPC permitting process attempts to ensure that for a given technology, the most efficient techniques are used. The design should therefore seek to minimise primary energy use and utilise as much waste heat as possible.

7.3.6 The fundamental characteristics of the plant (IGCC on coal, CCGT on natural gas) comply with indicative BAT requirements, but it should be expected that the details of the design will require justification. In particular, if any compromises need to be made to accommodate operation as a CCGT plant and then an IGCC plant, these will need to be justified.

7.3.7 From a review of the PDP, there is significant heat integration in the IGCC plant and therefore it would appear that the design of the IGCC plant has been optimised. This needs to be further evaluated as the design progresses.

**Combustion Emissions Concentrations**

**Criteria**

7.3.8 There are two criteria applicable to emissions from combustion plant, achievable emission concentrations and emission limit values (ELVs). Achievable emission concentrations are quoted by the Agency in the Combustion Sector guidance and are regarded as indicative BAT, and they can be exceeded under certain circumstances. ELVs are limits that come from EU Directives such as the Large Combustion Plant Directive (LCPD). ELVs must be complied with (in accordance
with the compliance criteria in the Directives), and will appear as permit limit values where applicable. In both cases, emission concentrations depend on the fuel used and the type of combustion appliance.

7.3.9 An assessment of the emission concentrations has confirmed that they are compliant with the indicative BAT guidelines for CCGT operation, but are marginally higher than the indicative BAT guidelines for IGCC operation. This suggests that some justification of the higher concentrations will be required within the permit application. Given the very low number of IGCC plants that have been built worldwide, it is unlikely that there is extensive evidence supporting the suggested achievable emission concentrations. It is therefore judged that a successful BAT argument can be made for the current emission limits.

LCPD

7.3.10 The LCPD applies to energy producing combustion plant and those that make direct use of the products of combustion in manufacturing processes, and which have a rated thermal input of greater than 50 MWth (for a single stack or windshield).

7.3.11 In terms of gas turbines, the LCPD applies to new equipment brought into operation after 27 November 2003 and therefore will apply to Hatfield.

Monitoring

7.3.12 In terms of BAT, continuous monitoring of emissions to air should normally be undertaken:

- Where the potential environmental impact of a substance is significant;
- Where the concentration varies widely; or
- Abatement equipment is being used, e.g. continuous monitoring of dust is needed after a fabric filter to show the effectiveness of the filter or to indicate where maintenance is needed.

7.3.13 Continuous monitoring equipment must be to the EAs MCERTS standards where available. In particular, as the plant will come within the auspices of the LCPD, the requirements of Annex VIII will need to be complied with, and will govern the monitoring requirements.

7.3.14 For gas turbines operating on natural gas, there is a derogation against continuous monitoring of SO\textsubscript{2} and dust. However, as the wording is ‘natural gas’ it is not clear that this would also apply to SYNGAS. It is also known that the Agency have approved predictive emissions software for gas turbines on other sites. The issue
of monitoring requirements therefore needs clarification with the Agency during
detailed design.

7.3.15 CEN standards must be used for monitoring LCPD plant where they are available, if
not, ISO, national or international standards must be used. Continuous monitoring
results must be verified by spot sampling at least once per year. In order to relate
emission concentrations to mass release, the stack gas flow rate will be required.
In order to relate measurements to reference conditions, temperature and pressure
will need to be determined. Oxygen and water vapour content should also be
measured.

7.3.16 Given the above, it would be necessary to fit manual stack monitoring ports on
emission points to air, including providing access platforms, in order to facilitate
manual stack testing of the gas turbine exhausts. For continuous monitoring, and in
accordance with the Agency Combustion Sector Guidance, indicative BAT limits are
regarded as being complied with if:

- No daily average value exceeds the relevant benchmark value;
- 95% of all hourly averages over a defined period, e.g. calendar year do not
  exceed 200% of the benchmark value.

7.3.17 In the case of the LCPD emission limits, the compliance criteria within the Directive
are:

- No validated daily average value exceeds the relevant emission limit value;
- 95% of all the validated hourly averages over the year do not exceed 200%
  of the relevant emission limit value.

7.3.18 The LCPD emission limit values do not include start-up and shut-down periods, and
the validated averages are determined after subtracting the 95% confidence interval
of the measured value. The confidence intervals are not to exceed 20% of sulphur
dioxide and nitrogen oxides emission limit value, and 30% of the dust emission limit
value.

**Stack Heights**

7.3.19 Stack heights must be set to give adequate dispersion of the emissions. A
methodology set out the Agency publication D1 may be used to give the minimum
stack height. It is more normal however, to also undertake atmospheric dispersion
modelling to verify that appropriate stack heights have been chosen. This will be
undertaken as part of the preparation of the Environmental Impact Assessment for
the planning application for the development, based on conservative emission
parameters. It is necessary to undertake the modelling at this stage as the visual impact of the development will need to take account of the chosen stack height.

7.3.20 The modelling will need to take into account the existing background concentrations of pollutants in the air (from existing sources), to ensure that the predicted ground level concentrations of the pollutants are below the UK’s Air Quality Strategy Objectives for human health impacts. Pollutants of specific concern are likely to be oxides of nitrogen, particulates and carbon monoxide. However, as noted previously, the principal concern is likely to be the impact on the Hatfield and Thorne Moors in terms of acid deposition.

**Visual Plume Suppression**

7.3.21 The suppression of visual plumes from the cooling tower may be an issue for the permit application. The use of primary energy for plume suppression is not considered to be BAT, but using waste or recovered heat should be considered and balanced against the potential benefits.

7.3.22 The degree of plume abatement required will depend on local conditions and the distance from the towers to the nearest sensitive area. Plume modelling may be required to confirm that the visible (condensed) plume will not ground beyond the boundary fence nor reach areas of habitation at a height that will cause significant loss of light. As a guide, the width of the plume should not fill an arc which subtends an angle greater than 10° when viewed vertically from the ground.

7.3.23 The Agency have already indicated a preference against visible plumes and it is understood that visible plume suppression is being installed.

**BAT from Gasification, Liquefaction and Refining Guidance**

7.3.24 The following section has been taken from the Agency’s Gasification, Liquefaction and Refining sector guidance.

**Gasification**

7.3.25 The indicative BAT guidance for the gasification sector concentrates on the control of releases to air and water from the storage and handling of the coal feedstock. The BAT reference box states that dry low NOₓ burners should be used in the turbines, but this contradicts information given within the text of the document, where it is stated that nitrogen can be used as a diluent to reduce NOₓ emissions (as proposed at Hatfield). The guidance also states that in practice, achievable emissions should be of the same order, or only marginally higher than that achieved
using natural gas. This is the case for Hatfield and therefore it can be assumed that the IGCC plant is compliant with BAT in this regard, especially as the turbine needs to cope with two fuels.

**Sulphur Recovery Unit**

7.3.26 Indicative BAT for sulphur recovery units are written in a refinery context where sulphur emissions are substantial, and therefore many of the elements are not strictly applicable to an IGCC power station.

7.3.27 In terms of recovery efficiency, the tail gas from the Claus SRU is hydrogenated in the Scot absorber such that the gas is recycled to the front of the Selexol process, and therefore sulphur recovery is 100%. There is no exhaust to atmosphere and no need for a tail gas incinerator.

7.3.28 In terms of sulphur recovery and its destination, the sulphur is degassed to ensure that it can be safely transported off-site for re-use.

**Flare**

7.3.29 Indicative BAT for flaring is specified as:

- Use flaring as a safety system (start-up, shutdown and emergencies);
- Use flare control systems with a fast enough response to avoid unnecessarily leaving steam injection running;
- Ensure smokeless and reliable operation;
- Management information systems and instrumentation;
- Balancing the fuel gas system;
- Installing a gas recovery system;
- Using high-integrity relief valves;
- Applying advanced process control;
- Reducing relief gas to flare by management/good housekeeping practices.

7.3.30 In addition, sour or acid gases should only be flared in an emergency and then for limited periods whilst measures are being taken to deal with the emergency. Special care should be taken to prevent flame snuffing, especially in high wind conditions.
Water Use and Discharge

7.3.31 The permit application will need to demonstrate that the use of raw materials, including water has been minimised. In terms of water use, the guidance splits into cooling water use and general water use.

Water Use

7.3.32 The permit application will need to demonstrate that the use of raw materials, including water has been minimised. In terms of water use, the Agency’s guidance splits into cooling water use and general water use.

7.3.33 The use and re-use of water within the design will need to be thoroughly evaluated taking into consideration practical constraints. The Agency’s guidance is very much concentrated on the minimisation of water use within the process by recycling wherever possible. In addition, it also suggests that it may not be necessary to treat cooling water streams if there is no environmental benefit.

Effluent Treatment

7.3.34 In terms of the water discharge, there are three main streams to consider; cooling tower blowdown, boiler blowdown and gasifier blowdown. The pollutant concentrations differ markedly between these streams and therefore in accordance with BAT, it would be normal to treat them separately (if necessary), before discharge. There are two effluent streams from the gasifier; slag bath bleed and scrubber bleed, and these are treated separately.

7.3.35 Where wastewater is discharged to surface water, it will need to be treated so as to meet the indicative BAT discharge concentrations as set out in the guidance. In addition, the permit application will need to demonstrate that when the wastewater is discharged, no harm is caused to the receiving water. The limits should be set as increases above the background level of the pollutant in the supply water. Where automatic sampling is performed, limits should be such that not more than 5% of the samples exceed the benchmark value. For spot samples, no spot samples should exceed the benchmark level by more than 50%. Annual mass emission limits for cadmium and mercury will also be set within the permit.

7.3.36 Mercury and cadmium discharges may arise from impurities within raw materials, i.e. caustic soda or acids used on the plant. Justification will be required why mercury free caustic soda cannot be used.

7.3.37 The PDP makes reference to the treatment of the gasifier effluent in the Utilities and Offsites section of the plant, but does not provide details. The composition of the blowdown water from the gasifier has been estimated from previous Shell projects.
The actual composition of the Shell gasifier effluent will need to be confirmed during FEED.

7.3.38 A decision will need to be taken as to whether or not to treat the effluent on site to a specification sufficient to be able to discharge the effluent to surface water. It should be possible to back calculate the allowable discharge concentration of the pollutants knowing the characteristics of the receiving water.

7.3.39 An initial assessment has indicated that sodium chloride emissions from the gasifier blowdown will be a critical parameter in terms of being allowed to discharge the gasifier blowdown to surface water. However, the concentration of other pollutants in the wastewater may also be significant in terms of impact on the receiving water. Through consultation with the Agency, they have suggested that the streams be combined and discharged to surface water at Rawcliffe Bridge.

**Monitoring Emissions to Water**

7.3.40 Continuous monitoring of emissions to water is generally required:

- If the flowrate is large;
- Where the potential environmental impact of a substance is significant;
- Where the concentration varies widely; or
- Abatement equipment is being used.

7.3.41 Given the emissions from the installation, it is considered likely that flow proportional sampling will be required. Spot sampling using MCERTS equipment or techniques may also need to be undertaken.

**Subsidiary Issues**

7.3.42 In addition to the main issues, there are a number of subsidiary issues to consider in the design.

**Material Storage and Handling**

7.3.43 Control of emissions from material storage and handling is essentially in relation to the prevention of fugitive dust emissions to air. Whilst there are coal stores associated with the existing Hatfield colliery operations, the storage and handling of the coal feedstock to the IGCC will likely come within the PPC permit. As such, the
requirements and mitigation techniques set out in the guidance will be taken into account.

**Fugitive releases to ground and groundwater**

7.3.44 The following sections describe the techniques that should be considered to minimise releases of potentially polluting substances to ground and groundwater:

- Run-off water of rain water from all open areas, but in particular from coal and raw material stocking areas should be intercepted and the suspended solids removed by settlement or other techniques. Arrangements should be made for monitoring the quality of the water discharged from the storage and blending areas where such discharges are in the vicinity of potentially vulnerable receptors;

- Overfill protection on tanks;

- Subsurface pipework, vessels and tanks should be minimised;

- For all subsurface pipework, sumps and storage vessels, install either secondary containment, continuous leak protection or facilitate future inspection and maintenance, i.e. CCTV;

- All sumps should be impermeable and resistant to the stored materials;

- Tanker unloading areas and all operational areas should be covered with an impervious surface with spill containment curbs, sealed construction joints and connected to a sealed drainage system.

7.3.45 Surface and subsurface drainage and containment systems should be designed to facilitate their future inspection and maintenance.

7.3.46 In addition to the above, consideration should be given to putting drains containing potentially polluting substances in suitable pipe trenches so that leaks may be contained, observed and repaired quickly.

7.3.47 All above ground tanks containing liquids whose spillage could be harmful to the environment should be bunded. Bunds should be:

- Impermeable and resistant to the stored materials;

- Have no drain outlets or taps;

- Drain to a blind collection point;
• Have pipework routed within the bund area;
• Have no penetrations in the containment surface;
• Be designed to catch leaks from tanks, fittings and fill points;
• Have a capacity of 110% of the largest tank or 25% of the total tankage.

7.3.48 Firewater, or potentially contaminated water or spillages need to be retained on site. This will require an assessment of volumes to be retained and the means of doing so. The layout of the plant within the PDP contains a firewater pond.

**Noise and vibration**

7.3.49 In terms of the PPC permit, noise criteria will be applied at the boundary of the installation and at the location of receptors around the site. There are only two specific criteria applicable to the design:

7.3.50 Noise from the installation should not give rise to reasonable cause for annoyance. Justification will be required when the rating level from the installation exceeds the numerical value of the background level;

7.3.51 Further justification will be required should the rating level exceed 50 dB by day or 45 dB by night.

7.3.52 In practice, noise impacts from developments proposals are considered in detail as part of the planning process. This often leads to noise limits being imposed by planning condition (at the noise sensitive receptors) which ensure that noise levels are kept at acceptable levels. Such limits are, more often and than not, considered acceptable for PPC requirements. Noise modelling undertaken as part of the noise and vibration assessment report to consider where additional noise mitigation measures may be required in order to ensure an acceptable noise level at the boundary of the site.

7.4 Conclusions

7.4.1 The proposed IGCC power station has significant benefits in terms of the ability to capture carbon, and therefore provide power generation at a carbon factor an order of magnitude better than current fossil fuel power generation. In addition, current Agency guidance indicates that direct combustion of coal may not be BAT.

7.4.2 Whilst energy efficiency will need to be addressed in the permit application, it will be in relation to maximising the efficiency of the technology to be employed. By their
very nature, IGCC and CCGT plants are highly integrated in terms of energy production.

7.4.3 NO\textsubscript{x} emission limits from the turbine exhaust comply with the indicative BAT criteria presented within the Combustion Sector guidance. Atmospheric dispersion modelling will be undertaken to confirm that it is not necessary to go beyond BAT for NO\textsubscript{x} emissions in terms of environmental impact.

7.4.4 Monitoring of emissions to air will need to meet the requirements of Agency guidance, and that of the LCPD. It may be necessary to continuously monitor SO\textsubscript{2} and dust emissions from the stack when burning SYNGAS and this will need confirming with the Agency.

7.4.5 In order to comply with BAT, water use within the installation will need to be minimised. Effluent treatment will need to comply with BAT emission limit values, and the impact on the receiving waters will need to be assessed. It may be necessary to go beyond the indicative BAT requirements in order to meet environmental quality standards in the receiving water. Whilst chloride emissions suggest that a discharge to the brackish section of the River Don may be possible, other pollutants within the wastewater may be significant in this regard. It may still be necessary/possible to tanker the concentrated waste water stream from the gasifier offsite for treatment, but this needs further evaluation.
8 NEED AND ALTERNATIVES

8.1.1 The Government has set out that around 30-35 GW of electricity will need to be provided by new power generation capacity to meet the rising electricity demand as the economy grows and to replace the retirement of many existing nuclear and coal fired power stations (in compliance with EU legislation). Many of the existing nuclear and coal fired power stations are at the end of their design life and will need significant investment to reduce their carbon emissions. This will require energy companies to make substantial investment in low carbon technologies in the near future. Two thirds of the estimated 30-35 GW will be required by 2020. Put simply the UK has a demonstrable need for new sustainable power generation.

8.1.2 To meet the energy requirements over the next couple of decades and to ensure security of supply the Government will be relying on having a diverse and flexible energy mix of fossil fuels, nuclear power and renewable. The Government has produced a White Paper on Nuclear Power setting out the potential contribution nuclear power could provide to help meeting the UK’s energy requirements. It does acknowledge though that it takes a long time to plan and build nuclear power stations and that new nuclear generation can make only a limited contribution before 2020. The large number of wind turbines presently being constructed in the UK, partially replace some of the generation capacity, however, there is still a requirement for installed thermal power plant capacity to be available for the days when the wind does not blow, to provide security of supply to the grid. Fossil fuels will therefore continue to play an essential role in our energy system for the foreseeable future.

8.1.3 Fossil fuels (oil, gas and coal) currently provide for around 90% of the UK’s energy needs much of which is provided by inefficient and environmentally unfriendly plants. In order for fossil fuel power generation to be considered acceptable in the future it will need to be provided in a much cleaner way to reduce carbon emissions. The Government acknowledges that this could be achieved by improving coal-fired power station efficiency; co-firing coal with biomass; and implementing carbon capture and storage (CCS).

8.1.4 Hatfield Colliery has been the subject of a comprehensive redevelopment programme involving significant financial investment. It has a Masterplan planning permission including a Section 36 consent for the development of a 430MW power station. The Colliery has long term coal reserves and currently supplies existing coal fired power station generators in the surrounding region. In addition to the environmental and economic costs of transporting the coal throughout the Yorkshire and Humber region the existing stations are less efficient and present concerns regarding air quality. There are therefore significant environmental and financial
benefits in locating a new clean coal power station (with the facility for Carbon Capture provision) immediately adjacent to an active Colliery producing circa 2 million tonnes of coal per year for the next couple of decades, particularly when the proposed power plant is much cleaner and has carbon capture capability. The proposed increase from 430MW to 900MW would therefore maximize the sites potential to generate energy, complying with the Governments sustainable objectives.

8.1.5 Initially though, power generation will need to be provided by burning natural gas (as opposed to SYNGAS), which is an inherently clean fuel and much cleaner than the traditional method of burning coal. Gas is also a flexible and responsive source of energy and, while it is important in terms of providing a diverse energy mix, it does give rise to concerns of security of supply in the medium to long term. The UK is estimated to be importing up to a third or more of the UK’s gas demand by 2010 potentially rising to around 80% by 2020. Our reliance on increased importation of oil and gas from international energy markets raises concern over security of supply and the UK’s exposure to this matter needs to be reduced. Diversifying sources and making the best use of economically viable and environmentally acceptable coal reserves is therefore essential to contribute to the UK’s security of supply goals.

8.1.6 Whilst not often within the control of the applicant alternative locations for siting a new power station need to be considered to ensure that this proposed location is the best environmental and sustainable option. One option is to consider is the redevelopment of the existing and now redundant Thorpe Marsh Power Station (located approximately 5km to the west of the proposal). However, as the Doncaster UDP acknowledges the existing buildings and structures are of such scale that they have a marked impact upon on a wider area of the countryside, particularly as the extent of visual mitigation is limited. Policy PU1 of the UDP relating to the redevelopment of Thorpe Marsh therefore expects the removal of the existing structures to remove the impact upon the open countryside location.

8.1.7 Any new power station proposals, of comparable output generation, are major development and likely to contain some large and tall structures. They are therefore likely to give rise to some negative visual and landscape impacts. Given their nature such developments often involve large structures which often become landmarks in themselves. The siting of new power station proposals to avoid adverse visual impacts is therefore a challenge. The existing coal fired power stations in the Yorkshire and Humber region are dominant landscape features because of the size and height of structures. In this case although the proposed power plant does contain some large and tall structures the site benefits from adjacent existing perimeter screening mounds, surrounding vegetation and changes in topography (such as the existing landraise operation) which will restrict open views from beyond.
the site boundary. It is therefore considered that in comparable terms the Hatfield Colliery site is a good location in visual and landscape terms.

8.1.8 In summary, it is concluded that there is a clear need for new power generating capacity over the next few decades and a more urgent need to fill the forthcoming generation gap as old coal fired and nuclear power station become redundant over the next few years. In order to secure security of supply the energy generation needs to be provided by a diverse mix, including fossil fuels (gas, coal and oil). It is noted, however, that the inclusion of coal needs to be delivered in an environmentally friendly manner with facility to capture carbon. The proposed power station will be low in emissions and has the facility to capture carbon. The plant design and processes have been assessed to ensure that they accord with the best available techniques (BAT) and therefore that alternative proposals have been considered. In the light of the above it is considered that the proposal is the preferred option and there are no better alternatives.
9 CONCLUSIONS

9.1.1 In carrying out the Environmental Impact Assessment (EIA) and preparing this Environmental Statement (ES) it is clear that there is a substantial background against which this work has been carried out. In this regard it is important to note:

- The current s36 application is proposed in a location where there is an existing s36 consent for a 430 MW Power Station
- The s36 application site sits within a site that has planning permission for major re-development, with the Power Park development well underway
- Doncaster MBC has resolved to grant planning permission for a new motorway link road and associated business development and landscaping
- There has already been a substantial body of EIA work previously carried out as part of the determination of these applications
- There is already a substantial body of planning control under existing permissions, consent and agreement, with further controls to be imposed under the permission and agreement for the development of the link road

9.1.2 The EIA, following scoping work, has focussed on potentially the most significant effects, focusing on the proposed increase in Power Station size and output from that already consented on the Power Park site. The assessment of these effects is covered in detail in the reports that form the Technical Appendices to this Environmental Statement. These reports confirm that the development of a 900 MW Power Station operating on an initial start-up with natural gas and the development and commissioning of a coal IGCC with carbon capture and export would not lead to environmental impacts of an unacceptable level. The reports consider the effects of mitigation, which would have the effect of reducing the impacts to a moderate or minor level. Mitigation is capable of being covered by planning controls or by other areas of regulation, including Power Station Permitting.

9.1.3 The Environmental Statement has included a review of other environmental matters, a substantial amount of which has previously been covered by EIA and/or existing planning controls. Such controls are capable of being applied to the proposed 900 MW Power Station and, therefore, it is concluded that these potential impacts can be controlled to acceptable levels.

9.1.4 The Environmental Statement has given consideration to the need for this 900 MW Power Station development and alternatives. The Statement confirms that there is a need for new generating capacity, but that, new energy generation based on fossil
fuels (in this case coal and natural gas) needs to become cleaner taking account of air quality and climate change considerations. The assessment has confirmed that the 900 MW proposal, with natural gas start up, followed by the development of coal IGCC generation combined with carbon capture and export is a clean, low emissions development, which thus accords with UK and European policies. The site already has the benefit of s36 consent for 430 MW of power generation and this Environmental Statement, including the reports contained in the Technical Appendices, confirm that the site is suitable in environmental impact terms to accommodate the proposed 900 MW Power Station.

9.1.5 Large energy generation proposals require Environmental Impact Assessment as most of them have the potential to result in potentially significant environmental effects. This proposal has been assessed in accordance with the EIA regulations and relevant guidance and the results confirm that this 900 MW development can be mitigated and controlled such that the environmental impacts can be kept to acceptable levels. The proposal site is therefore considered to be an appropriate alternative for natural gas and clean coal power generation.