Ferrybridge 'C' Power Station

Building Recording of Ferrybridge 'C' Main Station

SSE

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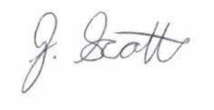			
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1. Introduction

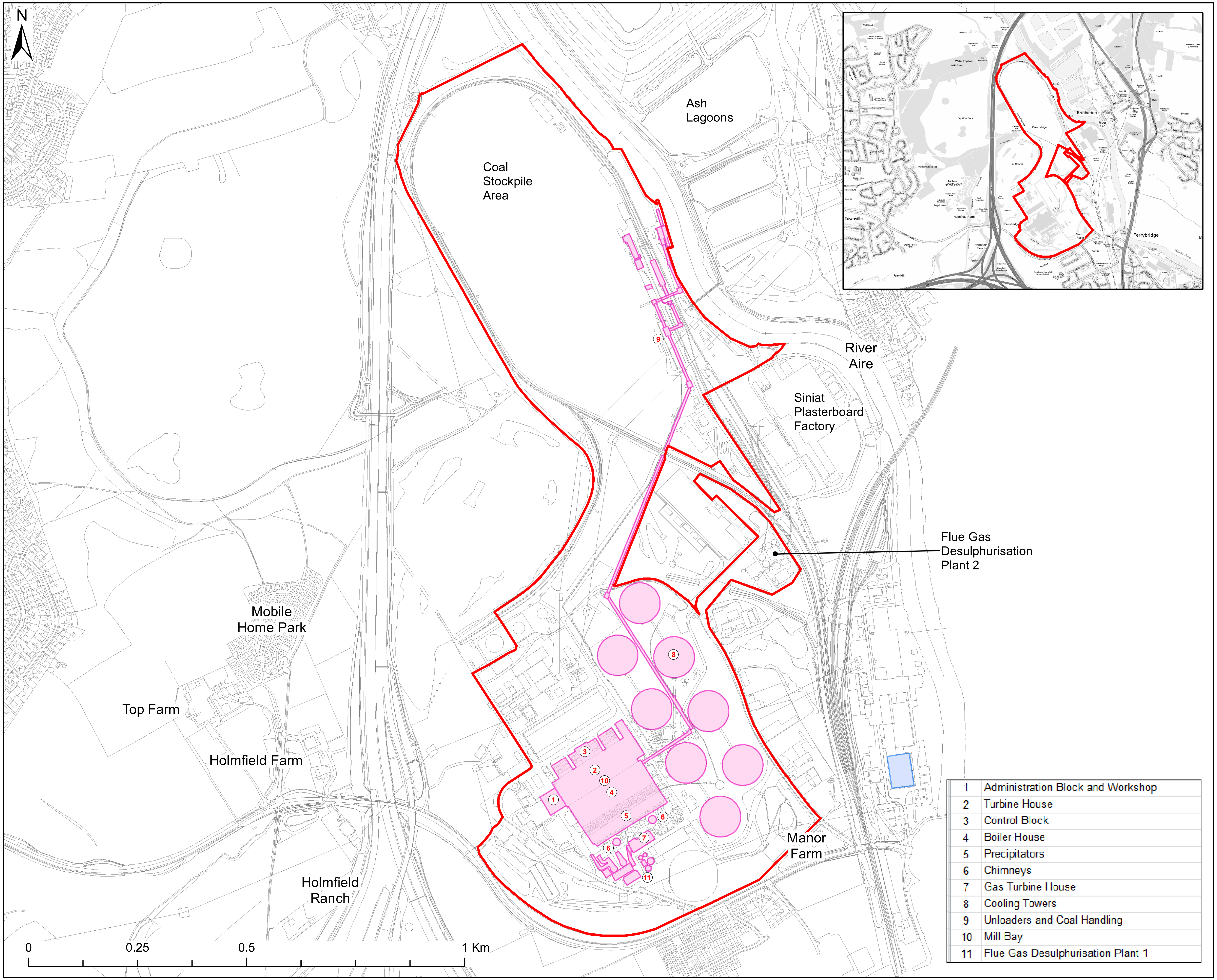
1.1 AECOM Infrastructure & Environment Ltd (AECOM) was commissioned by SSE Generation Ltd (SSE) to undertake a Level 2 Building Recording Ferrybridge ‘C’ power station (Figure 1). The building recording seeks to mitigate the impact of the demolition of the power station. The buildings were assessed for designation in October 2015 when it was announced that the power station was due to close. The decision was taken not to designate the power station. Further to that, the power station was granted a Certificate of Immunity from Listing (COI) in July 2017 (NHLE: 1448208).

1.2 The site is located on the River Aire, near Knottingley in West Yorkshire (centred on NGR: SE 47473 24777). Ferrybridge is one of three coal-fired power stations built in this area, the other two being Eggborough and Drax.

1.3 Ferrybridge ‘C’ has been the subject of a detailed heritage assessment produced by AECOM as part of the application for a COI (Turlington 2017). This outlined the site’s history and development. Ferrybridge ‘C’ is the third iteration of the power station on this site. The first, Ferrybridge ‘A’, was constructed in 1924 and is now a grade II listed building (NLHE: 1266191). It was replaced in 1955 with Ferrybridge ‘B’, built to its north side. Ferrybridge ‘C’ was then added to the west side in 1968 and it operated along with Ferrybridge ‘B’ until the latter was closed and demolished in 1992. Ferrybridge ‘C’ remained in operation until 2016, when it closed following fire damage and the uneconomical improvements that would be required to comply with the EU Industrial Emissions Directive (2010/75/EU). Ferrybridge Multifuel 1 Power Station began operation adjacent to Ferrybridge ‘C’ in 2015.

1.4 The heritage appraisal also outlined the significance of the standing buildings and structures on the site. Consultation undertaken during the course of securing the COI and the prior approval for demolition of the power station highlighted the particular interest associated with the barge unloader, or ‘barge tippler’ on the site. A separate building recording of the barge unloader and coal handling plant was subsequently undertaken as a condition of the granted approval for demolition. The results of this separate recording have been uploaded to the Archaeology Data Service online archive as a grey literature report.

1.5 In addition to the required building recording, AECOM were commissioned by SSE Generation Ltd to complete a building recording of the remainder of the original main power station buildings as a best practice measure. This report presents the results of that additional building recording exercise. The site archive of digital photographs and report is archived with SSE Generation Ltd in their private archive. A digital copy of the report has also been lodged with OASIS for upload to the Archaeology Data Service online archive as a grey literature report.



1	Administration Block and Workshop
2	Turbine House
3	Control Block
4	Boiler House
5	Precipitators
6	Chimneys
7	Gas Turbine House
8	Cooling Towers
9	Unloaders and Coal Handling
10	Mill Bay
11	Flue Gas Desulphurisation Plant 1

Filename: W:\Newproje\6_______ - Heritage Ferrybridge C Power Station - Demolition SORL\GIS\02_Maps\Figure1 -Boundary and power station layout_10.4.mxd

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Project Title:

FERRYBRIDGE 'C' POWER STATION BUILDING RECORDING

Client:

SSE GENERATION LTD

LEGEND

- Power Station Boundary
- 'C' Power station layout
- Ferrybridge 'A' Power Station Grade II listed Building

Projection: British National Grid

AECOM Internal Project No:

60474319

Drawing Title:

BOUNDARY AND ORIGINAL 'C' POWER STATION LAYOUT

Scale at A3: 1:8,000

Drawing No:			Rev:
FIGURE 1			0
Drawn:	Chk'd:	App'd:	Date:
PB	GS		15/2/2019

2. Methodology

2.1 The building recording aimed to provide a record of the form, function and phasing of the surviving original 1960s main buildings within the power station, and to augment the building recording already undertaken of the barge unloader and coal handling plant.

2.2 The building recording was undertaken in accordance with the Chartered Institute for Archaeologist's (CIfA) *Code of Conduct* (CIfA 2014a) and *Standard and Guidance for Archaeological Building Recording* (CIfA 2014b). The building recording was also carried out with reference to the guidelines in Historic England's *Understanding Historic Buildings; a guide to good recording practice* (Historic England 2016a) and their specific guidance for recording *England's Redundant Post-War Coal- and Oil-Fired Power Stations; guidelines for recording and archiving their records* (Historic England 2016b). The latter emphasises the particular difficulties in photographing power station architecture due their scale, and the constricted, congested nature of their internal spaces (Historic England 2016b, 6). It recommends oblique three-quarter views as a solution to this problem, supplemented by detailed photographs of significant features. It also highlights the necessity to convey a sense of scale and to take selective general views of major machinery and plant. A further recommendation is to record the power station prior to closure, to record how spaces and plant were being used (Historic England 2016b, 4). This has not been possible for the current project, although archive images of the building in use have been provided to illustrate the written report.

2.3 The building recording, broadly to Historic England Level 2 standard (Historic England 2016a), was carried out by Dr Gillian Scott and Amy Jones of AECOM Instructure and Environment Ltd in December 2018. This level of survey provides a descriptive account of the interior and exterior of the building and an analysis of its development and use. The survey consisted of a written and photographic account comprising the following:

- The written record comprises the location on the building, the date of survey and the location of the archive, A descriptive account of the form, function and phasing of the building as well as a cartographical analysis was undertaken.
- The photographic record includes photographs of the complex's wider aspects together with general views of the external appearance of the buildings. These are in the form of oblique and parallel ground-level photographs of the principal elevations and context. The overall appearance of internal rooms and circulation areas was captured, together with detailed views of fixtures and fittings as appropriate to illustrate the main plant used in the power station. The photographic record was made using a Cannon Digital SLR and consists of colour, digital, .jpeg files at a minimum of 10 megapixel minimum. All photographs contain a graduated photographic scale, where practicable.
- A photographic register detailing the location and direction of each shot was compiled and is included as Appendix A of this report.
- The drawn record is based upon copies of architect's and archive plans made available to the survey team. No new measured survey drawings were produced for this recording exercise. Plans an elevations supplied to the project team were checked for accuracy on site, and necessary amendments an annotations were made.

2.4 Background research to compliment and expand upon that already undertaken to inform the previous heritage assessment (Turlington 2017) was carried out. The following sources have been consulted:

- Consultation with WYAAS;
- The National Heritage List for England (NHLE);
- Re-examination of SSE's archive; and
- Information held at West Yorkshire Archives.

3. Historical Background

3.1 The following sections provide context relating the history of power generation and the history of Ferrybridge 'C' Power Station.

Coal-Fired Power Stations

3.2 The following summary is derived from Historic England's *'High Merit': Existing English Post-War Coal and Oil-Fired Power Stations in Context* (Historic England 2013) and *20th Century Coal and Oil-Fired Electric Power Generation – Introductions to Heritage Assets* (Historic England 2015).

3.3 All power stations (also historically known as generating stations, powerhouses or generating plant) contain one or more generators that convert mechanical power into electrical power by means of a relative motion between a magnetic field and a conductor. Their principal classification has been by the source of heat (fossil-fuel, nuclear, geothermal, biomass etc.) or motive power (hydroelectricity and wind power).

3.4 By the turn of the 20th century, the electricity industry in Britain had witnessed considerable developments which had laid the foundations for growth in the 20th century through a series of technical innovations and developments. These saw electric power generation become progressively more larger-scale and refined.

3.5 In England from the advert of the first public power station in the 1880s until the end of the 20th century, fossil-fuel power stations, above all coal, significantly outnumbered all others; reaching a peak in the second quarter of the 20th century.

3.6 The first two decades of the 20th century saw the establishment of numerous power companies serving most of England not covered by existing municipal authority supply districts. A series of private Acts between 1897 and 1905 alone created around 20 large power companies, which along with the municipal authorities, began building larger power stations with larger distribution areas. London remained at the forefront of technological developments. The Electric Light Act 1909 led to a re-organisation of supply requiring Board of Trade consent for the erection of power stations.

3.7 Between 1919 and 1947 there was a period of rationalisation. During the First World War there had been growing discontent with the disorganisation of the electricity supply and distribution. The Electricity (Supply) Act 1919, which tried to persuade suppliers to re-organise, was unsuccessful and led to the Electricity (Supply) Act 1926 which put the industry under the overall direction of a public corporation, the Central Electricity Board (CEB). This allowed the CEB to concentrate generation in a limited number of 'selected stations' and to interconnect these stations and the regional distribution networks into a 'national gridiron'. The National Grid, a 4,000 mile network of overhead power lines suspended from pylons, was constructed over an eight year programme between 1927 and 1935. During this time, many smaller power stations were closed. This period of rationalisation saw increasingly large, higher-output coal-fired stations being built.

3.8 Nationalisation was the next step in the evolution of the power station and electricity supply. Between 1948 and 1990, following desperate fuel shortages after the Second World War, the need to nationalise and rationalise the plethora of municipal and privately owned electricity generation became apparent. The 1947 Electricity Act saw the replacement of the CEB with the British Electricity Authority (BEA) which introduced a degree of standardisation. This period also signalled a shift in the location of the stations from town centres into countryside; their locations determined by fuel sources and water supply rather than load supply. On the eve of nationalisation on 1st April 1948 the electricity supply industry in Britain consisted of some 560 separate supply undertakings, both private and municipal.

3.9 The creation of the BEA was not accompanied by any significant reformation regarding power station layout or architectural style, at least initially. The monumental 'brick Cathedral' approach, with two visual components, the boiler house and turbine hall, attached in a side-by-side, or occasional T-plan configuration, persisted well into the 1950s. Epitomised by Scott at Battersea, it provided a tried and tested functional and stylistic idiom that happily accommodated 30 MW and 60 MW sets. The BEA, like the CEB before it, was required to submit all new power stations to the Royal Fine Art Commission, for comment and advice before they were approved. The move away from brick as a preferred building material was down to economics. The publication of 'Committee of Enquiry into Economy in the Construction of Power Stations' in 1953 urged the BEA to experiment with new building techniques in the interest of the economy, as well as recommending that architects be a fundamental and equal part of the design team for each new power station. This brought about a more functional approach to power station design by making bold use of bright colours, crisp aluminium cladding, glass and concrete blocks. It was during this era that enormous concrete cooling towers became major visual elements in their own right.

3.10 The late 1950s saw further reorganisation of the electricity supply industry. The Electricity Act 1957 saw the formation of the Central Electricity Generating Board (CEGB) in 1958. The CEGB had two principle duties: firstly, to supply and maintain an efficient, coordinated and economical system of electricity supply; and, secondly to minimise the impact of power stations and overhead lines on the scenery, fauna and flora. This second environmental duty was unique at the time and was enshrined in Section 37 of the Electricity Act as the ‘Amenity Clause’. The incorporation of enormous cooling towers in rural sites made this of paramount importance.

3.11 Sir William Holford, a professor of Town Planning at University College London, who had played a crucial role in getting landscape design built into the planning of post-war new towns, was appointed as Part-Time Member of the CEGB with special responsibility for architecture and the conservation of amenity. Previously he had served as Architectural Adviser to the BEA and he was a key figure on the Royal Fine Art Commission and the Historic Buildings Council. Landscape architecture assumed importance from the outset with the appointment of specialists early on in the design process, and on occasion, before the appointment of civil engineering consultants, so they could have input at site selection stage.

3.12 Throughout the 20th century, coal remained the dominant fuel. Ten of the 13 ‘super stations’, the largest power stations ever built by the CEGB, were coal-fired. Thus, banks of gigantic concrete cooling towers, essential for coal-fired stations, typified thermal power stations of the latter 20th century, and dominated their landscapes for miles around. These were:

- West Burton, Nottinghamshire;
- **Ferrybridge ‘C’, West Yorkshire**;
- Eggborough, North Yorkshire;
- Ironbridge ‘B’, Shropshire;
- Fiddlers Ferry, Cheshire;
- Ratcliffe, Nottinghamshire;
- Cottam, Nottinghamshire;
- Rugeley ‘B’, Staffordshire;
- Didcot ‘A’, Oxfordshire; and
- Drax 1, North Yorkshire (although this was released for construction at a later date and exceeded the MW capacity of the others).

3.13 These were the afforded ‘First Division Status' by the CEGB since they had they had high-merit, high-output plant with low operating costs generating 2,000MW from units cooled by the largest towers in the system.

Architecture and Landscape Architecture under CEGB 1958-1970

3.14 The new generation of 1960s conventional power stations, whilst being fewer in number, their size, capacity and locations called for new thinking and design solutions. They were tied to large rivers for their water supply and to the coal fields for their fuel supply. This made their location very specific with little room for manoeuvre. However, great pains were taken to take the least objectionable sites from the point of view of the effect on the local amenity. In the early 1960s the first of the new ‘super stations’, West Burton and Ferrybridge ‘C’, were in development.

3.15 The approach and procedure for the design evolved over the course of the 1960s as experience was gained with the design and construction of each station. Architects and landscape architects were members of the design team advising on site layout, orientation, the form of buildings and the choice of colour and texture of the main visual components. However, economics and cost were a consideration and the architectural contribution was constrained within certain parameters with a reputed budget of less than 2 per cent of the total investment. The location of the power stations in remote locations with extensive site boundaries meant that close up inspection and appreciation of the architectural detail was limited.

3.16 By the early 1960s the architectural team at CEGB were fully aware that the architectural character and expression could only be appreciated from middle or distant viewpoints; the enormity of the standard components of a 2,000 MW station precluded anything else. The character of the power stations therefore depend very much on the massing of the main block in relation to the chimneys or chimney, the grouping of the cooling tower field, and variations in the colour and texture of the cladding. Rather it was the interplay of the component parts to one another than the dominance of any one element. Achieving coherence and balance in the composition of the power stations was important.

3.17 After road building, electricity generation and transmission had one of the largest impacts on the rural landscape of Britain in the 1960s and 1970s. The duty under the Electricity Act to Section 37, the ‘Amenity Clause’, saw CEGB become an advocate of landscape architecture. During this period they funded landscape design and advanced methodological frontiers with new techniques being developed in the assessment of the impact of the power stations through the production of visualisations, drawings, plans, models and latterly computer generated graphics.

3.18 It was Brenda Colvin (1897 – 1981) and Sylvia Crowe (1901 – 1997) who helped shaped the CEGB’s attitude and approach to landscape design. They had an unassuming simplicity and naturalness in their approach to landscape architecture. For power stations, they thought it mistaken to attempt to humanise them, favouring large-scale open settings that accentuated the elemental quality structures, with artificial mounds and trees used to screen the untidier or unsightly components such as coal stockpiles.

3.19 The scale of the buildings meant that they had no relationship to human scale and therefore much effort was put into making them more palatable to the public. Thus a public relations exercise was undertaken through the production of an exhibition at the Royal Institute of British Architects (RIBA) in 1963 called ‘The Architecture of Power’ and attractive, souvenir booklets of the stations, talks and articles all helped to popularise the buildings and the use of electricity in people’s homes.

3.20 Ferrybridge ‘C’ and West Burton, Nottinghamshire were the first of the super stations to be constructed. At Ferrybridge ‘C’ the two chimney rise behind the boiler house and turbine hall, with a lozenge array of eight cooling towers ranged to one side. From certain viewpoints these elements combined to form a pictorial composition, but to traditionalists their physical isolation precluded any sense of true architectural composition. A contemporary observer, A. Trystan Edwards commented ‘the lay-out is in in bits and pieces and no amount of care expended upon the design of these separate and individual items of plant can ever produce a unified architectural ensemble’. West Burton, however, was generally viewed as more successful in architectural and pictorial terms. There, the chimneys were set behind the boiler house and turbine hall, but the cooling towers were split into two groups placed at either end of the station, improving views from the surrounding countryside. This arrangement was the result of model studies using a device called a heliodon to see how different grouping world appear at various dates and times of day. This approach was seemingly used in almost all subsequent 2000 MW stations.

Power Generation at Ferrybridge

3.21 The following account of the historical development of the wider Ferrybridge ‘C’ power station is taken from the Heritage Assessment prepared in support of the application for a Certificate of Immunity from Listing (Turlington 2017).

3.22 Prior to the development of the Ferrybridge power stations, the site was continuously used for agriculture; however the surrounding area has a more varied history. There is evidence of human activity from the Prehistoric times in the form of Mesolithic flints (9000 – 4000 BC) and earthworks from the Neolithic period (4000 – 700 BC). In the Bronze Age there was ceremonial and funereal activity with a cemetery located at Ferry Fryston as well as buried bronze implements. A permanent settlement was not made in the area until the Iron Age period. There are also scattered Roman finds.

3.23 Ferrybridge is listed within the Domesday Book records and is referenced as Ferie. The first reference to a bridge occurs in 1226 in the Feet of Fines where the settlement is referred to as Pons Ferie. It is not known when the first bridge was erected, however in 1538 a bridge with eight arches was recorded. This bridge was replaced in the 18th Century with the current structure which was built in 1797 by Bernard Hartley and based on a John Carr design. Coal was first extracted in the area in the 18th Century by the Crowle family of the Fryston Estate.

3.24 The Church of St. Andrews was originally located on a site between the three Ferrybridge Power Stations, which was to the west of the River Aire and the railway line. The church was initially constructed in the 11th century and suffered from a number of floods, the worst occurring in 1866 when the flood waters reached 0.78m up the main doorway. Restoration works are known to have taken place throughout the history of the church, in 1350 the majority of the church was rebuilt and major alterations were carried out by Ewan Christian in 1879 which resulted in loss of any Norman or early English elements of the church. In the early 1950s the church was dismantled stone by stone and relocated to a site in Ferrybridge which was located just under 1 mile south of its original position at Ferry Fryston onto Pontefract Road. Dismantling works began in 1951 and in 1953 the church at the new site was re-consecrated. The rebuilding used only 60% of the original walling and as the stones were not numbered when they were dismantled, the appearance of the church changed after it was moved. In particular, the porch was moved from one side of the church to the other, a bay was added to the west end of the church, the south doorway became the north doorway and north aisle was moved to the south side.

3.25 In 1917 the land was purchased by the West Yorkshire Power Company and plans for the first power station were put forward to the Board of Trade in 1918. Permission was granted 1921. The site had good transport links and easy access to coal and water. The first power station, now known as ‘Ferrybridge ‘A” began construction in 1924 and comprised of a large power station building with four chimneys projecting from the roof and a small number of ancillary structures (Figure 2). The power station contained boilers, turbines, offices and workshops. A smaller structure housed the electrical switchgear.

3.26 A new facility, ‘Ferrybridge ‘B” was added to the north of Ferrybridge ‘A’ in 1955. It comprised one large building and three cooling towers which were positioned on the edge of the River Aire. It generated electricity through three 100 MW generating sets (Figure 3) and worked alongside Ferrybridge ‘A’.

3.27 In 1961 permission was granted for the construction of Ferrybridge ‘C’ superstation. The Central Electricity Generating Board (CEGB) has completed construction by 1968, but the station first supplied electricity to the grid on 27th February 1966. The station comprised eight cooling towers, turbine hall, two chimneys, four turbo-generator units and four gas turbine generators (Figures 4-6).

3.28 All three stations worked together until Ferrybridge ‘A’ was closed in 1976. Its chimneys were demolished and the boiler room and turbine hall were converted into offices and workshops. The remaining building is now grade II listed (NHLE: 1266191).

3.29 The M62 was constructed to the south of Ferrybridge ‘C’ in 1977 and runs from east to west. It joins with the A1 which was upgraded in 2000.

3.30 Ferrybridge ‘B’ and ‘C’ power stations continued to operate together until Ferrybridge ‘B’ was closed and demolished in 1992. Figure 6 shows the positions of the three power stations along the River Aire and the surrounding land uses as they were in the 1960s.

3.31 In 2006, a large plasterboard factory was constructed by Lafarge on the site of the former Ferrybridge ‘B’ station.

3.32 Following a decision not to improve the station to comply with the EU Industrial Emissions Directive (2010/75/EU), due to the uneconomical cost, and an unfortunate fire in the flue gas desulphurisation plant, Ferrybridge ‘C’ closed on 31st March 2016.

3.33 In 2015, Ferrybridge Multifuel 1 Power Station was constructed next to Ferrybridge ‘C’. Ferrybridge Multifuel 1 is capable of generating up to 70 MW of low carbon electricity using a range of fuel sources, including waste-derived fuels from various sources of municipal solid waste, commercial and industrial waste and waste wood. The plant takes fuels from across Yorkshire and the wider region. Fuel is burned under controlled conditions to raise high temperature steam which is then used to generate electricity. Some of the steam is also used for heating purposes within the multifuel plant itself.

Ferrybridge ‘C’ Power Station

3.34 The site for Ferrybridge ‘C’ was located on land that was designated as green belt, however the development was considered to be a special circumstance, hence permission was granted for its construction in 1961. Ferrybridge ‘C’ was one of a series of large power stations built by the CEGB in close proximity to the Yorkshire coalfield, which was a readily available fuel source facilitating the production of cheap electricity.

3.35 The site selection was also influenced by mining activity, as the land was in an active mining area. The National Coal Board entered into an agreement with CEGB to suspend and vary current workings to that an area, free from mining subsidence, adequate for the power station could be retained. This resulted in the sterilisation of approximately 12,800,000 tons of coal. The surface area free from subsidence was only sufficient for the main buildings and cooling towers and this had a great influence on the layout of the station (SEE Generation private archive).

3.36 The site initially comprised of four 500 MW turbo-generators linked to a pulverised fuel fired boiler which were the first of their type in Europe. There were also four 17.5 MW gas turbine generators which were used to start the plant in the absence of an external power supply, two of which were retired in the late 1990s. There are eight cooling towers, two chimneys, a boiler house, turbine hall and switch house as well as workshops and an administration block.

3.37 Rendel, Palmer and Tritton advised on the civil engineering matters for the site particulars; however it was C.S. Allott and Son civil engineering consultants who were the design engineers for the foundations, cooling water system, cooling towers, steelwork, superstructure and main chimneys. The consulting architects were the Building Design Partnership, the landscape architect was Mr L. Milner White, the mining consultants were Greaves, Childe and Rowand and the quantity surveyors for the cables installation were Rex, Proctor and Partners.

3.38 The area surrounding the station was not landscaped as part of the proposals; it was kept simple to reflect a parkland setting with groups of trees planted to improve the appearance. Due to the flat topography in this area, no attempt was made to screen the main station buildings. The only area of the site which would have minimal visual impact was the coal store area, due to the slightly lowered levels and land contouring around this end of the site which would ensure that the coal store would not be visible within the surrounding area, at least until the M62 and A1 were constructed.

3.39 To the south of the station an ornamental lake was created which resulted in an attractive approach for visitors. This was later infilled. Around the administrative buildings the area was paved and planted to provide an attractive forecourt and approach.

3.40 It took three attempts to build the first chimney on the site. The first chimney distorted and had to be demolished and the second chimney collapsed and killed two men who were working on the site.

3.41 In 1965, during the construction of the power station, three of the natural draft cooling towers collapsed during a gale force wind. This was caused by short gusts of strong westerly wind which funnelled into the towers, created a vortex and causing vibrations which weakened the structures. The towers lost their structural integrity and could no longer hold their shape causing the upper rims to buckle and collapse into the centre of the tower. This type of weather had not been taken into consideration by the designers of the site. The cooling towers had been structurally complete but were not in operation at the time.

3.42 Following this damage, the CEGB formed a committee to investigate the failure and found that although the larger height and diameter of the shells could withstand winds up to 200 miles per hour, the designers had not considered the impacts of wind in conjunction with the clustering of the towers which were also located beside other large structures. Following the investigation, the five standing towers were strengthened with a second layer of concrete to the outside of the towers which provided additional strength. The three towers which collapsed were rebuilt using a double skin design which has since been a standard regulation for other cooling towers.

3.43 The Ferrybridge ‘C’ site comprised the principal process buildings, accessed via Hinton Lane, at the west, the cooling towers at the east and the coal stock area to the north. The principal process buildings were integrated with one another in a line running north to south, comprising the turbine hall, mill bay, and boiler house. Each is distinguishable by differing roof heights and, in the case of the turbine hall, different glazing provision for interior light. The control block projects from the centre of the north side of the turbine hall.

Workshops and the administrative blocks are attached to the west side of the turbine hall. The administrative block is built of brick in a quadrangle with an L-shaped, two storey addition to the west. A water treatment plant is attached to the east of the turbine hall to de-mineralise water before it entered the boilers.

3.44 The mill bunker bay and boiler house extend to the south of the turbine hall. Extending from the south of the boiler house there are a sequence of three phases of precipitators, which feed gas into two reinforced concrete chimneys. Each phase was added to improve the station's emissions. Further south is a gas turbine house containing four gas turbines which would be used to restart the station in the event of a power failure. Beyond it, the flue gas desulphurisation plant built was in 2010.

3.45 The natural draught cooling towers are to the east of the main complex and arranged in a lozenge array. A cold water pump house is located between them. North-east of the cooling towers is the coal stock area, supplied by canal and the merry-go-round rail system. It contains the coal-handling plant as well as the barge unloader that formed the focus of a separate building recording.

3.46 In the 1970s, Ferrybridge 'C' employed a workforce of more than 600 people and set records for its thermal efficiency. In 1973 it set a world record for running non-stop for 5,488 hours and generating 2,999 GWh at an average thermal efficiency of 34.45%.

3.47 As a result of privatisation, the ownership of Ferrybridge passed from CEGB to Powergen in 1989 and then to Edison Mission Energy in 1999, AEP Energy Services Ltd in 2001 and then SSE plc in 2004.

3.48 From the early 1990s, a number of upgrades have been undertaken to improve environmental performance of Ferrybridge 'C' including the replacement of major components with more efficient modern designs. SSE carried out major changes and alterations to the buildings at Ferrybridge in 2005 including the installation of flue gas desulphurisation (FGD) equipment. In 2008 the boilers were fitted with Boosted Over Fire Air in order to reduce the Nitrogen Oxide emissions. By carrying out improvements and upgrades, Ferrybridge was able to fully comply with the station's operating licence issued by the Environment Agency to satisfy the UK requirements under European Legislation (Large Combustion Plant Directive) that came in to force on 1st January 2008. This legislation limits the station's flue gas emissions of Sulphur (SO_2) Nitrogen Oxides (NO_x) and Particulates (Dust).

3.49 In 2009, FGD was commissioned on Units 3 and 4 which enabled SSE to sign a 5 year agreement with UK Coal to supply 3.5 million tonnes of higher sulphur coal. However, in 2013, SSE decided not to comply with the EU Industrial Emissions Directive (2010/75/EU), which meant that the plant would have to close either by the end of 2023 or after 17,500 hours of operation after January 2016 (whichever came sooner).

3.50 The units which were not fitted with FGD (1 and 2) were closed in 2014 and later in the same year, a large fire broke out in generating Unit 4 which also affected Unit 3. This resulted in partial collapse of the generating unit. SSE then announced that the Ferrybridge 'C' electricity production would cease by 31st March 2016 due to the irreparable damage.

3.51 Historic England assessed Ferrybridge 'C' Power Station under the Planning (Listed Building and Conservation Areas) Act 1990 (as amended) for its special architectural or historic interest. It concluded that Ferrybridge 'C' Power Station did not meet the criteria for national designation as a listed building and it was not listed. The Historic England Decision Summary document that outlines the results of their assessment is included in Appendix C.

3.52 The power station was subsequently granted a Certificate of Immunity from Listing (COI) in July 2017 (NHLE: 1448208) and permission was granted for its demolition in November 2018.

3.53 SSE Generation Ltd retains an archive of material pertaining to the power station and this includes a copy of the 1961 Outline Design Planning Application documentation. The Outline Design includes elevations of the proposed new station and details of the intended operation of the stations, its manufacturers and the materials for its main components. The Outline Design elevations are shown in Figures 7-10 and the information therein has been used to inform the results of the building recording.

Figure 2. Ferrybridge ‘A’ power station in 1928 (© Historic England)

Figure 3. Ferrybridge ‘B’ power station prior to demolition in 1992 Photo © Phillip Beadham (cc-by-sa/2.0).

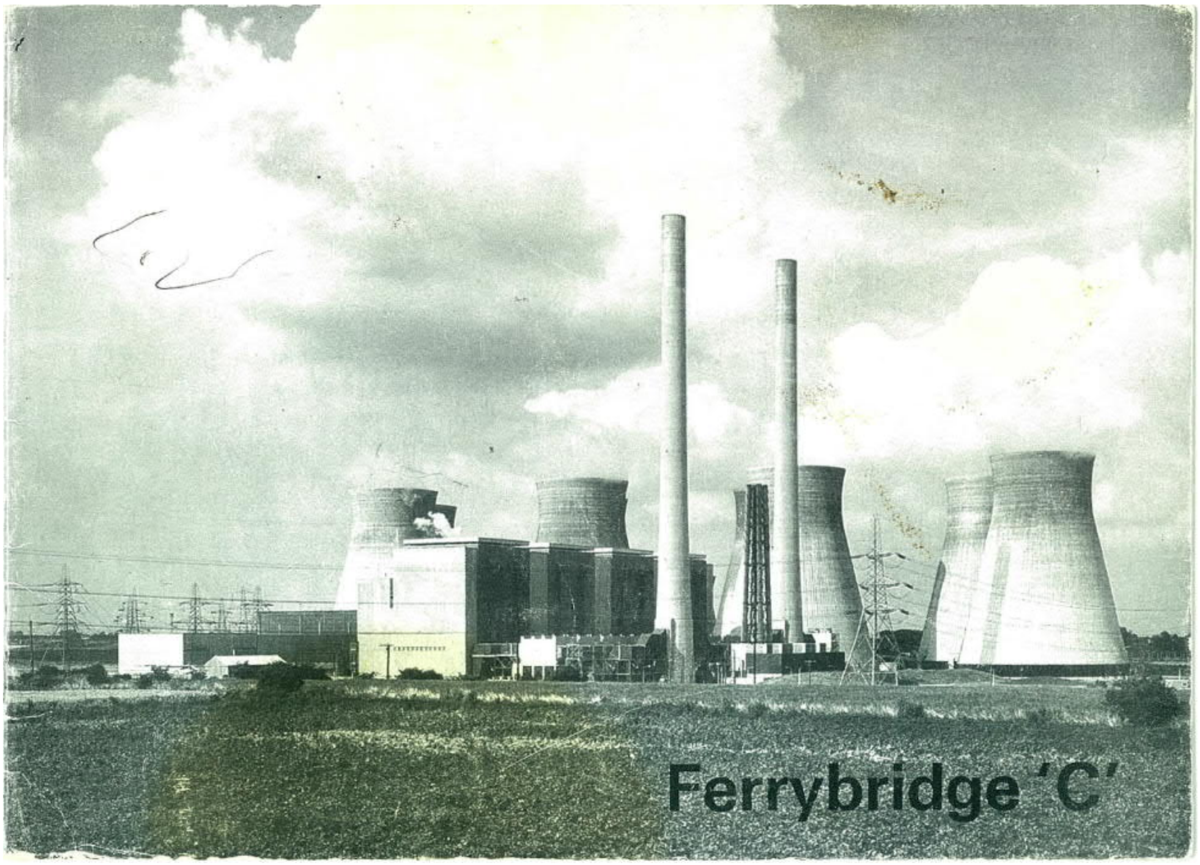

Figure 4. Ferrybridge 'C' Power Station (Souvenir Booklet)

Figure 5. Ferrybridge 'C' power station from the air with the remaining building of Ferrybridge 'A' in the background. Photographed in 2014 (© Historic England)

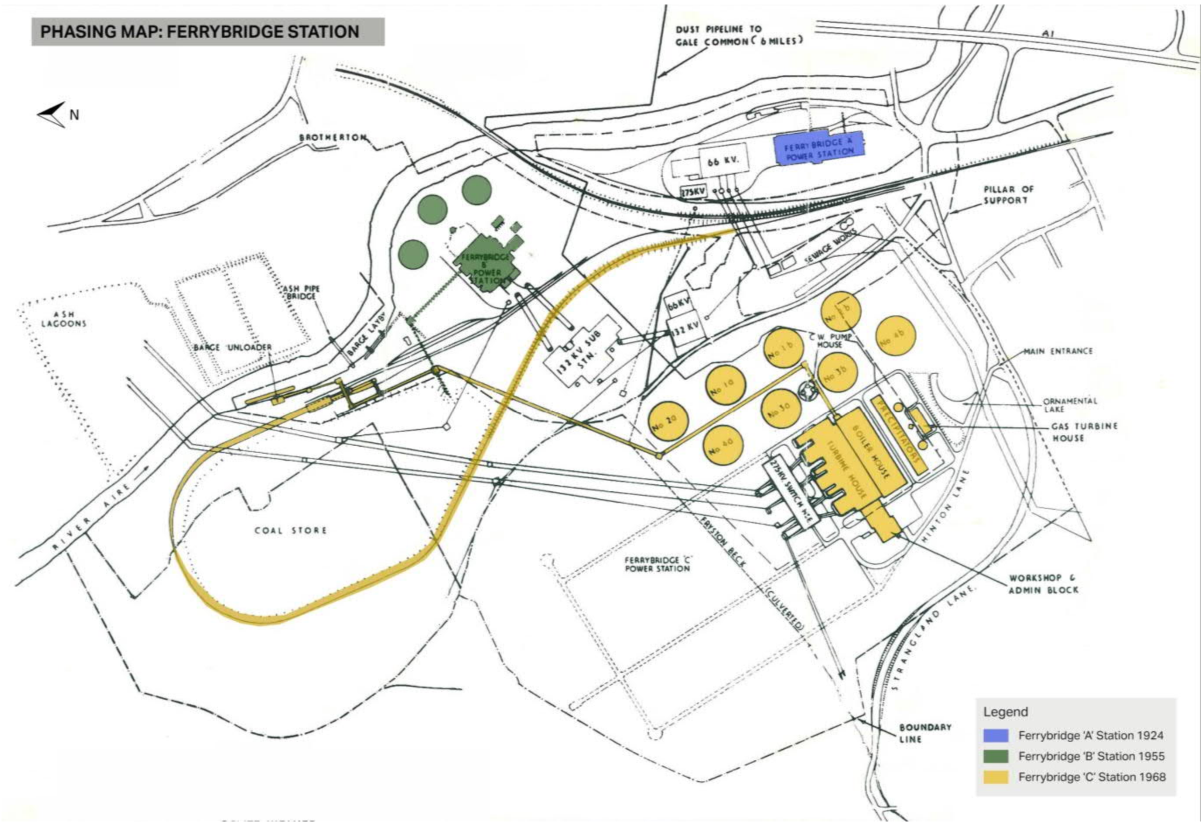

Figure 6: Map of Ferrybridge Power Stations Site Layout in 1966 when all three power stations were designed to work in tandem. Ferrybridge 'A' to the east, Ferrybridge 'B' to the north and Ferrybridge 'C' to the south-west.

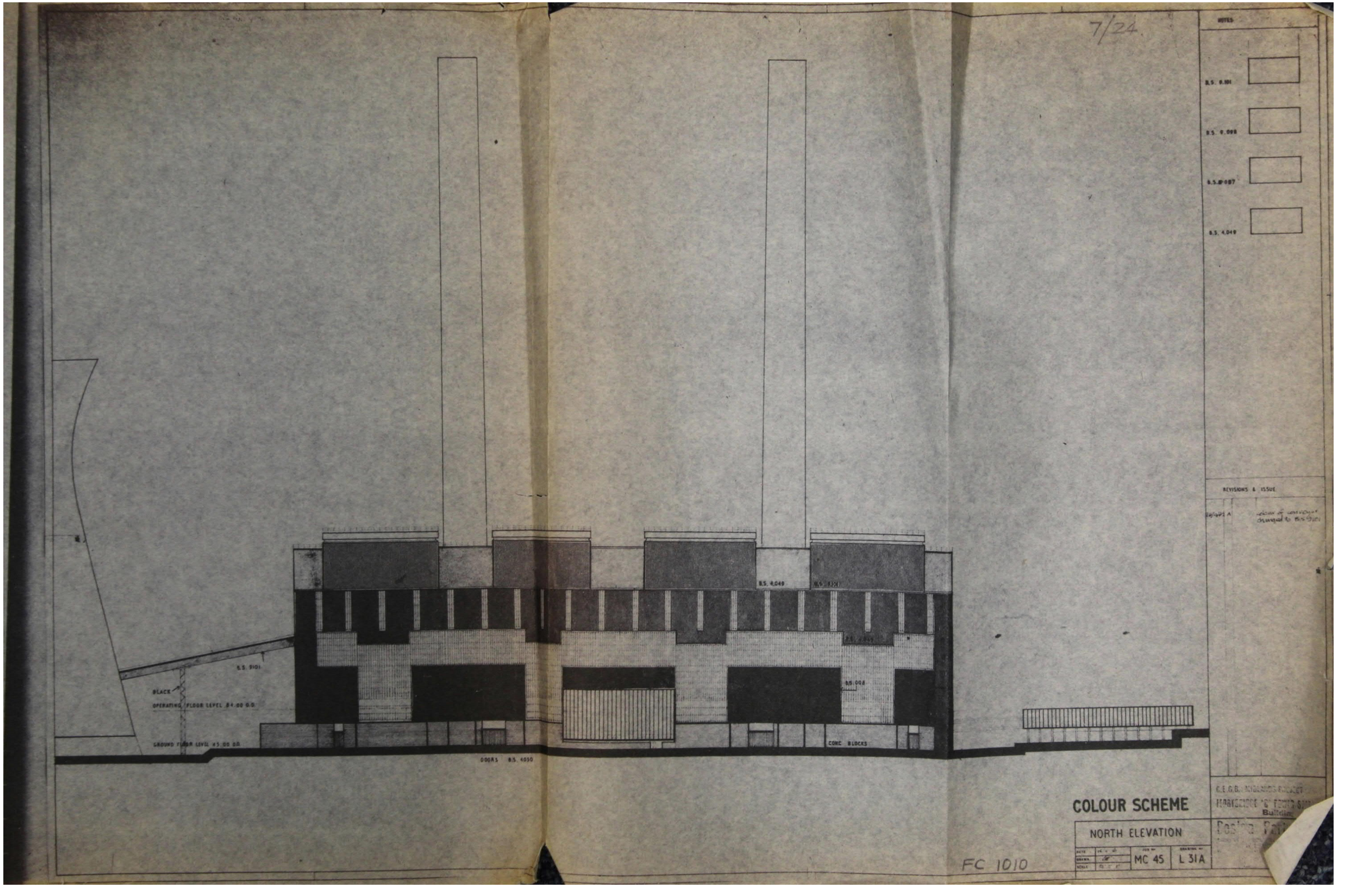

Figure 7. Outline Design Drawing of the north-west elevation of the station, showing the central control block, backed by the turbine hall, backed by the mill bay, backed by the boiler house and the station's chimneys (source SSE Generation Ltd private Archive 1961).

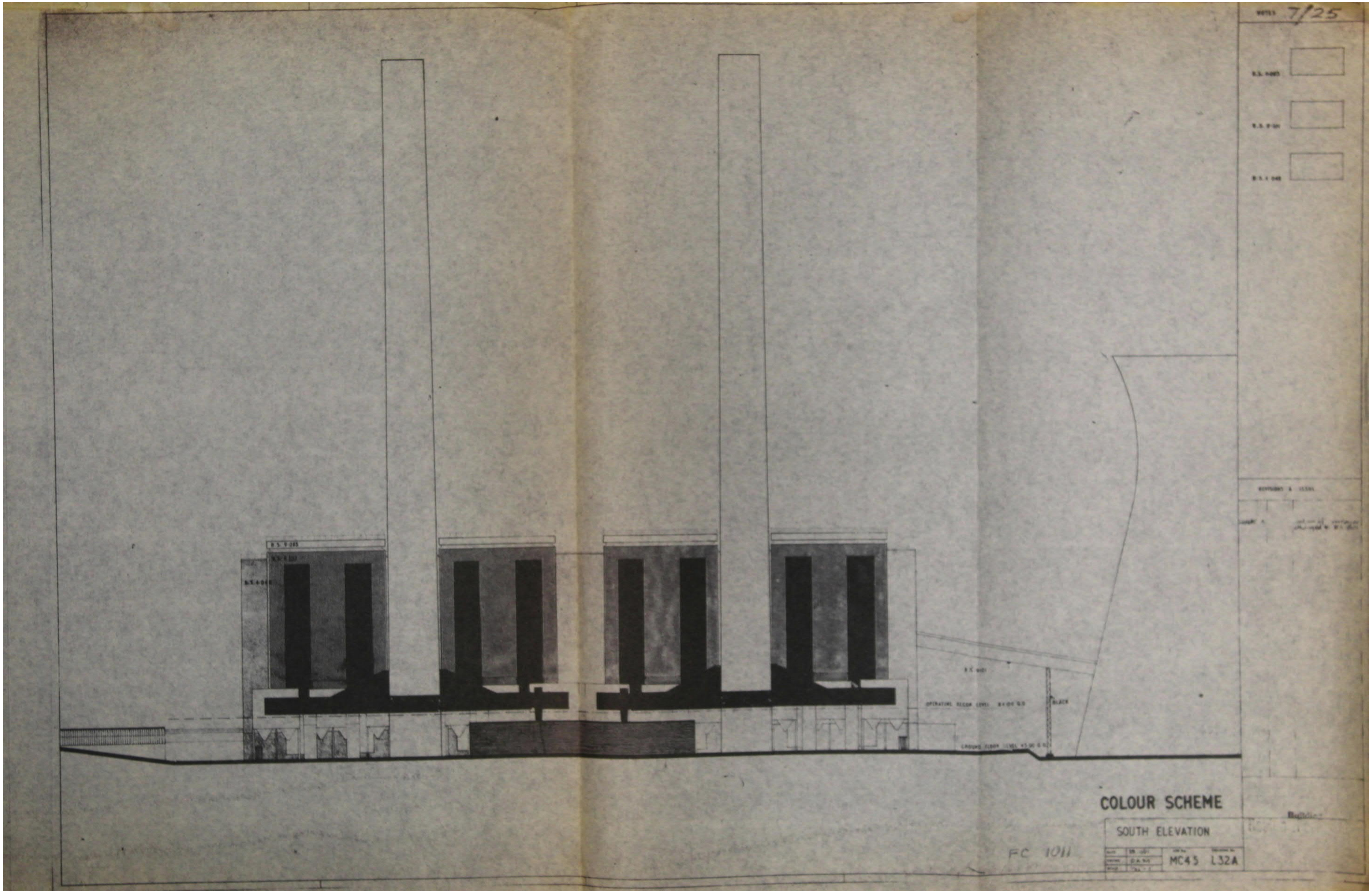

Figure 8. Outline Design Drawing of the south-east elevation of the station, showing the chimneys, precipitators and the boiler house behind.(source SSE Generation Ltd private Archive 1961).

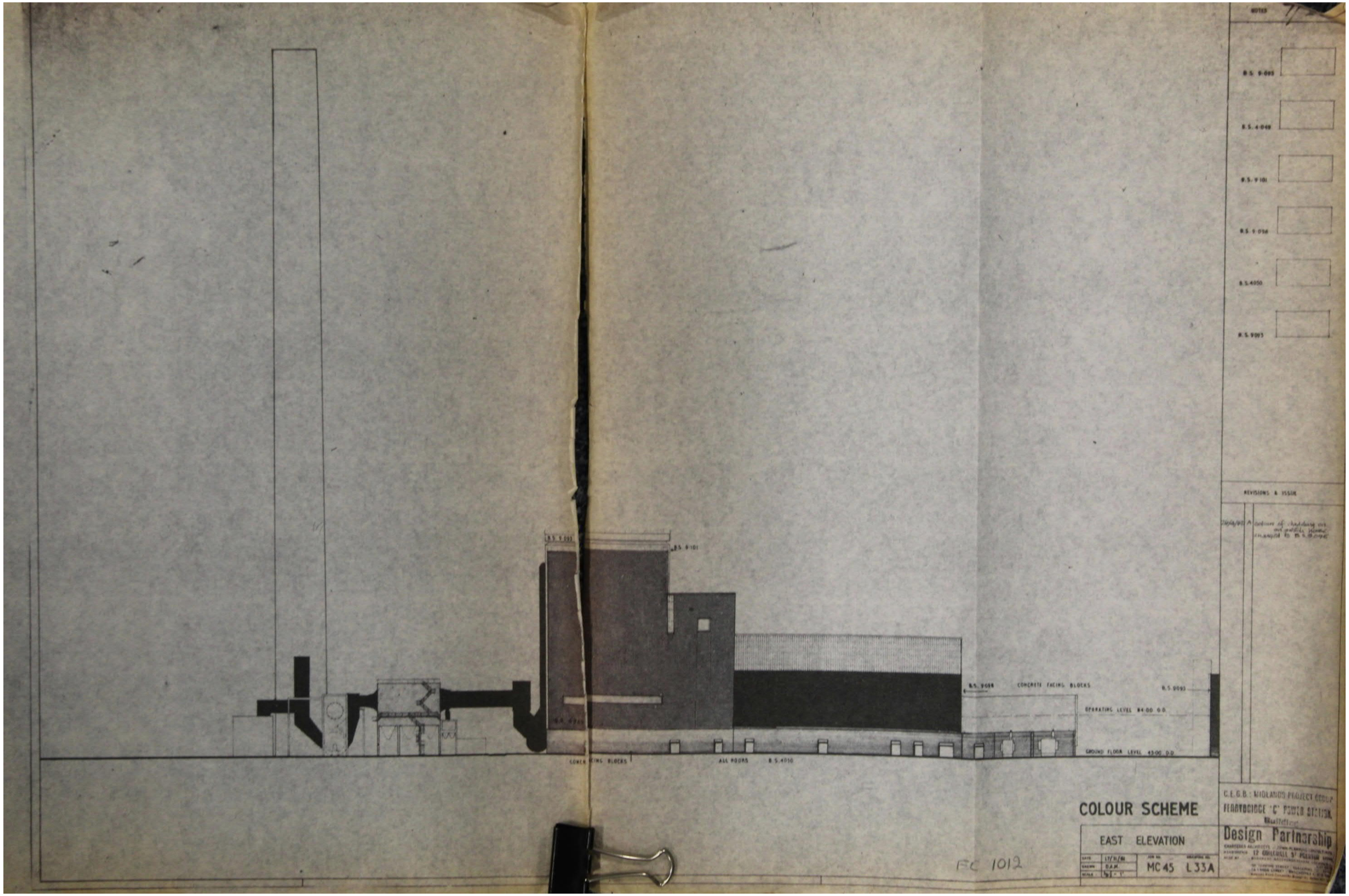

Figure 9. Outline Design Drawing of the north-east elevation of the station, showing (from left to right) the chimneys, precipitators, boiler house, mill bay, turbine house and the control block and transformer station.(source SSE Generation Ltd private Archive 1961).

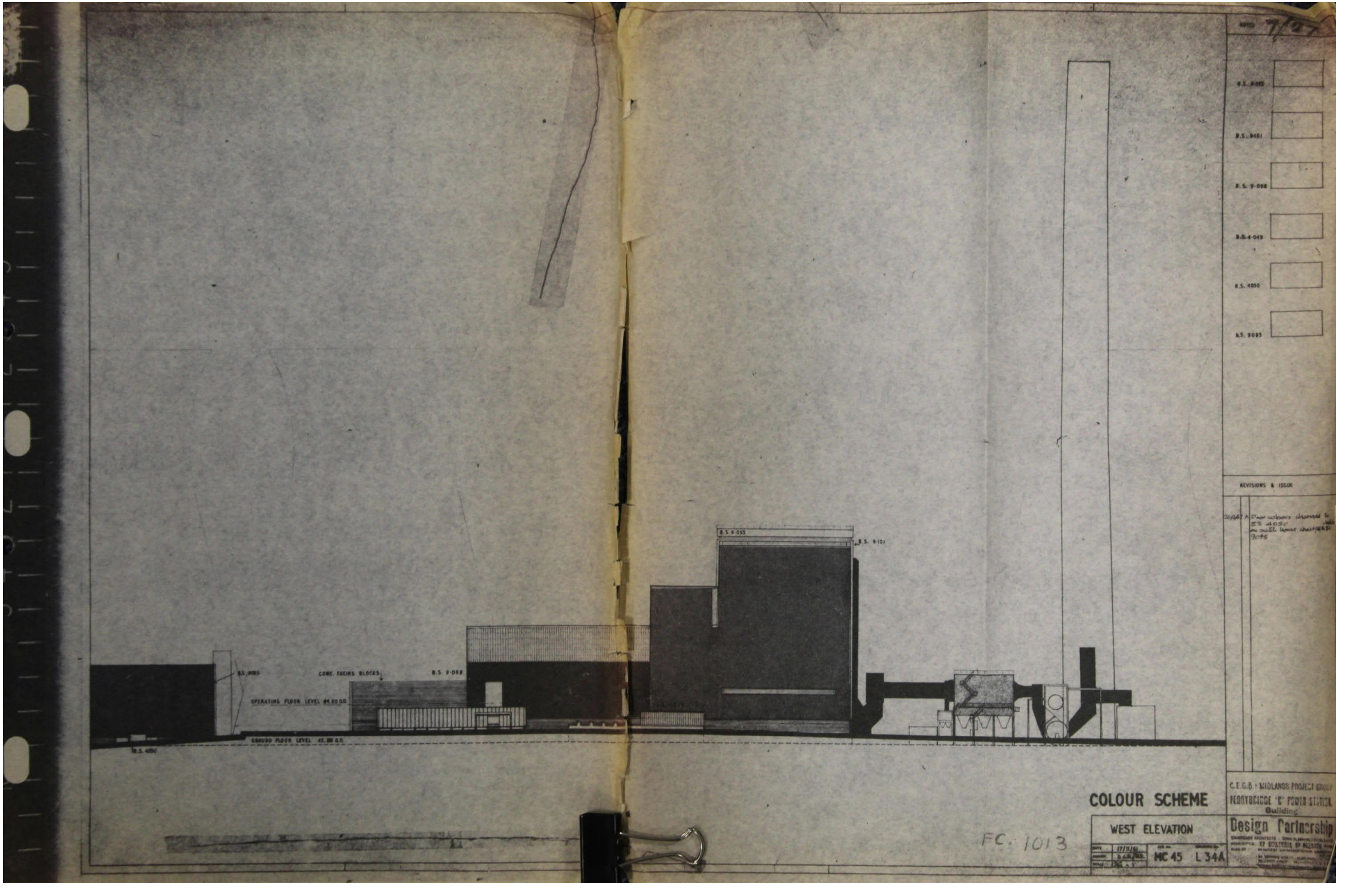

Figure 10. Outline Design Drawing of the south-west elevation of the station, showing (from left to right) the National Grid switch house, the control block and transformer station, turbine hall, mill day, boiler house, precipitators and chimney (source SSE Generation Ltd private Archive 1961).

4. Results of Building Recording

4.1 The building recording was undertaken over a period of three days, 5th – 7th December 2018.

4.2 The following account discusses the elements of the site in the context of the process outlined below. The power station's architecture falls into the popular adage of 'form follows function'. The buildings are merely shells to house the equipment needed to carry out the process. The appearance of the buildings was very much of secondary importance to the process that they were designed to house.

4.3 Ferrybridge 'C' Power Station generated electricity by burning coal to turn water into steam, which then drives electric generators. The process can be summarised as follows (using figures based on the station's full load operation in the 1960s). Approximately 32,000 tons of coal can be supplied daily to the coal stock area by, road, rail, via a merry-go-round system, and canal. From the coal stock it is moved via conveyors to the mill bunker bay and then the boiler house where it is fed into pulverising mills to form a powder, which then fuels four boiler furnaces. About 18,600 tons of coal was burnt each day when on full load. The heat produced converts water, within steel tubes lining the boilers, to superheated steam at a temperate of 568 degrees centigrade. The steam supplies four turbo-generators within the turbine hall, which convert mechanical energy into electricity that is then fed through a switch-gear and into the National Grid. Some of the steam is cooled in condensers after passing through the turbines, and then returned into the boilers to be re-heated. After use, the condenser water is circulated through eight cooling towers. These can cool 6.3 m gallons of water per hour before it re-enters the system. Approximately 13 m gallons of water are drawn from the River Aire each day to make up for evaporation losses. Waste gasses from the boilers pass through dust collectors and precipitators, designed to remove dust particles, before being dispersed via two chimneys. Ash and dust is also extracted from the boilers into hoppers, mixed with water to form slurry, and then pumped either to the Brotherton Ings disposal area 1.5 miles away or to the Gale Common disposal area six miles away. The boilers, turbines and auxiliary plant are all operated from a central control room. Figure 11 provides a schematic overview of the operation at Ferrybridge 'C'.

4.4 The following account of the main station buildings follows the process in a logical fashion, beginning with the delivery of coal and its transport to the main station buildings.

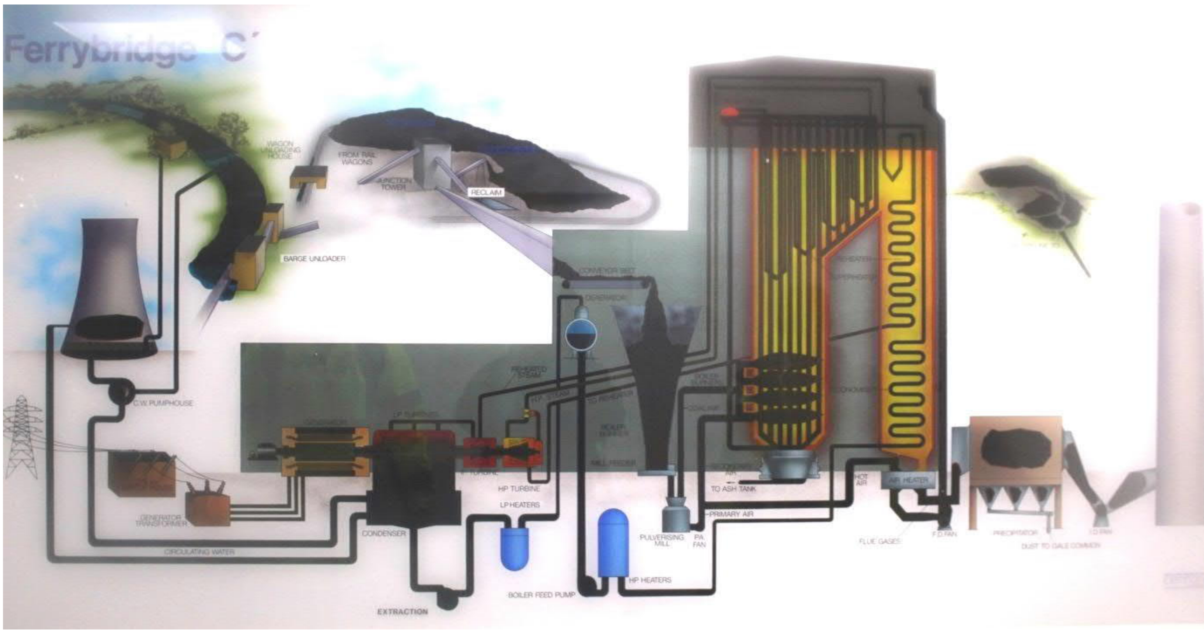

Figure 11. Schematic overview of the main process at Ferrybridge 'C' Power Station

Coal Delivery, Storage and Transport to Station

4.5 The delivery, storage, and the means of transport to the main station have been the subject of a separate building recording, that has been uploaded to the ADS archive. In summary, the coal for the power station was delivered by multiple modes of transport; rail, canal and road (Figure 12).

4.6 The coal which was delivered by rail came via the main railway line to the south-east which then linked to a loop line, called the merry-go-round, located to the east of the cooling towers. The train would deliver the coal to rail unloader without stopping, the waggons had hopper bottoms which automatically emptied the coal onto a conveyor which took the coal to a stock pile or into bunkers.

4.7 The coal which was delivered by canal was unloaded using a purpose-built barge unloader (or barge tippler) north of the power station, on the west bank of the River Aire. The unloader was designed to facilitate the delivery of up to 2 million tons of coal annually. The barges travelled along the Aire and Calder Navigation towards the barge unloader which lifted the barges from the water and extracted the coal into a concrete hopper before returning the barge to the water. This mode of delivery was used between 1966 and 2002.

4.8 The coal which was delivered by road was unloaded into an underground hopper and fed into the system of conveyors and towers that eventually moved all of the coal, from all three sources, to the mill bay in the main station. It first passed through a number of towers were interim processing took place. These processed were generally gravity-fed.

4.9 The coal was originally stored to the north of the power station over a 47 acre stockpile area and initially served both the ‘B’ and ‘C’ stations.

4.10 The operation of the coal handling plant was managed from the Coal Plant Administration Building, located to the west of the barge unloader and rail unloader, and to the east of the coal stockpile area. It is contemporary with the power station, although a single-storey brick-built amenity building was added to its south side in 1988. The administration building is brick-built, of two-storeys under a flat felt roof (Figure 13). There is a majority-glazed projecting control room at the first-floor, south end of the original building. The building contains offices, switch room, first aid room, lockers, toilets, and vehicle maintenance bays. The amenity block added in 1988 contains locker rooms, showers, drying rooms, toilets and a mess hall, repeated for ‘dirty’ and ‘clean’ usage.

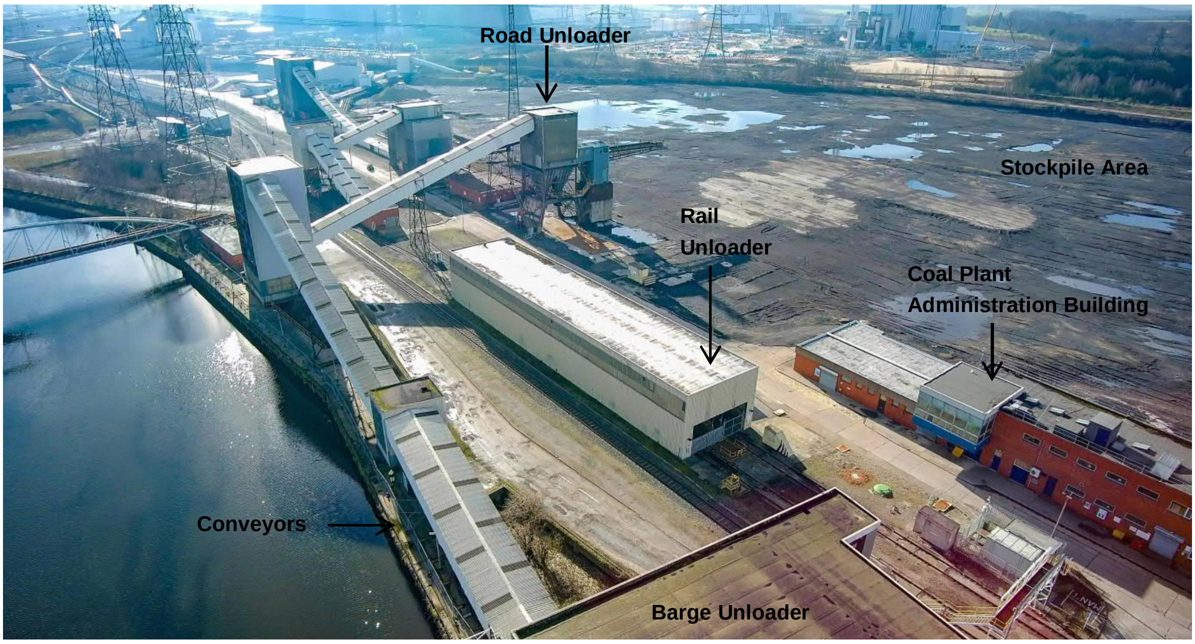

Figure 12. Overview of the coal handling facilities, looking from the top of the barge unloader south-west towards the main station.

Figure 13. East elevation of the Coal Plant Administration Building, taken from the upper level of the barge unloader looking west.

Mill Bay and Boiler House

4.11 The mill bay is located in the main station buildings, comprising the conjoined mill bay, boiler house and turbine. The mill bay forms part of the boiler house, but its location is distinguishable externally as a narrow bay of lower roof height (Figure 14). The mill bay and boiler house are constructed of a semi-rigid steel frame with a concrete block wall below the operating floor level. They are clad in vinyl coated aluminium sheeting. Both have flat roofs, although the roof of the boiler house is heightened in four sections over the four boilers. The south-west elevation of the main station has had its cladding renewed to improve its appearance from the A1 adjacent to the site. The north-east elevation retains the original corrugated steel sheeting (Figure 15). There are no windows in the mill bay and therefore no natural to the interior, except borrowed light from the boiler house, which is minimal.

4.12 The boiler house is 196m long, 45m wide and 62m high. It contains four top-hung 500 MW boiler units which were manufactured by Babcock & Wilcox Ltd. They were the first boilers in the country to have membrane type furnace walls. The boilers were fed by coal dust injected from the base of the mill bay. The south-west and north-east elevations have been discussed above in terms of their external appearance (Figures 14 and 15). This leaves the south-east elevation of the building which faces onto the station's precipitators units and chimneys. The precipitators have been extended since the original construction of the power station (see description to follow), but originally the south-east elevation of the boiler house had four panels of almost floor-to-ceiling glazing, that would have allowed significant natural light into the boiler house, and probably also the mill bay. This natural light has been largely blocked by the precipitators, but the glazing can be seen in distant and close-up views of the structure, behind the chimneys and between the precipitator units (Figures 16 and 17).

4.13 The coal conveyors deliver the coal to the upper level of the mill bay. The upper level contains four large bunkers. Shuttle units feed the coal from the conveyors into the mill bay bunkers through grates. From the bunkers coal is gravity-fed into the 32 mills on the ground level of the mill bay (8 per boiler) where the coal is crushed to a fine dust and injected into the boilers with the assistance of fans blowing hot air taken from the boiler's exhaust, to improve the coal burning process (Figures 18-20).

4.14 The four top-hung boilers consist of miles of tubing which fill the full volume of space within the boiler house. This is added to pipework, handrails hoppers and ladders all creating a congested space (Figures 21-28). Pure boiler feedwater is stored on the upper level of the boiler house in large tanks (Figure 24), the weight of the tanks necessitating a reinforced concrete floor in that area. The water is fed into the boiler to be turned into steam. Access throughout the boiler house is provided by means of ladders and metal floors, the floor levels are measured by the number of feet off the ground as opposed to first, second and third etc. The floors are perforated, most-likely to allow light to pass through (Figure 25).

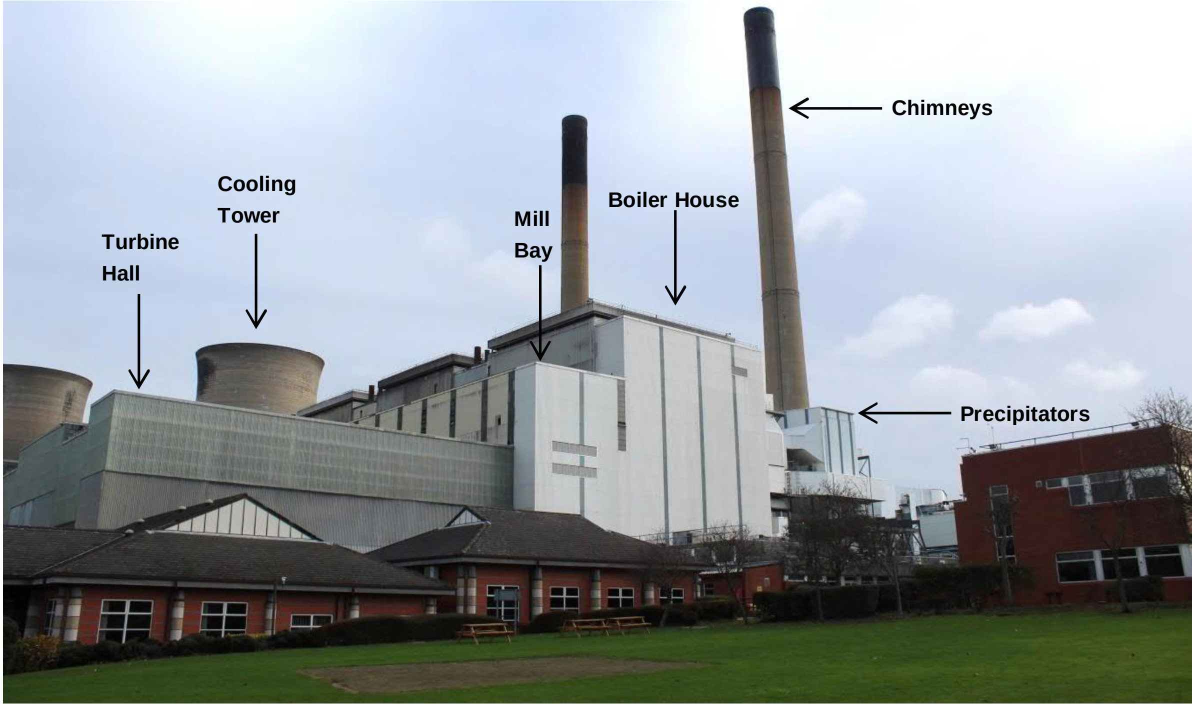

Figure 14. View of the south-west elevation of the main station with the main components labelled.

Figure 15. North-east elevation of the main station buildings, showing the coal conveyor entering the mill bay at high level. Note the difference in cladding between this elevation and the south-west elevation (Scale 2m).

Figure 16. The south-east elevation of the power station showing the base of a chimney and the precipitator arrangement. The glazing and original cladding of the south-east elevation of the boiler house is visible behind.

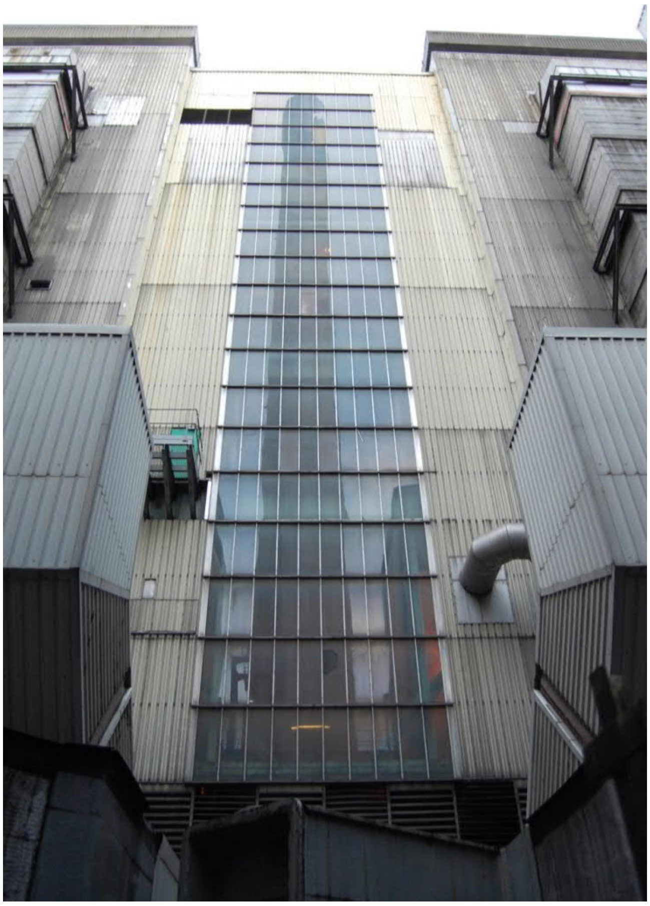

Figure 17. Detail of the glazing on the south-east elevation of the boiler house.

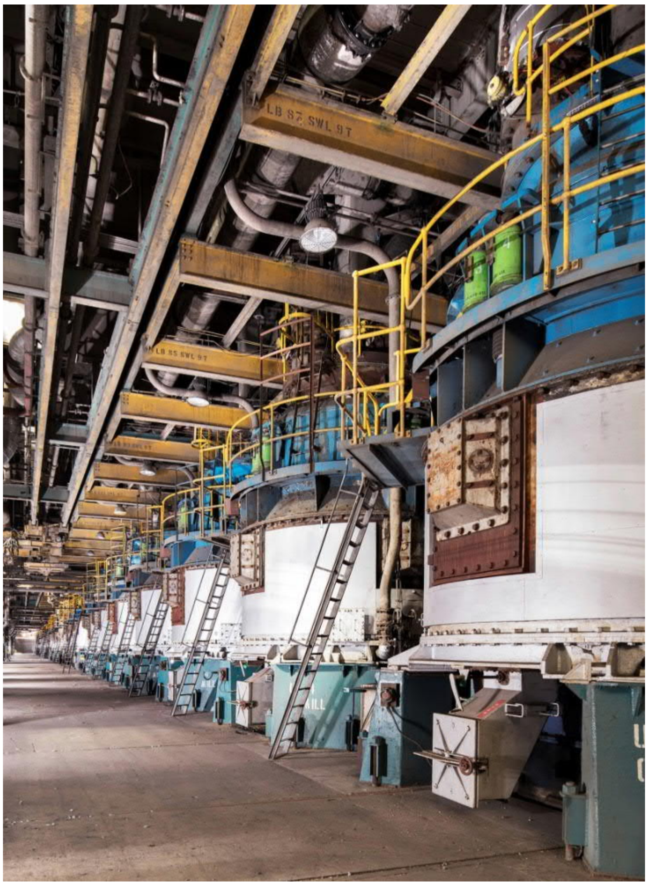

Figure 18. View north-east along the 32 coal mills at the base of the Mill Bay (© Historic England).

Figure 19. Ducting from the rear side of the mill bay taking the ground coal dust to the boilers.

Figure 20. Two views of the ducting and fans to the rear of the mill bays transferring the coal dust to the boilers (Scale 2m).

Figure 21. Ash reclaim bays at the base of the boilers.

Figure 22. General view at the base of the boilers

Figure 23. General view in the boiler house.

Figure 24. Pure boiler feedwater storage tanks in the upper level of the boiler house.

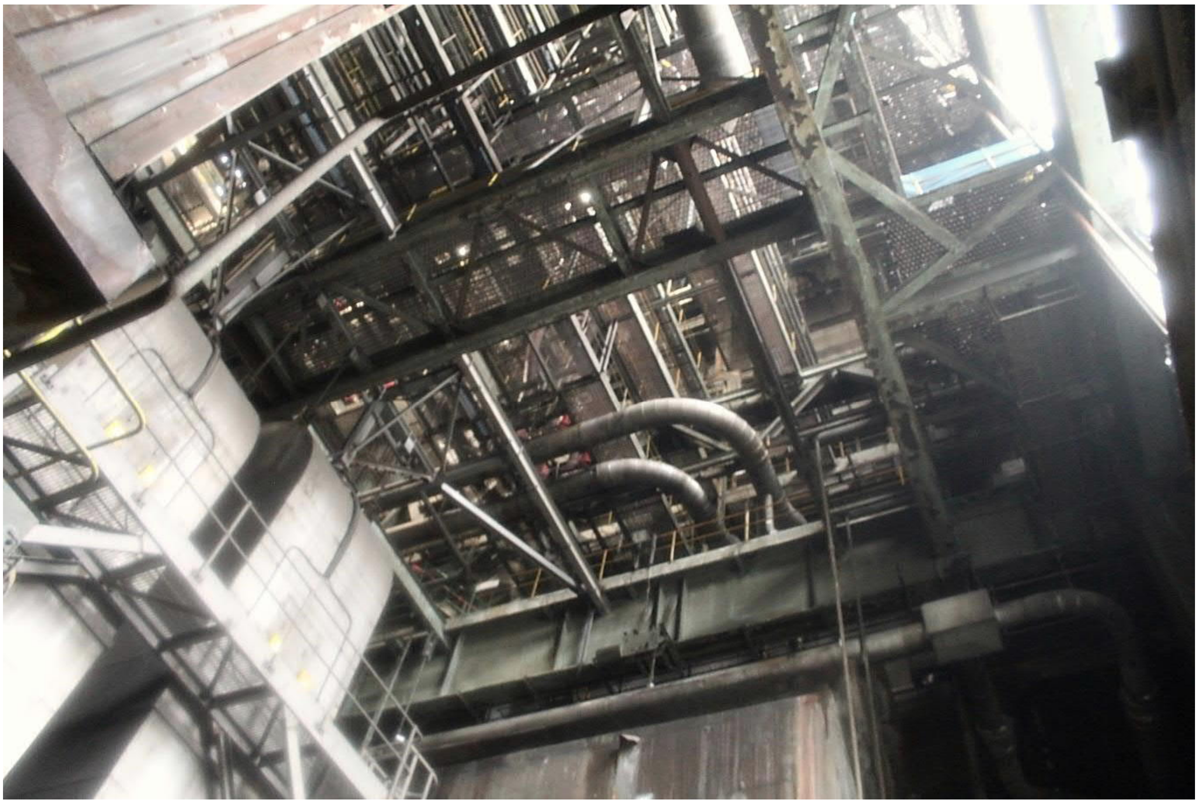

Figure 25. General view in the boiler house showing the perforated metal floors and access ladders.

Figure 26. General view in the boiler house showing congestion.

Figure 27. View of reject hoppers at the base of the boilers.

Figure 28. General view at the base of the boiler house.

Turbine Hall

4.15 The turbine hall is located to the north of the boiler house. The building is constructed of a steel and concrete frame clad with vinyl coated grey aluminium sheeting. It is 185m long by 44m wide and 23m high. The upper level is entirely glazed, although this is not apparent externally. The bays between the turbines are glazed to a lower level to bring as much natural light as possible into the lower portion of the turbine hall. Like the boiler house, the roof of the turbine hall is flat, but is raised in sections to reference the four turbines inside (Figure 29).

4.16 The high pressure steam generated in the boiler house is transferred in ducting from the boiler house, past the mill bay, and into the turbine hall. It contains four single shaft turbo-generators (Figures 30-34) manufactured by C. A. Parsons & Co. Ltd. The high pressure steam is passed through the high, intermediate and low-pressure cylinders of the turbine, with an intermediate stage where the steam is sent back to the boilers for reheating. This makes the most efficient use of the steam pressure. The steam spins angled blades within the turbine and rotates a long shaft which is linked to the generator. Heaters adjacent to the turbines assist in this process by preheating the turbine so that the steam does not condense inside (Figure 35). The depressurised steam is then passed into condensers in the base of the turbine (Figure 36).

4.17 The turbine hall also contains three integrated cranes, bearing the maker's plate 'Cowans Sheldon 1963 Carlisle'. They are each capable of lifting a maximum of 200 tons. These would be used in the initial installation of the turbines and for maintenance (Figures 37 and 38). Throughout the turbine hall there is a complex array of interconnected and overlapping pipework and ducting that was designed to fit the space and to take the most efficient route to their destination. The pipework is colour-coded by function, for example the red coloured emergency fire water supply. Coupled with the scale of the space; the overall effect is both functional and aesthetic (Figure 39).

4.18 The generator is at the end of the turbine and contains a magnet, the rotor, which is rotated to produce electricity. Cables run from the generator the transformer station outside the north-west end of the turbine hall (Figures 40-42). Power is generated at 22,000 volts, then boosted o 275,000 volts or 400,000 volts in the generator transformer before being transferred via electricity cables to the national grid switch house located across the access road, north-west of the main station buildings. The connecting cables were removed when the station closed.

Figure 29. North-west and south-west elevations of the turbine house.

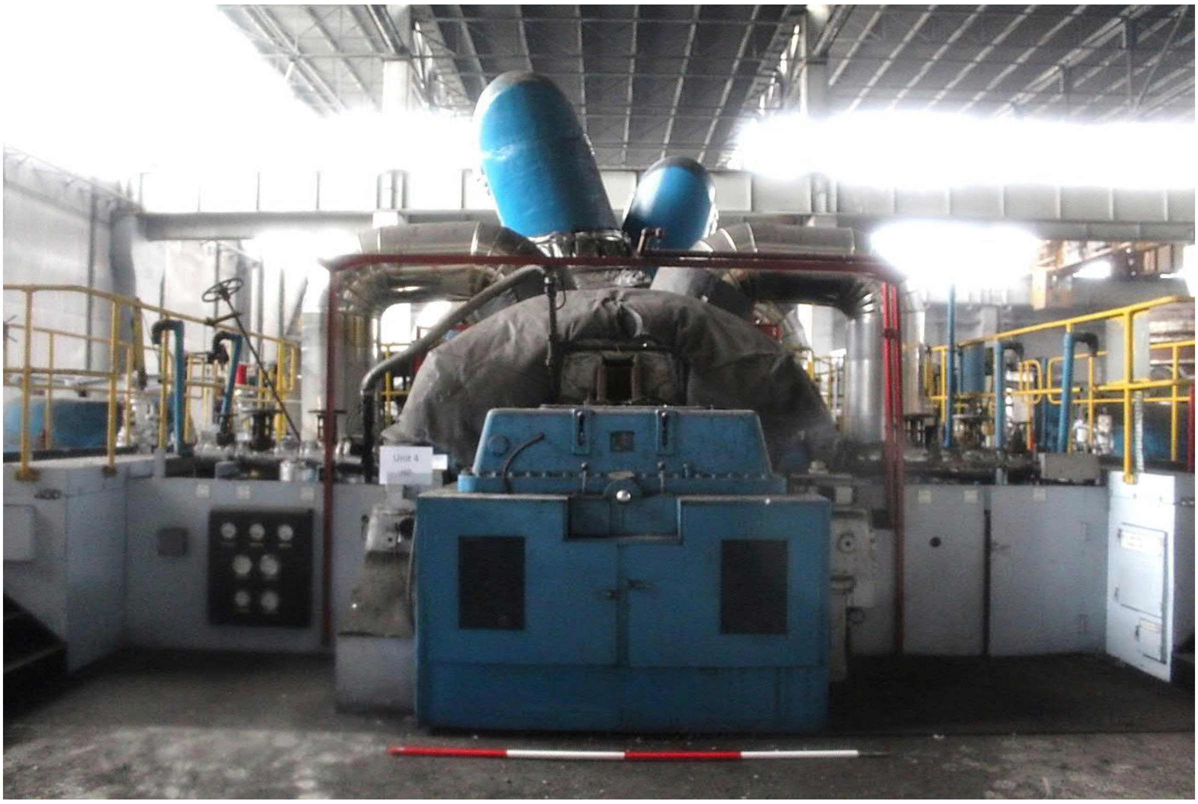

Figure 30. The high-pressure end of No. 4 turbine (Scale 2m)

Figure 31. View of No. 4 turbine (Scale 2m).

Figure 32. View of No.4 turbine showing the generator.

Figure 33. View of the full height of the turbine within the turbine hall (part 1).

Figure 34. View of the full height of the turbine within the turbine hall (part 2).

Figure 35. Heaters adjacent to the turbine.

Figure 36. View of the top end of the condenser integrated into the base of the turbine (Scale 2m).

Figure 37. General view within the turbine hall, showing the integrated crane (© Historic England).

Figure 38. General view within the turbine house (© Historic England).

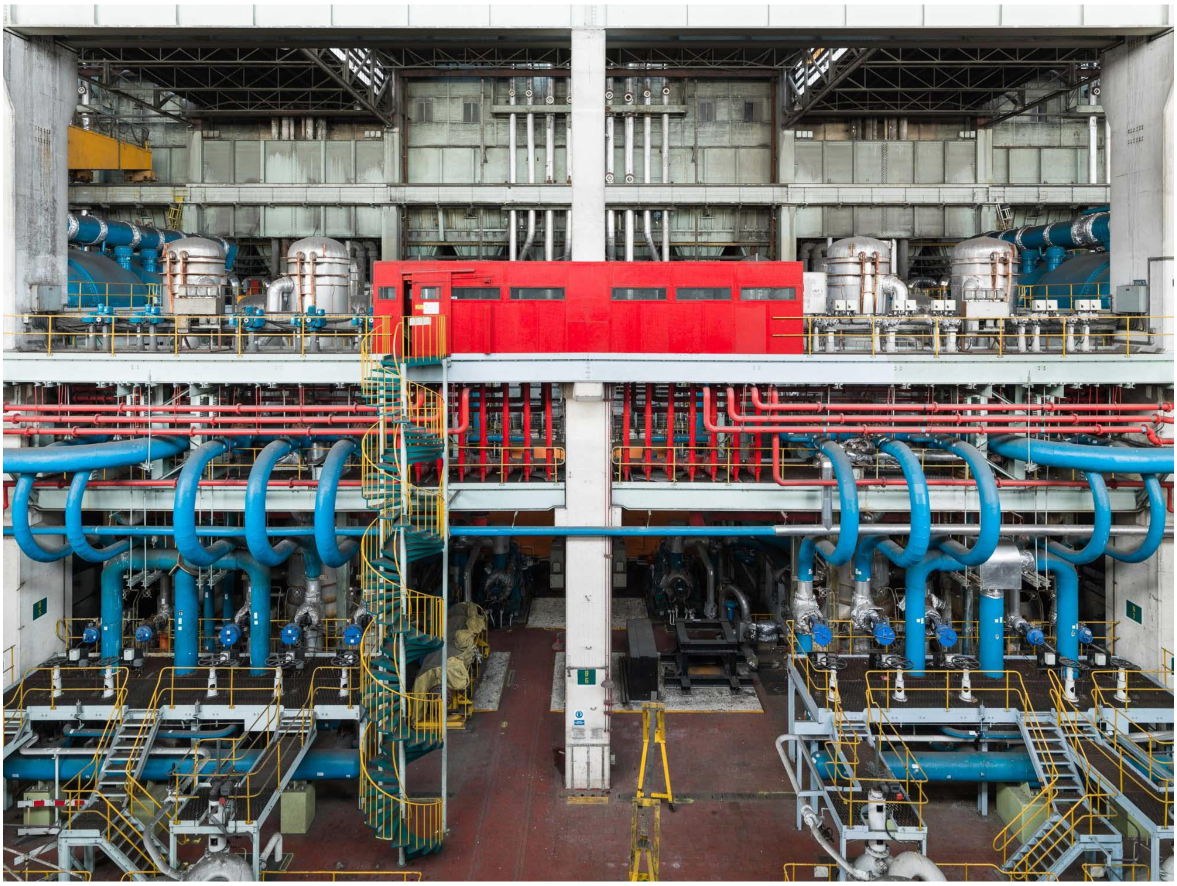

Figure 39. General view within the turbine house (© Historic England).

Figure 40. Exterior of the turbine hall showing the transformer station at its north-west end (Scale 2m).

Figure 41. View of the transformer station to the north-west of the turbine hall (Scale 2m).

Figure 42. View from the transformer station across to the national grid switch house.

Control Block

4.19 The control room is located in a structure that projects from the centre of the north-west wall of the turbine hall. It is constructed of concrete blockwork with a fully glazed north-west wall and a flat steel-framed roof (Figure 43). It controls the running of the boilers and turbine units, auxiliary plant and emergency gas turbines.

4.20 A dedicated control room occupies the entire upper level of the control block, accessed from the upper level of the turbine hall, or from its internal staircase. The original station's Outline Design Planning Application documents (SSE Generation Ltd private archive) state that the concept of the central control room on the upper level is to supervise the operation of the units and to switch on the substation from this part of the station, without having to be in the main plant buildings. The unit control desks and panels were arranged around the edge of the room in an oval layout and each unit was controlled by two operators (Figures 44-48). The ceiling has a decorative oval panel containing the lighting units and the floor covering is of vinyl tiles, now bearing the SSE logo.

4.21 The remainder of the building was designed simply and functionally, with terrazzo tile used for some floor areas and staircases (Figure 45). The two levels below the control room are dedicated relay rooms and cable rooms; these are filled with switch boxes, servers, fuses and batteries (Figure 46 and 47). The first floor contains auxiliary offices for the efficiency department, a chart room, a long term panning office, and offices for branches of engineering services, such as plant performance and computing (Figure 49). The ground floor was dedicated to battery stores, the batteries now removed.

Figure 43. Exterior of the control block, located on the north-west side of the turbine hall.

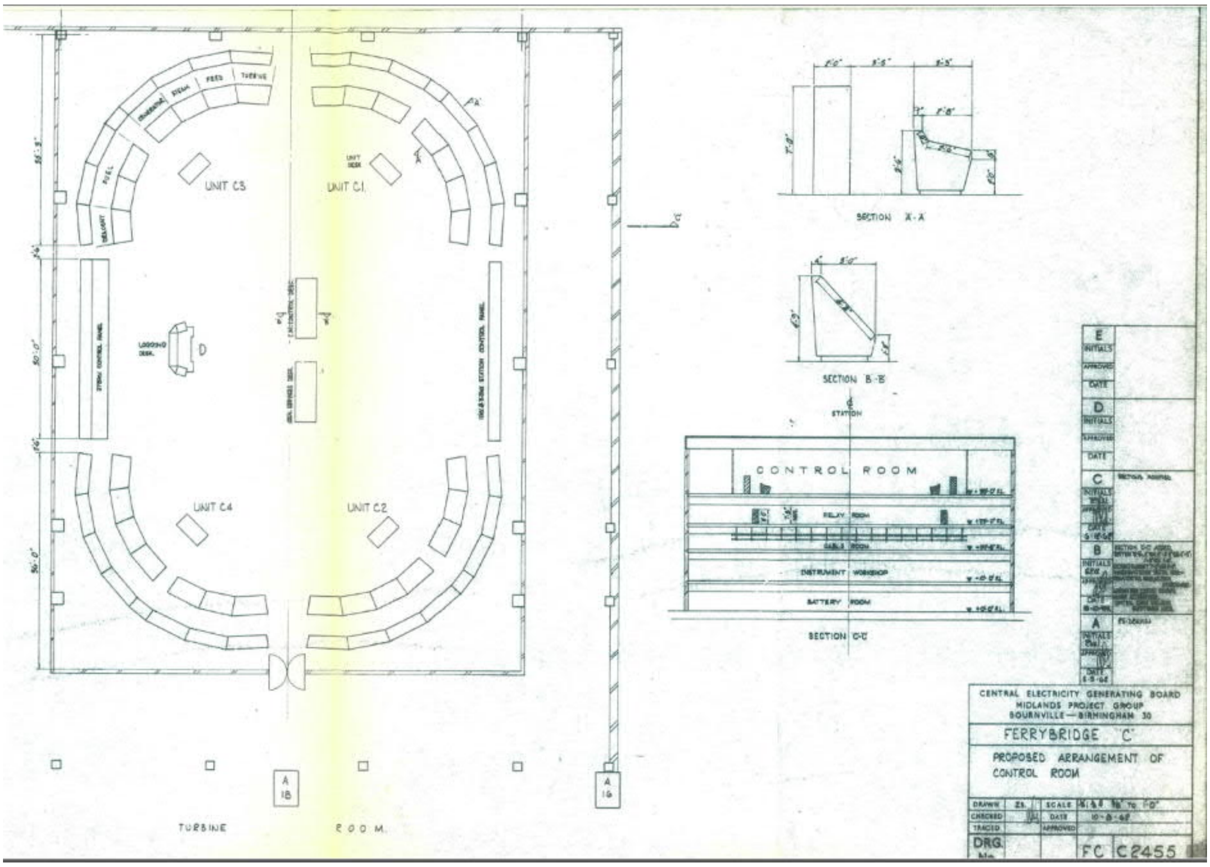

Figure 44. The original 1968 Outline Design plans of the control room (source: SSE Generation Ltd. Private Archive)

Part of the Central Control Room

Figure 45. Photograph of the control room in operation in 1968 (source SSE Generation Ltd. Private Archive).

Figure 46. Control room, looking south-east towards turbine hall.

Figure 47. Control room, looking north-west towards the National Grid switch house.

Figure 48. Detail of the control panels in the control room.

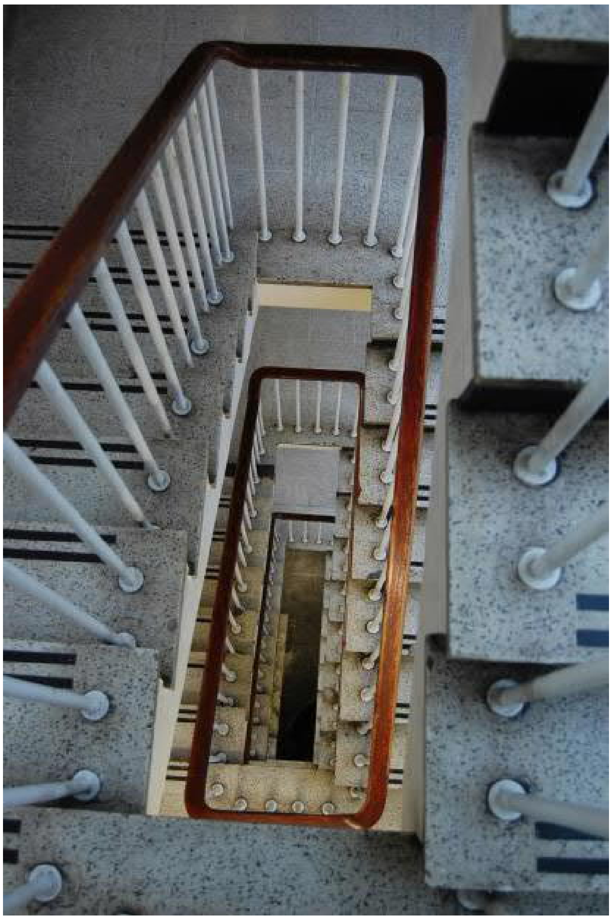

Figure 49. Stairwell, control block, 2017

Figure 50. View of the glazed north-west wall of the control block, using secondary glazing, behind the control room units.

Figure 51. General views within the relay room on the third floor of the control block.

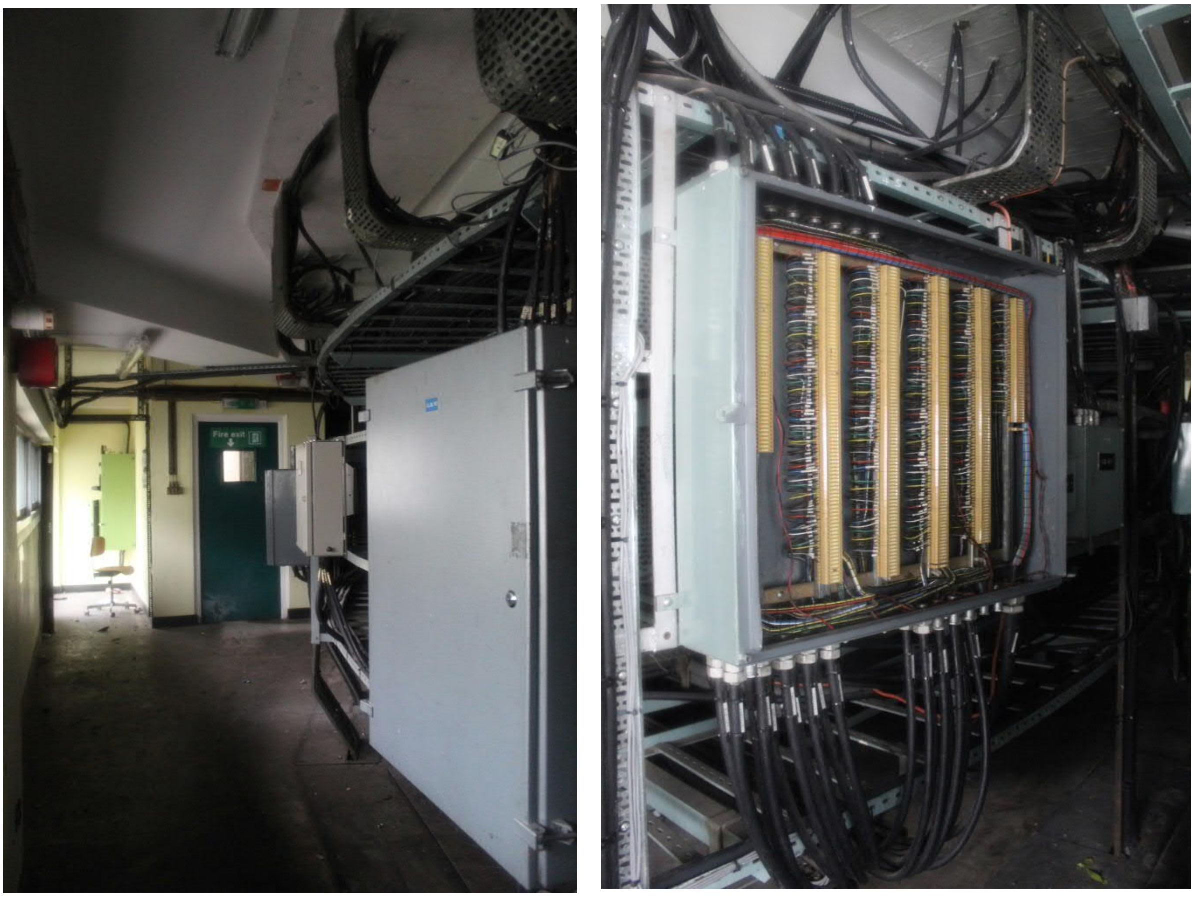

Figure 52. General views of the cable room on the second floor of the control block.

Figure 53. Example view of the offices on the first floor of the control block.

Precipitators and Chimneys

4.22 At the opposite end of the station buildings to the control room, the south-east elevation of the boiler house leads onto the station's electrostatic precipitators and chimneys (Figure 54-55).

4.23 The waste gasses from the boiler house are passed through mechanical dust collectors and the station's precipitators where over 90% of the pulverised fuel ash waste product is removed from the waste gases. The pulverised fuel ash is collected at the base of the precipitators and sold for use in construction. Any surplus is disposed of in worked-out gravel pits to the north-east of the station. The resulting cleaned gases are then dispersed from the station's two 650ft high chimneys located at the south-eastern end of the station.

4.24 The chimneys are built from reinforced concrete with dust hoppers at the base of the chimney. The chimneys measure 59ft 3inches at the base and 33ft 2inches at the top (Figure 56). The shell thickness varies from 7.5inches to 24inches and is lined with acid resisting bricks which are supported on reinforced concrete corbel rings. Two vertical lines of non-ferrous steeplejack access sockets with cappings are provided from the base to the top of the chimney. At each lighting level and at the top of the chimney there are rings to give access for maintenance.

4.25 Since the initial development of the station in 1968, environmental standards for emissions have been altered several times and this has led to two extensions to the precipitators in order to remove more of the waste product from the gases. The first phase of extension took place in the 1980s and consisted of a second set of precipitators, built on top of the first. This necessitated enclosing the first phase precipitators inside a steel frame to carry the weight of the added precipitators above. The second phase of extension took place after 1994 and saw a third set of precipitators added, this time infilling the space between the original precipitators and the boiler house. These additions restricted natural light to the boiler house, but were necessary to keep the station compliant with emissions regulations. The three phases of precipitators are easily readable in views of the station (Figures 57 and 58).

Figure 54. Overview of the station's south-east elevation showing the precipitators and chimneys.

Figure 55. View south-west along the line of precipitators with one of the station's chimneys to the left.

Figure 56. Detail of the one of the stations two chimneys.

Figure 57. Overview of the south-west elevation of the precipitators, showing the three phases of construction labelled in red (© Historic England).

Figure 58. Archive image of the same view as Figure 57 in 1994 showing the station prior to the addition of the third set of precipitators and prior to the upgrading of the cladding on the south-west elevation of the station (source: SSE Generation Ltd. Private Archive).

Cooling Towers

4.26 The collapse in high winds on 1 November 1965 of three of Ferrybridge 'C's eight water cooling towers resulted in a number of recommendations and minor changes in design for cooling towers across the country. An inquiry found there was an underestimation of the amount of reinforcement needed to resist severe wind loadings and the use of single layer reinforcement was considered inadvisable. The CEGB led studies into the dynamic stresses arising from turbulence and the effects of tower groupings; which led to those towers still under construction at other sites, such as Eggborough, to be modified wherever that particular structure had not progressed too far. Following the investigation, the five remaining cooling towers at Ferrybridge 'C' were strengthened with a second layer of concrete to the outside of the towers, whilst the three towers that collapsed were rebuilt using a double skin design which has since been a standard regulation for cooling tower construction (Figure 64).

4.27 The Ferrybridge 'C' cooling towers were designed by C. S. Allott and Son (Figure 59) and at the time of their construction they were considered to be the largest of their kind, although they were based on the same design as cooling towers which had been constructed in previous years. As with most power stations, the distinguishing feature of the Ferrybridge site are its eight cooling towers which are a visible features in the landscape for miles around, and which dominate close in views of the station (Figures 60 and 61). The cooling towers are 377ft tall, constructed of concrete (Figure 62). They are grouped together to the east side of the main station buildings, in two rows of four and staggered into a checkerboard pattern.

4.28 The warm water from the condensers within the boiler house is transported to the cooling towers where it is sprayed over plastic packing material in the base of the tower. The distinctive hourglass shape of the cooling towers draws warm air up through the concrete tube; this cools the water for it to then pool back at the base of the tower. Once cooled the water is recirculated back into the power station via surface channels which flow into a moat situated centrally within the cluster of towers (Figure 63). The water re-enters the station through inlet ducts into concrete volute pumps. Some water evaporates through the cooling towers as steam, so additional water was taken from the River Aire.

4.29 The cooling towers span 290feet in diameter, weigh 8000 tons and have a concrete structural membrane of 12 inches at the hips, 5 inches at the throat and 14 inches at the top. Access into the towers was provided using external concrete steps, built in a brutalist style with a central, massive concrete pier supporting concrete cantilevered steps. Additional support for the steps is now also provided by metal brackets. The doorways into the cooling towers are coffin-shaped and fitted with timber plain doors (Figure 65). Inside the cooling towers the main floor is simply a grate to allow steam to pass through and the cooled water to trickle down. Each tower has a central water channel, and at each end there is access down metal steps into inspection areas in the base of the towers, where the inlet pipes and plastic packing material is located (Figures 66-69). Access into the cooling towers would be restricted during operation.

4.30 With the warm water cooled in the cooled in the cooling towers and transported back to the station, the main operation cycle of the power station was complete.

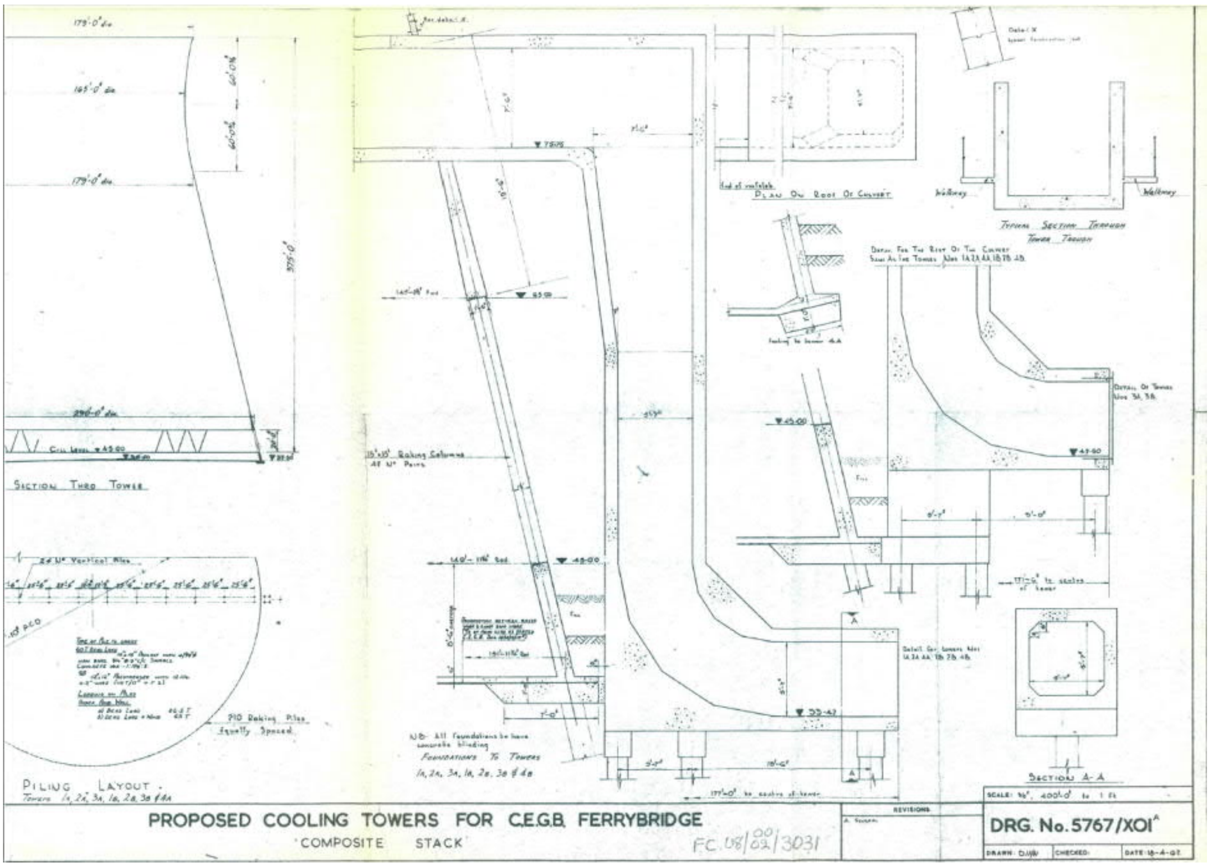

Figure 59. Proposed design for the cooling towers, CEGB, 1962 (source: SSE Generation Ltd private archive)

Figure 60. The cooling towers viewed from showing the presence in the local landscape.

Figure 61. Detail of the cooling towers.

Figure 62. Detail of the upper part of the cooling towers.

Figure 63. View of the open channel for the cooled water to be transported back to the station.

Figure 64. Views of the bases of two cooling towers showing the different construction resulting from the collapse of three towers in 1965. The left image shows a reinforced cooling tower where a second skin of concrete was added to the tower following the collapse. The right image shows one of the rebuilt towers with a new specification for the thickness of the concrete and its supporting piers.

Figure 65. Detail of the access arrangement to the cooling towers (Scale – left image 2m, right image 1m)

Figure 66. Detail of the access hatches at the end of the cooling tower leading to the inspection areas below the grate (© Historic England).

Figure 67. Detail of the area below the grated floor of the cooling tower showing the pipework where water would be sprayed over the plastic packing material below (© Historic England).

Figure 68. Detail of the interior of the cooling tower.

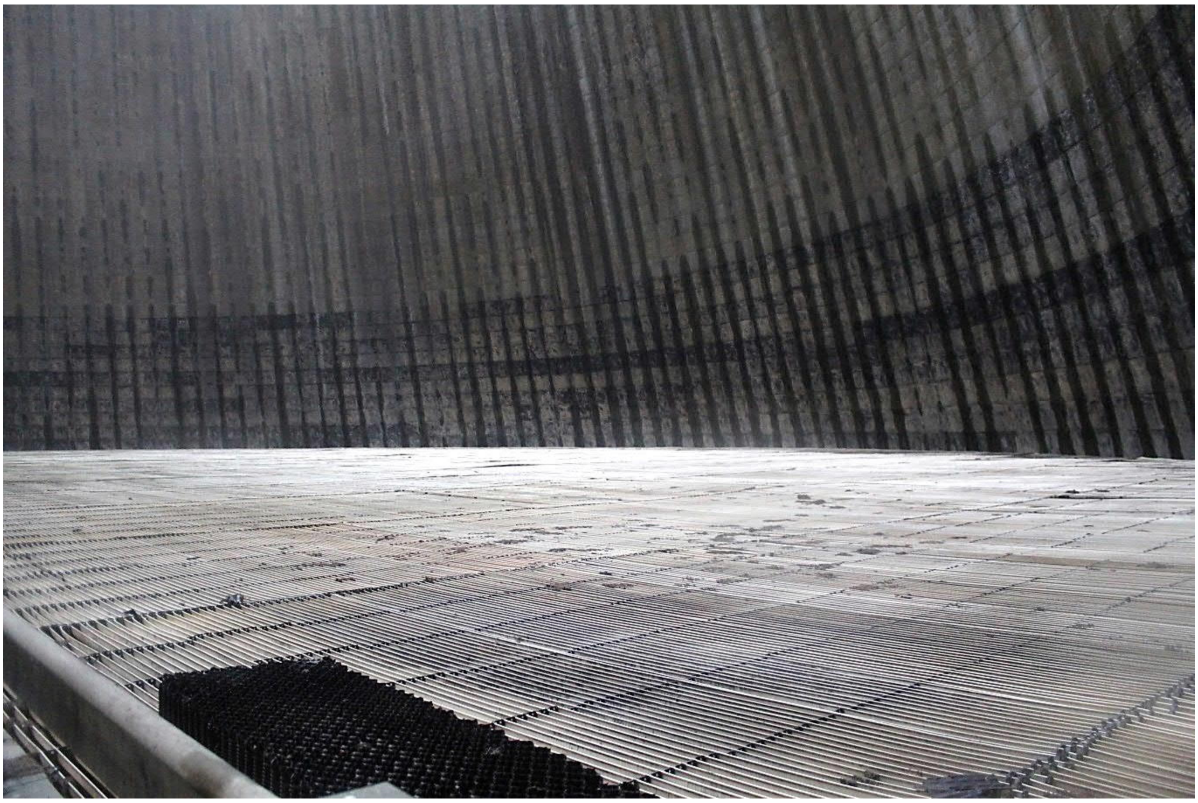

Figure 69. Detail of the interior of the cooling tower (a section of the packing material taken from the level below is in the foreground).

Later Phases

4.31 Some later phases of development in the station provide important information to understand how the present situation differs from the original design in the 1960s. A short overview of these is provided below.

4.32 In the 1970s, a sports and social club was formed with the construction of three golf greens to the west of Ferrybridge 'C'. This was followed by a nine-hole golf course which was constructed to the front and side of the station in 1976.

4.33 A new office block was constructed on site in 1988 which housed the managers, administration and engineering staff.

4.34 In 1992 a new training and education centre was built beside the turbine hall. This replaced the previous structure which had contained a beech wood dance floor. The new single-storey building has column detailing and a gable to demarcate the front entrance.

4.35 In 2001 the A1(M) was constructed and cut through the golf course which resulted in a redesign with new areas of landscaping and new bunkers.

4.36 Flue gas desulphurisation (FGD) buildings and equipment were added to the station in 2010 in order to improve emissions. FGD1 (Figure 70) is located on the southern corner of the station next to the precipitators, whilst FGD 2 (Figure 72) is located to the north-east of the station near to the Siniat plasterboard factory. The addition of the FGD plants led to conduits carrying limestone slurry and gypsum being added throughout the station, snaking around and between the cooling towers. Gypsum, the waste product of the process, was conveyed directly to the Siniat plasterboard factory.

Figure 70. FGD 1 Plant, looing south-west.

Figure 71. FGD 2 Plant, looking east.

4.37 A carbon capture pilot plant at Ferrybridge Power Station was opened in 2011 and was constructed in partnership with Doosan Power Systems, Vattenfall and the Technology Strategy Board. The project tested the amine-based, post-combustion capture (PCC) technology on a working power station and ran during 2012 and 2013 to optimise the process and components, and develop performance models. The equipment trapped exhaust fumes produced by the plant, these emissions were equivalent to 5MW of generation. The equipment is formed of two towers at the foot of the chimneys.

4.38 The Ferrybridge Multifuel 1 (FM1) was permitted in 2011 and construction began on land at Ferrybridge ‘C’ Power Station in 2012. The works were completed in 2015. FM1 produces low carbon electricity and heat by burning processed refuse derived fuels from a number of sources.

4.39 In 2013, plans began for the development of a second multifuel power station known as Ferrybridge Multifuel 2 (FM2) which would generate over 50MW of energy. In 2015 planning consent (through a Development Consent Order) was granted and in 2016.

4.40 At the time of writing demolition of Ferrybridge ‘C’ is underway, in a process expected to last several years.

5. Conclusion

5.1 The historic building recording has provided information relating to the historical development of power stations, the historic development of power generation at Ferrybridge, the place of Ferrybridge ‘C’ power station in the wider context of post-war coal-fired power stations in Britain and the historical development of the station’s buildings. The development of the station since the 1960s has been largely focused on optimising the performance of the station’s operation and output, through regular maintenance and limited improvements to the station’s operating components. The second, and more noticeable, focus of alteration has been the sequential development of facilities for reducing the station’s emissions and environmental impacts, in tandem with changes to recognised environmental standards. The three phases of precipitators, the introduction of two Flue Gas Desulphurisation Plants, the development of the carbon capture scheme, and the creation of Ferrybridge Multifuel plants, are all part of this story. In the end the ‘C’ Station’s closure was linked to the unviable cost of station improvements that would have been necessary to bring it into compliance with the latest update of environmental standards. The development of the station is therefore demonstrative of changing attitudes to the environment in Britain and Europe over the course of the last 60 years, and the effects of those changes in attitude on energy generation and industry more widely.

5.2 This report provides a record and descriptive account of the standing buildings and processes at the site. It should be read in tandem with the building recording produced for the barge unloader and coal handling facilities, which has been uploaded to the ADS archive.

6. Acknowledgements

AECOM would like to thank SSE Generation for commissioning this work and for facilitating access to the site and private archives for the purposes of carrying out this record. Thanks are also due to Historic England for their permission to reproduce several images from their photographic archive of Ferrybridge power station, all of which are attributed in the image captions.

7. References

Chartered Institute for Archaeologists, 2014a. *Code of Conduct.* Reading: Chartered Institute for Archaeologists.

Chartered Institute for Archaeologists, 2014b. *Standard and Guidance for Archaeological Building Recording.* Chartered Institute for Archaeologists

Historic England, 3013. *'High Merit': Existing English Post-War Coal and Oil-Fired Power Stations in Context.* Swindon: Historic England.

Historic England, 2015. *20th Century Coal and Oil-Fired Electric Power Generation – Introductions to Heritage Assets*. Swindon: Historic England.

Historic England, 2016a. *Understanding Historic Buildings; a guide to good recording practice.* Swindon: Historic England.

Historic England 2016b. *England's Redundant Post-War Coal- and Oil-Fired Power Stations; guidelines for recording and archiving their records.* Swindon: Historic England.

Powergen (1997) *Ferrybridge 'C' Power Station: 30 Years of Generation*

SSE Generation (2016) *Ferrybridge 'C': 50 years of achievement*

Turlington, C. 2017. *Ferrybridge 'C' Power Station; Heritage Assessment in Support of an Application for a Certificate of Immunity from Listing*. AECOM Unpublished Report. Project No. 60474319.

Ferrybridge 'C' Power Station Outline Design Planning Permission Documents (SSE Generation Ltd private archive)

Appendix A Photograph Register

PHOTOGRAPHIC REGISTER					
Ferrybridge 'C' Power Station					
PROJECT	60474 319	**CAMERA**	Digital	**COLOUR/MONO**	-
FILM NO.	-	**FILM TYPE**	-	**ISO**	-

Frame	Building	Description	Direction	Scale	Date	Initials
FCPS 1	General	FGD 1 Plant, chimneys and precipitators	NW	-	5/12/18	AJ
FCPS 2	General	FGD 1 Plant, chimneys and precipitators	NW	-	5/12/18	AJ
FCPS 3	FGD 1	FGD 1 Plant with slurry conveyor leading to FGD 2 Plant	SW	-	5/12/18	AJ
FCPS 4	FGD 1	Detail of FGD 1 Plant slurry tanks with access steps	SW	-	5/12/18	AJ
FCPS 5	FGD 1	Detail of FGD 1 Plant slurry tanks with access steps and remaining absorber tower in background	SW	-	5/12/18	AJ
FCPS 6	FGD 1	Detail of FGD 1 Plant with slurry conveyor leading to FGD 2 Plant and remaining absorber tower in background	W	-	5/12/18	AJ
FCPS 7	FGD 1 and cooling towers	Slurry conveyor leading form FGD 1 to FGD 2 with 3 of 8 cooling towers in view	NE	-	5/12/18	AJ
FCPS 8	FGD 1	Slurry conveyor leading form FGD 1 to FGD 2	NE	-	5/12/18	AJ
FCPS 9	Cooling tower	Reinforced Cooling tower	NE	-	5/12/18	AJ
FCPS 10	Cooling tower	Detail of top of the tower	NE	-	5/12/18	AJ
FCPS 11	Cooling tower	Detail of base of the tower	NE	-	5/12/18	AJ
FCPS 12	Boiler Economiser Dosing Tanks	Detail of one of the dosing tanks	NW	2m	5/12/18	AJ
FCPS 13	Boiler Economiser Dosing Tanks	View of dosing tanks with precipitators in the background	NW	2m	5/12/18	AJ
FCPS 14	Boiler Economiser Dosing Tanks	Detail of valve on the dosing tanks	NE	1m	5/12/18	AJ
FCPS 15	Boiler Economiser Dosing Tanks	Detail of valve on the dosing tanks	NE	1m	5/12/18	AJ
FCPS 16	Oil storage tanks	Oil storage tanks with brick bund	NW	2m	5/12/18	AJ
FCPS 17	Oil storage tanks	Oil storage tanks with brick bund and access steps	SW	2m	5/12/18	AJ
FCPS 18	Gas turbine hall	Contains four gas turbines designed to kick-start the system in the event of a shut down. No access – asbestos	W	2m	5/12/18	AJ
FCPS 19	Oil storage tanks	Oil storage tanks with brick bund and access steps	NE	2m	5/12/18	AJ
FCPS 20	FGD 1	Link between FGD 1 and the precipitators	NE	-	5/12/18	AJ
FCPS 21	FGD 1	Detail of the FGD 1 Plant	E	2m	5/12/18	AJ
FCPS 22	FGD 1	Detail of the FGD 1 Plant	NE	2m	5/12/18	AJ

FCPS 23	FGD 1	Detail of the FGD 1 Plant	NE	-	5/12/18	AJ
FCPS 24	FGD 1	Detail of remaining absorber tower, site of tower that burnt down in the foreground	NE	-	5/12/18	AJ
FCPS 25	FGD 1	Detail of base of the absorber tower that burnt down in 2014	NE	-	5/12/18	AJ
FCPS 26	FGD 1	Sign recording opening of FGD plant in 2010	NW	-	5/12/18	AJ
FCPS 27	FGD 1	Detail of the FGD 1 Plant	NE	-	5/12/18	AJ
FCPS 28	Gas turbine hall	Detail of metal chimney rising from gas turbine hall	NW	-	5/12/18	AJ
FCPS 29	FGD 1	Detail of remaining absorber tower, site of tower that burnt down to the left	NW	-	5/12/18	AJ
FCPS 30	Turbine hall	Ground floor of turbine hall	NE	-	5/12/18	AJ
FCPS 31	Turbine hall	General view of upper level of turbine hall, showing N0. 4 turbine in the foreground	NE	-	5/12/18	AJ
FCPS 32	Turbine hall	No. 4 turbine detail of high pressure end of the turbine	NW	2m	5/12/18	AJ
FCPS 33	Turbine hall	Detail of dials on No. 4 turbine	NW	1m	5/12/18	AJ
FCPS 34	Turbine hall	Detail of No. 4 turbine	NE	2m	5/12/18	AJ
FCPS 35	Turbine hall	No. 4 turbine detail of low pressure end of the turbine	SW	-	5/12/18	AJ
FCPS 36	Turbine hall	Detail of No. 4 turbine painted name plate	NE	-	5/12/18	AJ
FCPS 37	Turbine hall	No. 4 turbine detail of low pressure end of the turbine	NE	2m	5/12/18	AJ
FCPS 38	Turbine hall	No. 4 turbine general view from low pressure end	SE	-	5/12/18	AJ
FCPS 39	Turbine hall	General view of the upper level of the turbine hall	NE	-	5/12/18	AJ
FCPS 40	Turbine hall	Detail of integrated crane in the turbine hall – used for maintenance during stoppage and shut down. Not all turbines would be active at once	NE	-	5/12/18	AJ
FCPS 41	Turbine hall	Detail of integrated crane maker's plate, Cowans Sheldon Carlisle 1963	NE	-	5/12/18	AJ
FCPS 42	Turbine hall	General view of the turbine hall	SE	-	5/12/18	AJ
FCPS 43	Turbine hall	General view of the turbine hall	NE	-	5/12/18	AJ
FCPS 44	Turbine hall	Detail of Unit 4 hydrogen control panel	NW	2m	5/12/18	AJ
FCPS 45	Turbine hall	Detail of dials on No. 4 turbine	E	-	5/12/18	AJ
FCPS 46	Turbine hall	Detail of dials on No. 4 turbine	E	-	5/12/18	AJ
FCPS 47	Turbine hall	View of heaters in the turbine hall used to maintain the pressure in the turbines?	NE	-	5/12/18	AJ
FCPS 48	Turbine hall	View of heaters in the turbine hall used to maintain the pressure in the turbines?	NW	-	5/12/18	AJ
FCPS 49	Turbine hall	Detail of vibration transducer adjacent to No. 4 turbine	SE	2m	5/12/18	AJ
FCPS 50	Turbine hall	View across the turbine hall showing detail of full side profile of No. 3 turbine	NE	-	5/12/18	AJ

FCPS 51	Turbine hall	View across the turbine hall showing detail of full side profile of No. 3 turbine	NE	-	5/12/18	AJ
FCPS 52	Turbine hall	Detail of general services switchboard	SE	2m	5/12/18	AJ
FCPS 53	Turbine hall	Detail of general services switchboard ‘English Electric’	SE	-	5/12/18	AJ
FCPS 54	Turbine hall	View into upper level of the mill bay showing coal hopper above the mills	SE	2m	5/12/18	AJ
FCPS 55	Turbine Hall	View across the turbine hall showing detail of full side profile of heaters adjacent to No. 4 turbine	NW	-	5/12/18	AJ
FCPS 56	Turbine hall	Detail of valve on steam transmitter pipework in turbine hall	SE	-	5/12/18	AJ
FCPS 57	Turbine hall	View across the centre of the turbine hall showing the arrangement of fire water pipes	NW	-	5/12/18	AJ
FCPS 58	Turbine hall	Detail of generator core condition monitor module	NW	-	5/12/18	AJ
FCPS 59	Turbine hall	Detail of access stairs between No.1 an No.2 turbines	SW	-	5/12/18	AJ
FCPS 60	Turbine Hall	Detail of sign outlining the process in the turbines	NW	-	5/12/18	AJ
FCPS 61	Turbine Hall	Maker’s plate (blurry) Matner & Platt Ltd. Made in England FE.ISS Manchester	SE	-	5/12/18	AJ
FCPS 62	Turbine Hall	Detail of fire water system leading from turbine hall to transformers outside	NE	2m	5/12/18	AJ
FCPS 63	Turbine Hall	General view of turbine hall showing access steps, and fire water systems	SW	-	5/12/18	AJ
FCPS 64	Control Block	Control room on upper level general shot of room	NW	-	5/12/18	AJ
FCPS 65	Control Block	Control room on upper level general shot of room	SE	-	5/12/18	AJ
FCPS 66	Control Block	Control room view of desks and corner units controlling one of the turbines/boilers	NW	-	5/12/18	AJ
FCPS 67	Control Block	Control room on upper level general shot of room	W	-	5/12/18	AJ
FCPS 68	Control Block	Control room view of desks and corner units controlling one of the turbines/boilers	NE		5/12/18	AJ
FCPS 69	Control Block	Control room view of desks and corner units controlling one of the turbines/boilers	NE		5/12/18	AJ
FCPS 70	Control Block	Control room on upper level general shot of room	SE		5/12/18	AJ
FCPS 71	Control Block	Control room view of desks and corner units controlling one of the turbines/boilers	SW		5/12/18	AJ
FCPS 72	Control Block	Control room view of desks and corner units controlling one of the turbines/boilers	NW		5/12/18	AJ
FCPS 73	Control Block	Control room view of desks and corner units controlling one of the turbines/boilers	NW		5/12/18	AJ

FCPS 74	Control Block	Detail of the rear of the control panels – cupboards where the computers were located (now removed)	NE		5/12/18	AJ
FCPS 75	Control Block	Detail of the rear of the control panels – glazing on NW elevation of control block. View onto Nat Grid building – the end of the process	NE		5/12/18	AJ
FCPS 76	Control Block	Control room view of desks and corner units controlling one of the turbines/boilers	NE		5/12/18	AJ
FCPS 77	Control Block	Detail of control with references to other SSE power stations – Eggborough etc	NE		5/12/18	AJ
FCPS 78	Control Block	Detail of level below the control room with storage of further computers and maintenance walkways etc.	SW		5/12/18	AJ
FCPS 79	Control Block	Detail of level below the control room with storage of further computers and maintenance walkways etc. view towards staircase	NE		5/12/18	AJ
FCPS 80	Control Block	Detail of level below the control room with storage of further computers and maintenance walkways etc. view towards staircase	SE		5/12/18	AJ
FCPS 81	Control Block	Detail of level below the control room with storage of further computers and maintenance walkways etc. view towards staircase	NE		5/12/18	AJ
FCPS 82	Control Block	Detail of level below the control room with storage of further computers and maintenance walkways etc. view towards staircase	NE		5/12/18	AJ
FCPS 83	Control Block	Detail of secondary glazing system in level below the control zoom	W		5/12/18	AJ
FCPS 84	Control Block	Detail of secondary glazing system in level below the control zoom	NE		5/12/18	AJ
FCPS 85	Control Block	General view of example office on the first floor of the control block	SW	2m	5/12/18	AJ
FCPS 86	Control Block	General view of example office on the first floor of the control block	NE	2m	5/12/18	AJ
FCPS 87	Boiler House	Upper lever - View of hopper above the coal mill in the mill bay	N	-	5/12/18	AJ
FCPS 88	Boiler House	Upper level - General view towards the boilers	SE	-	5/12/18	AJ
FCPS 89	Boiler House	Upper level - General view towards the boilers	SE		5/12/18	AJ
FCPS 90	Boiler House	Upper level - General view towards the boilers' water towers	N		5/12/18	AJ
FCPS 91	Boiler House	Upper level - General view looking up the gantries around the top-hung boilers	-	-	5/12/18	AJ

FCPS 92	Precipitators	View along the precipitators outside the boiler house with the chimneys in view	SW	-	5/12/18	AJ
FCPS 93	Precipitators	View along the precipitators outside the boiler house with the chimneys in view	SW	-	5/12/18	AJ
FCPS 94	Oil tanks	Upper view over oil tanks and bunds area	SW		5/12/18	AJ
FCPS 95	Precipitators	View along the precipitators outside the boiler house with the chimneys in view	SW		5/12/18	AJ
FCPS 96	Precipitators	View across the top of the original level of precipitators, with scaffold structure surrounding them to support the 2nd phase precipitators above	NE		5/12/18	AJ
FCPS 97	Cooling tower	Upper level view towards cooling towers with ducting maze in front	N		5/12/18	AJ
FCPS 98	Cooling tower	Upper level view towards cooling towers with FGD conveyor system in front	E		5/12/18	AJ
FCPS 99	Cooling tower	View of cooling tower	E		5/12/18	AJ
FCPS 100	Cooling tower	Upper level view towards cooling towers with FGD conveyor system in front	E		5/12/18	AJ
FCPS 101	Cooling tower	Upper level view along three cooling towers	NW		5/12/18	AJ
FCPS 102	Cooling tower	Detail of construction of cooling tower	NE		5/12/18	AJ
FCPS 103	Transformer	Detail of transformer	S	2m	5/12/18	AJ
FCPS 104	Transformer	Detail of transformer	S	2m	5/12/18	AJ
FCPS 105	Transformer	Detail of transformer	SW	2m	5/12/18	AJ
FCPS 106	Transformer and Switch house	View from transformer towards National Grid Switch House (no access). Linking electricity cables have been removed	NE	-	5/12/18	AJ
FCPS 107	Transformer and Switch house	View from transformer towards National Grid Switch House (no access). Linking electricity cables have been removed	NE	-	5/12/18	AJ
FCPS 108	Control Block	Exterior of control block. North-west and South-west elevation	SE		5/12/18	AJ
FCPS 109	Turbine House and transformers	Exterior North-west elevation of turbine house with transformer and control block in view	S		5/12/18	AJ
FCPS 110	Turbine House and transformers	Exterior North-west elevation of turbine house with transformer and control block in view	SE		5/12/18	AJ
FCPS 111	Cooling tower	Detail of the base of a reinforced cooling tower	-	-	5/12/18	AJ
FCPS 112	Cooling tower	Packing system to promote condensation beneath the cooling tower			5/12/18	AJ
FCPS 113	Cooling tower	Detail of the base of a reinforced cooling tower	-	-	5/12/18	AJ
FCPS 114	Cooling tower	Detail of the base of a reinforced cooling tower	-	-	5/12/18	AJ

FCPS 115	Cooling tower	Detail of the base of a rebuilt cooling tower	-	-	5/12/18	AJ
FCPS 116	Cooling tower	Detail of the base of a rebuilt cooling tower	-	-	5/12/18	AJ
FCPS 117	Cooling tower	Detail of the concrete steps leading to the door of the cooling towers	-	-	5/12/18	AJ
FCPS 118	Cooling tower 1B	Detail of the concrete steps leading to the door of the cooling towers (Tower IB)	NE	2m	5/12/18	AJ
FCPS 119	Cooling tower 1B	Interior of cooling tower IB	NE	-	5/12/18	AJ
FCPS 120	Cooling tower 1B	Interior of cooling tower IB	NE	-	5/12/18	AJ
FCPS 121	Cooling tower 1B	Interior of cooling tower IB - upwards	NE	-	5/12/18	AJ
FCPS 122	Cooling tower 1B	Interior of cooling tower IB – view across the plastic filter system	SE	-	5/12/18	AJ
FCPS 123	Cooling tower 1B	Interior of cooling tower IB	NE	-	5/12/18	AJ
FCPS 124	Cooling tower 1B	Interior of cooling tower IB – view into inspection chambers	NW	-	5/12/18	AJ
FCPS 125	Cooling tower 1B	Interior of cooling tower IB	NW	-	5/12/18	AJ
FCPS 126	Cooling tower 1B	Example of the packing material used to promote condensation in the lower level of the cooling towers	-	-	5/12/18	AJ
FCPS 127	Cooling tower 1B	View into the water tank showing where the water was filtered into the packing material to promote condensation			5/12/18	AJ
FCPS 128	Cooling tower 1B	Interior of cooling tower IB	SW		5/12/18	AJ
FCPS 129	Cooling tower 1B	Interior of cooling tower IB – detail of coffin-head entrance door	NE	1m	5/12/18	AJ
FCPS 130	Cooling tower 1B	Exterior of cooling tower IB – detail of coffin-head entrance door	NE	1m	5/12/18	AJ
FCPS 131	Cooling tower 1B	Detail of the base of a rebuilt cooling tower	-	-	5/12/18	AJ
FCPS 132	Administration block and workshop	Exterior South-east elevation showing the corridor run leading to the turbine hall	NE	2m	5/12/18	AJ
FCPS 133	Administration block and workshop	Exterior South-east elevation showing the corridor run leading to the turbine hall	NE	2m	5/12/18	AJ
FCPS 134	Administration block and workshop	Exterior South-east elevation showing the corridor run leading to the administration building	W	2m	5/12/18	AJ
FCPS 135	Administration block and workshop	Entrance to a workshop off the linking corridor – ground floor	NE	2m	5/12/18	AJ
FCPS 136	Administration block and workshop	View along the ground floor level of the linking corridor	SW	2m	5/12/18	AJ
FCPS 137	Administration block and workshop	Interior of the workshop. South-west and north-west walls	N	2m	5/12/18	AJ
FCPS 138	Administration block and workshop	Interior of the workshop looking towards upper level offices and welfare	SE	2m	5/12/18	AJ

FCPS 139	Administration block and workshop	Interior of second workshop showing offices between the two workshops on the south-west wall.	NE	2m	5/12/18	AJ
FCPS 140	Administration block and workshop	Detail of the roof of the workshop	SE	-	5/12/18	AJ
FCPS 141	Administration block and workshop	View of the laboratory on the first floor.	SW	2m	5/12/18	AJ
FCPS 142	Administration block and workshop	View of the laboratory on the first floor.	SW	2m	5/12/18	AJ
FCPS 143	Administration block and workshop	View of the canteen on the first floor.	SW	2m	5/12/18	AJ
FCPS 144	Administration block and workshop	View of the canteen on the first floor.	SW	2m	5/12/18	AJ
FCPS 145	Administration block and workshop	Example view of an office on the ground floor. Used by the IT team.	E	2m	5/12/18	AJ
FCPS 146	Administration block and workshop	Example view of an office on the ground floor. Used by the IT team.	SW	2m	5/12/18	AJ
FCPS 147	-	View of light box detailing the outline process in place at Ferrybridge ‘C’	-	-	5/12/18	AJ
FCPS 148	-	General view of power station looking north-east, showing full process	NE	-	6/12/18	GS
FCPS 149	Cooling towers	View of cooling towers from the coal stockpile area.	SW	-	6/12/18	AJ
FCPS 150	Siniat Plasterboard Factory	Plasterboard factory where gypsum produced by the FGD plant would be used	W	-	6/12/18	AJ
FCPS 151	FGD2	General view of FGD2	E	-	6/12/18	AJ
FCPS 152	Cooling Tower 2A	Example view beneath cooling tower with water in pool	N	-	6/12/18	AJ
FCPS 153	Boiler House	General view within the boiler house showing the constricted space with ducting	NW	-	6/12/18	AJ
FCPS 154	Precipitators	View from the boiler house out to the precipitators and chimney	SE	-	6/12/18	AJ
FCPS 155	Precipitators	View from the boiler house out to the precipitators and chimney	SE	-	6/12/18	AJ
FCPS 156	Boiler House	Water storage tanks			6/12/18	AJ
FCPS 157	Boiler House	Water storage tanks			6/12/18	AJ
FCPS 158	Boiler House	Detail of release hopper for rejects at the base of the top-hung boiler	SE	-	7/12/18	AJ
FCPS 159	Boiler House	Row of ash reject bays at the base of the boilers	E	-	7/12/18	AJ
FCPS 160	Boiler House	Detail of an ash reject bay at the base of the boiler	SE	-	7/12/18	AJ
FCPS 161	Boiler House	Fan lubrication oil bay	NE	-	7/12/18	AJ

FCPS 162	Boiler House	View within the base level of the boiler house showing access steps and safety and rails.	SW	-	7/12/18	AJ
FCPS 163	Boiler House	Reject hoppers at the base of the top-hung boilers	N	-	7/12/18	AJ
FCPS 164	Boiler House	Unit 3 boiler ‘B’ rear side	NE	-	7/12/18	AJ
FCPS 165	Boiler House	Unit 3 boiler ‘A’ front side	NE	-	7/12/18	AJ
FCPS 166	Boiler House	Unit 3 boiler ‘A’ front side	NE		7/12/18	AJ
FCPS 167	Boiler House	Access steps through the base of the boiler with inserted sprinkler/cooling system	NW	-	7/12/18	AJ
FCPS 168	Mill workshop and boiler house	North-west and south-west elevations of the mill workshop with the boiler house behind	SE	2m	7/12/18	AJ
FCPS 169	Mill workshop and boiler house	North-west and south-west elevations of the mill workshop with the boiler house behind	SE	2m	7/12/18	AJ
FCPS 170	Turbine Hall	South-west elevation above administration building	NE	-	7/12/18	AJ
FCPS 171	Boiler House	South-west elevation of the boiler house	NE	2m	7/12/18	AJ
FCPS 172	Mill workshop	South-east elevation of the mill workshop with the boiler house behind	N	2m	7/12/18	AJ
FCPS 173	Precipitators	South-west elevation of the third phase, infill precipitators	NE	2m	7/12/18	AJ
FCPS 174	Precipitators	Junction between the boiler house and the third phase infill precipitators	NE	2m	7/12/18	AJ
FCPS 175	Precipitators	View of all three phases of precipitator – south-west elevation	SE	2m	7/12/18	AJ
FCPS 176	Precipitators	South-west elevation of the first and second phase precipitators leading onto the chimney and the FGD1 plant	SE	-	7/12/18	AJ
FCPS 177	Station	General view of the south-west elevation of the station showing admin building, mill workshop, turbine hall, mill bay, boiler house and infill precipitator	N	-	7/12/18	AJ
FCPS 178	Precipitator	View of the original cladding on the south-east elevation of the boiler house to the rear of the infill precipitator	N	-	7/12/18	AJ
FCPS 179	Precipitators	View of all three phases of precipitator – south-west elevation	NE	-	7/12/18	AJ
FCPS 180	Precipitators	View along the precipitators showing the two chimneys	NE	-	7/12/18	AJ
FCPS 181	Precipitators	North-east elevation of the first and second phase precipitators	SW	2m	7/12/18	AJ
FCPS 182	Precipitators	North-east elevation of the third phase, infill precipitators with the original cladding on the boiler house behind	NW	-	7/12/18	AJ
FCPS 183	Station	North-east elevation of the boiler house, mill bay and turbine hall	NW	-	7/12/18	AJ
FCPS 184	Boiler house	North-east elevation of the boiler house	SW	-	7/12/18	AJ

FCPS 185	Boiler House	Detail of rudimentary openings in the cladding of the north-east elevation of the boiler house	SW	-	7/12/18	AJ
FCPS 186	Mill bay and Turbine Hall	North-east elevation of the mill bay and turbine hall	NW	-	7/12/18	AJ
FCPS 187	Precipitators	North-east elevation of all three phases of precipitator with the chimney	SW	-	7/12/18	AJ
FCPS 188	Turbine Hall	North-east elevation of the turbine hall	SW	2m	7/12/18	AJ
FCPS 189	Cooling towers	General view of cooling towers	NW	-	7/12/18	AJ
FCPS 190	Cooling towers	General view of cooling towers with conveyor 13 above	NW	-	7/12/18	AJ
FCPS 191	Cooling towers	General view of cooling towers with FGD plant conveyors running between			7/12/18	AJ
FCPS 192	Cooling towers	General view of cooling towers with FGD plant conveyors running between			7/12/18	AJ
FCPS 193	Cooling towers	General view of cooling towers with FGD plant conveyors running between			7/12/18	AJ
FCPS 194	Cooling towers	General view of cooling towers with FGD plant conveyors running between			7/12/18	AJ
FCPS 195	Cooling towers	View of cooling tower with exposed water channel between			7/12/18	AJ
FCPS 196	Cooling towers	General view of cooling towers			7/12/18	AJ
FCPS 197	Cooling towers	Detail of the top of a cooling tower			7/12/18	AJ
FCPS 198	Cooling towers	General view of cooling towers with FGD plant conveyors running between			7/12/18	AJ
FCPS 199	Cooling towers	General view of cooling towers with FGD plant conveyors running between			7/12/18	AJ
FCPS 200	Cooling towers	General view of cooling towers with coal conveyors running between			7/12/18	AJ
FCPS 201	Station	Cooling towers, coal conveyors, boiler house, mill bay, chimney and precipitator in view	S	-	7/12/18	AJ
FCPS 202	Shower	Hughes emergency safety shower	NW	-	7/12/18	AJ
FCPS 203	Station	General view of ducting etc crossing the access roads within the station	SE	-	7/12/18	AJ
FCPS 204	Cooling towers	General view of cooling towers			7/12/18	AJ
FCPS 205	Station	South-east elevation of the station showing the precipitators and chimneys with cricket pitch in foreground	NW	-	7/12/18	AJ
FCPS 206	Chimneys	Detail of precipitators and chimneys on the south-east elevation of the station	NW	-	7/12/18	AJ
FCPS 207	Chimneys	Detail of the base of the precipitators and chimneys on the south-east elevation of the station	NW	-	7/12/18	AJ

FCPS 208	Chimneys	Detail of the gas turbine house chimney	NW	-	7/12/18	AJ
FCPS 209	Chimneys	Detail of the base of the precipitators and chimneys on the south-east elevation of the station	NW		7/12/18	AJ
FCPS 210	Station	South-west elevation of the station showing the turbine hall, mill bay, boiler house, precipitators, chimneys and cooling towers	SE	-	7/12/18	AJ
FCPS 211	Mill bay and turbine hall	Detail of the original cladding on the north-west elevation of the mill bay	SE	-	7/12/18	AJ
FCPS 212	Engineering centre	North-west elevation of the Engineering Centre with the station behind	SE	-	7/12/18	AJ
FCPS 213	North-west elevation of the station	Detail of cooling towers, turbine hall, mill bay and transformers	E	-	7/12/18	AJ
FCPS 214	Turbine hall	North-west elevation of the turbine hall with transformers in front.	SE	-	7/12/18	AJ
FCPS 215	Turbine hall	North-west elevation of the turbine hall with transformers in front.	SE		7/12/18	AJ

Appendix B Archive Plans, Elevations and Sections

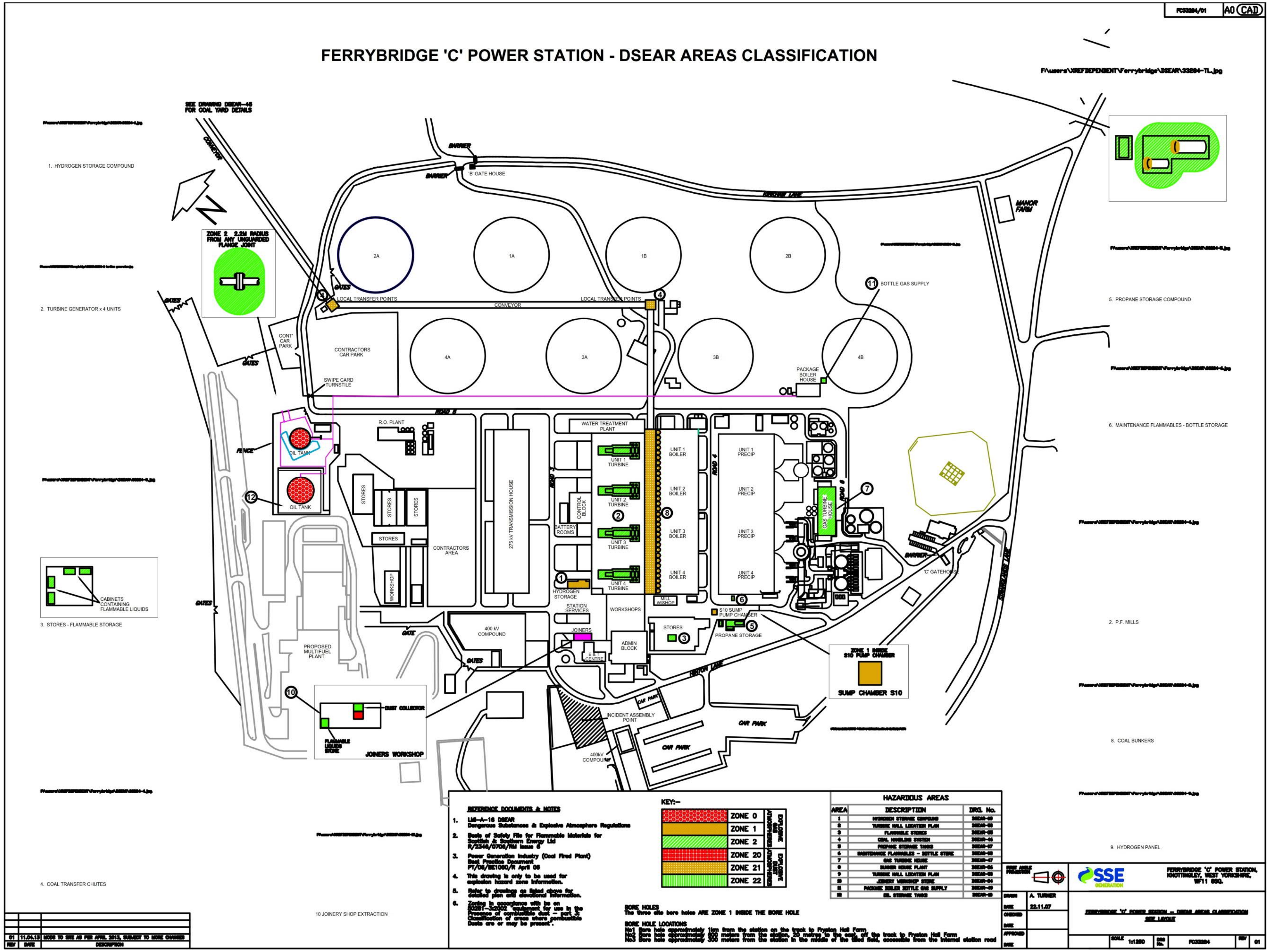

Figure 72. Overview of the main station and infrastructure.

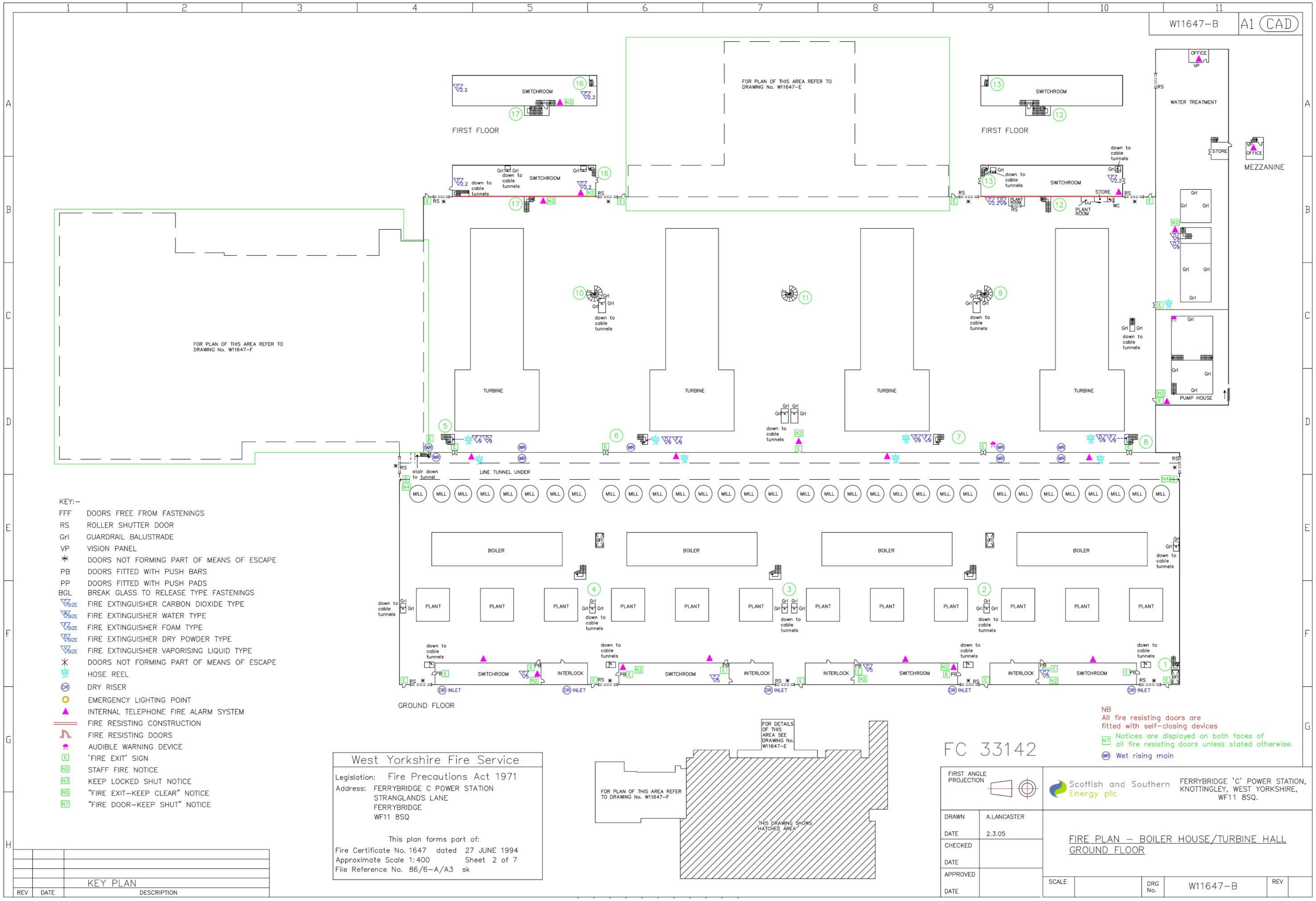

Figure 73. Ground Floor plan of the main station buildings showing the Mill Bay, Boiler House and Turbine Hall.

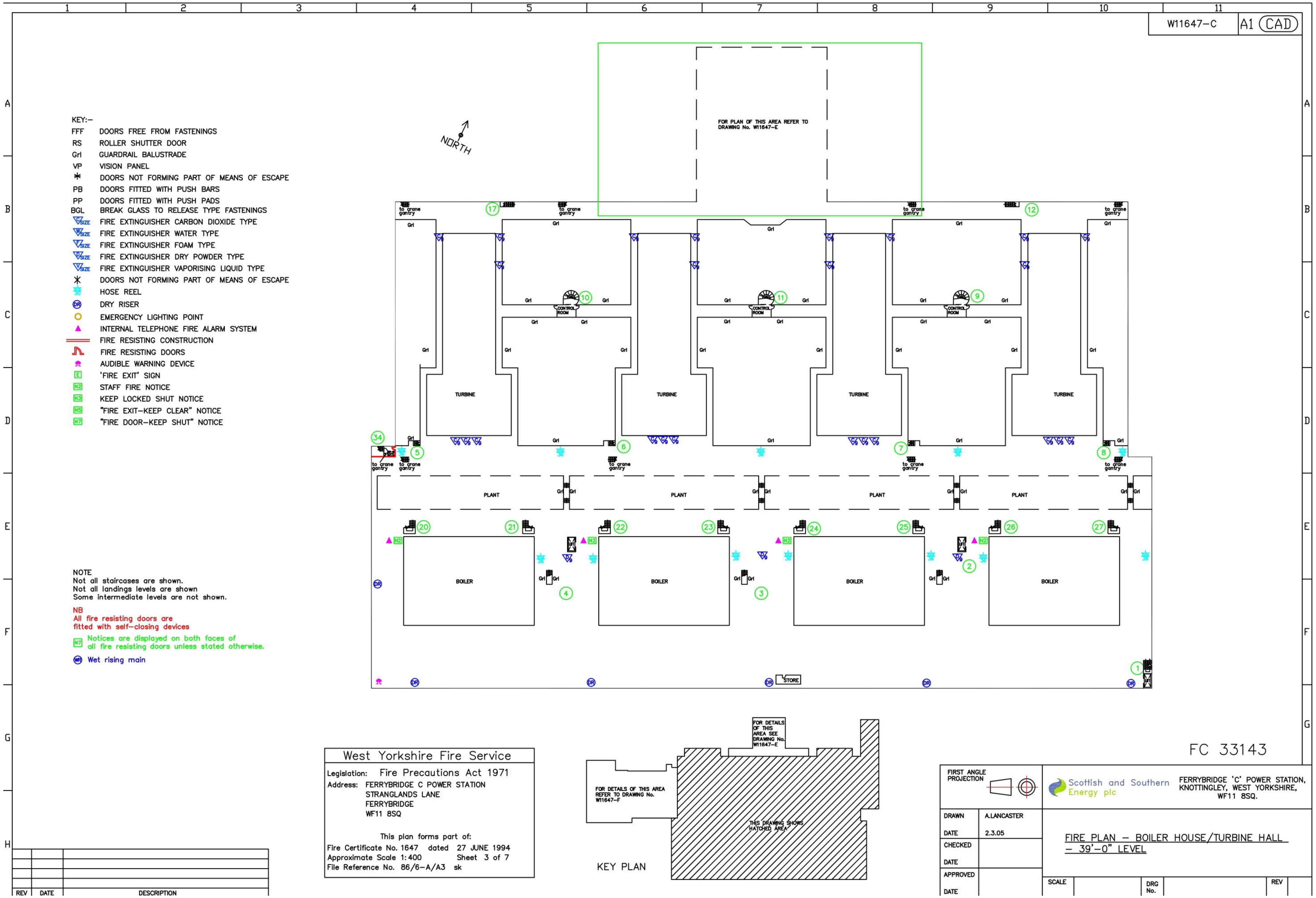

Figure 74. Plan of the 39" floor of the main station buildings, showing the Mill Bay, Boiler House and Turbine Hall.

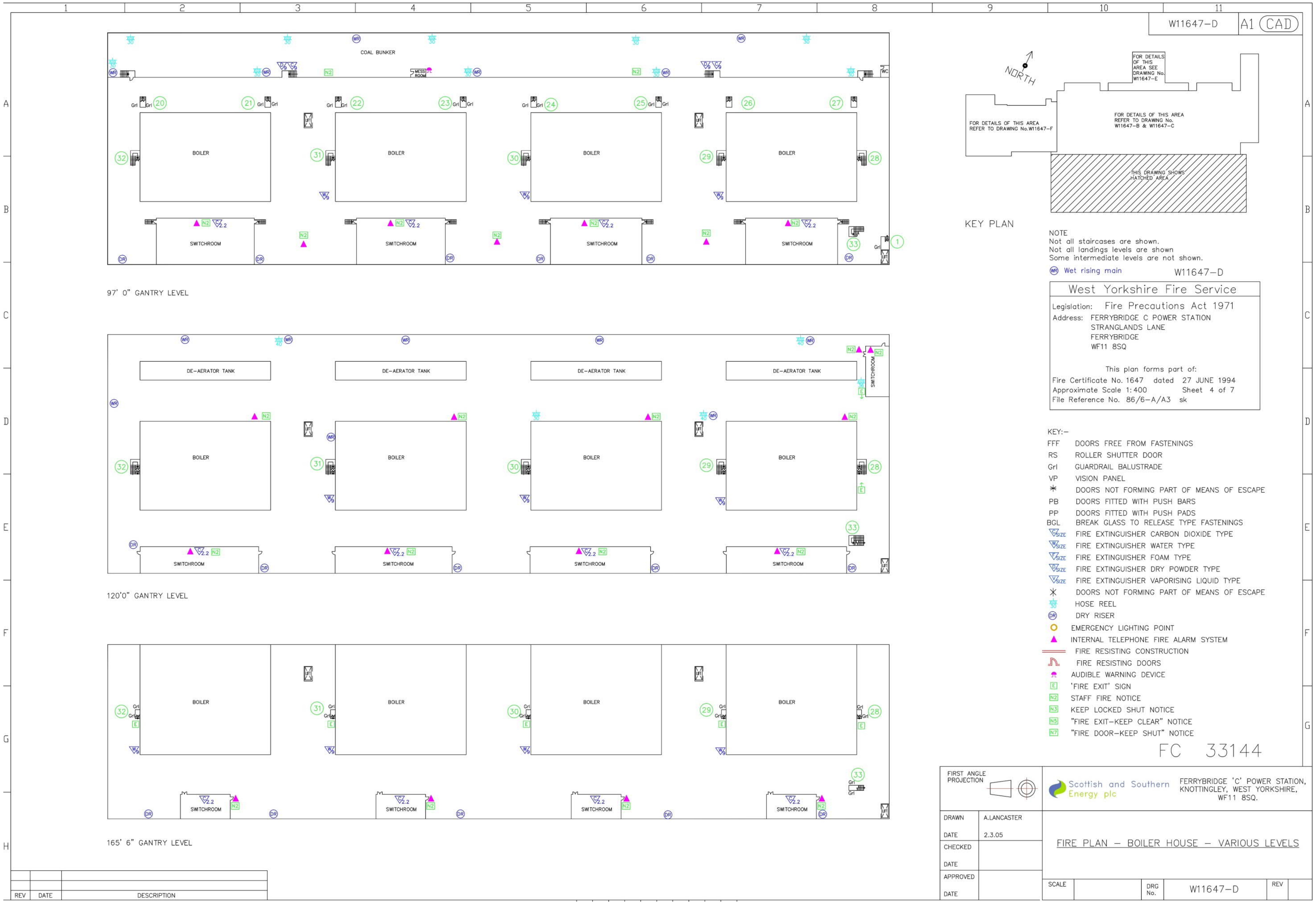

Figure 75. Plan of various levels of the Boiler House and Mill Bay.

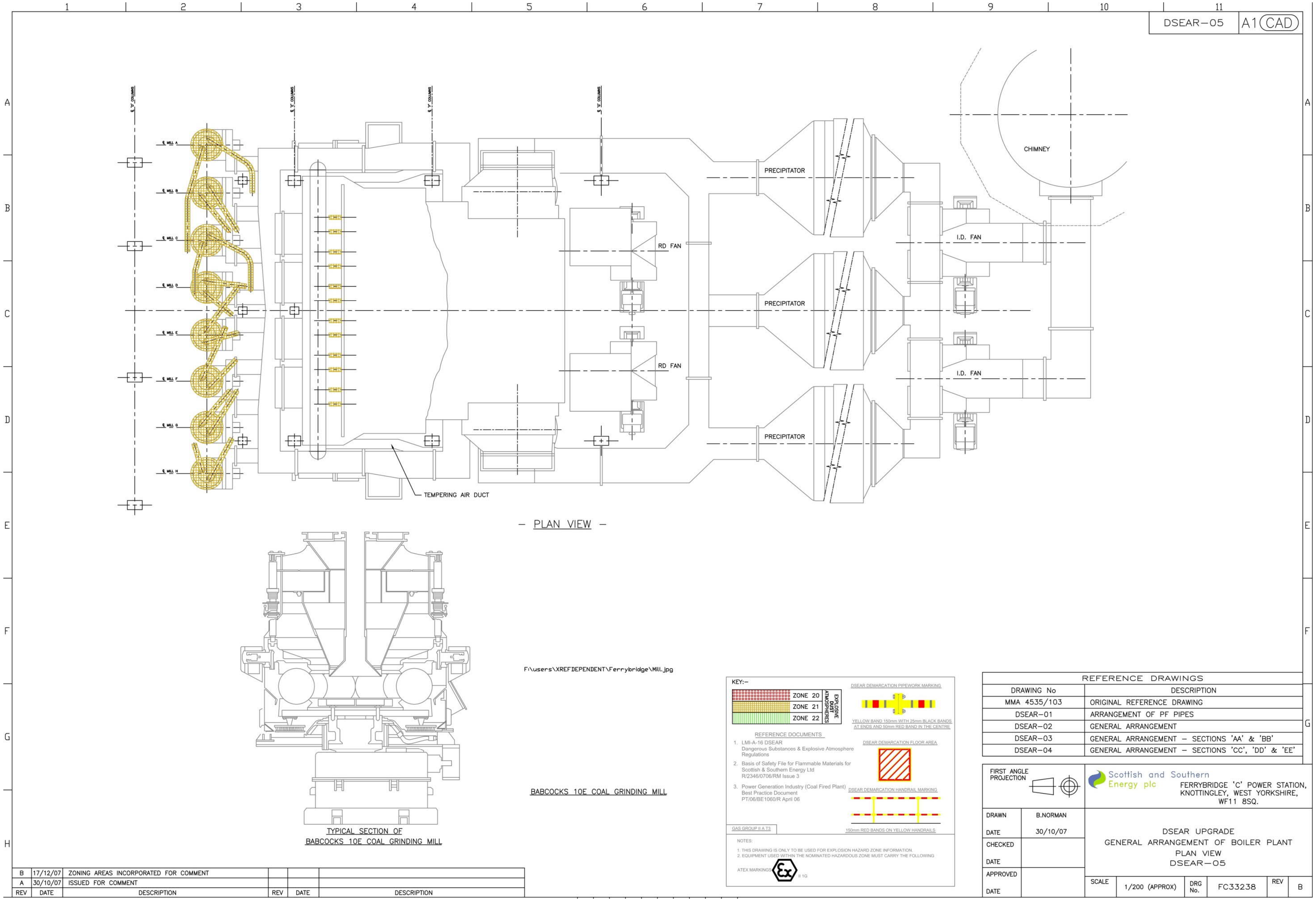

Figure 76. Plan view of an indicative section of the Coal Mills, Boiler, Precipitators and Chimney, also showing a section through a Coal Mill.

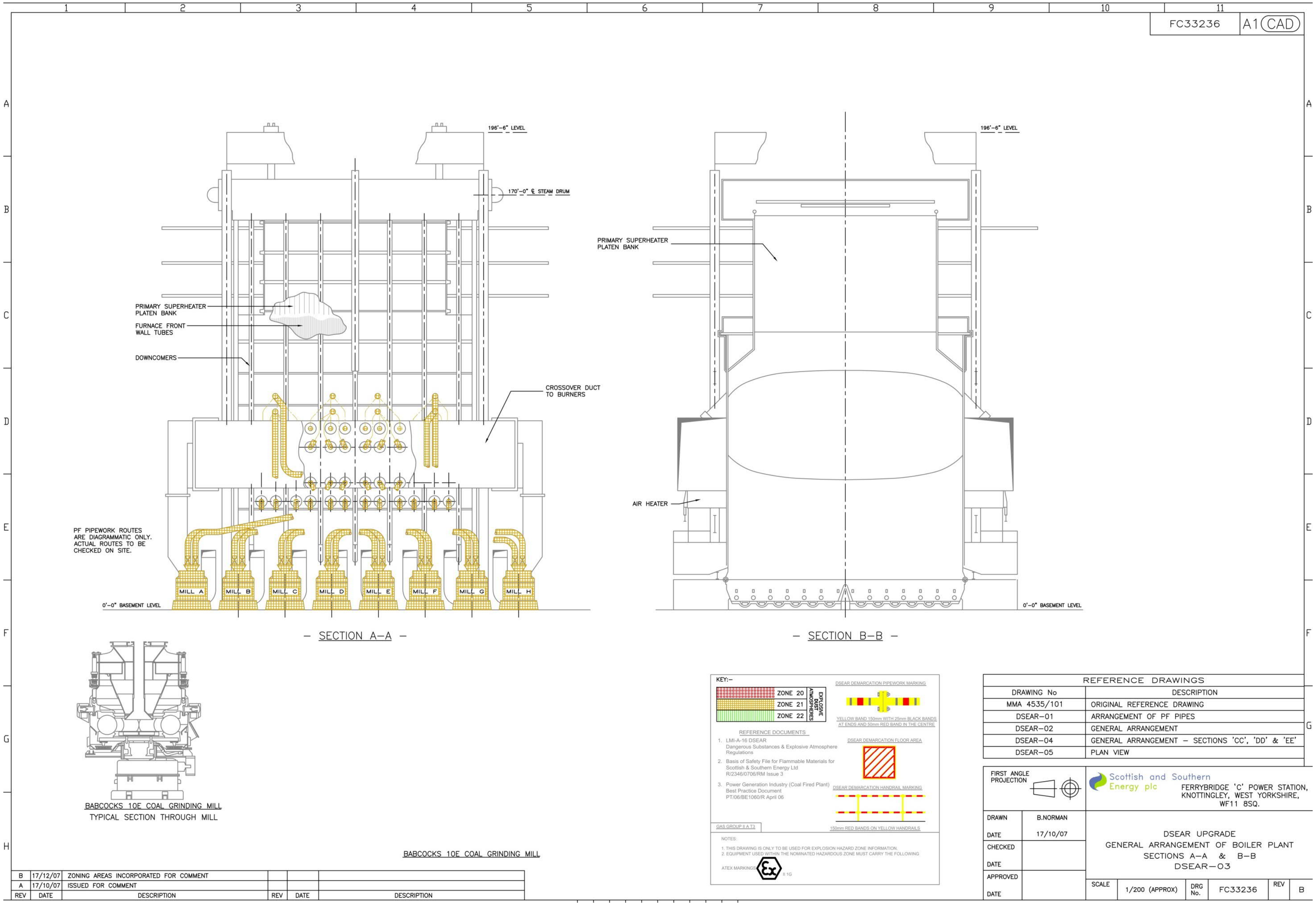

Figure 77. Half-sectional view of the Coal Mill and Boiler Plant.

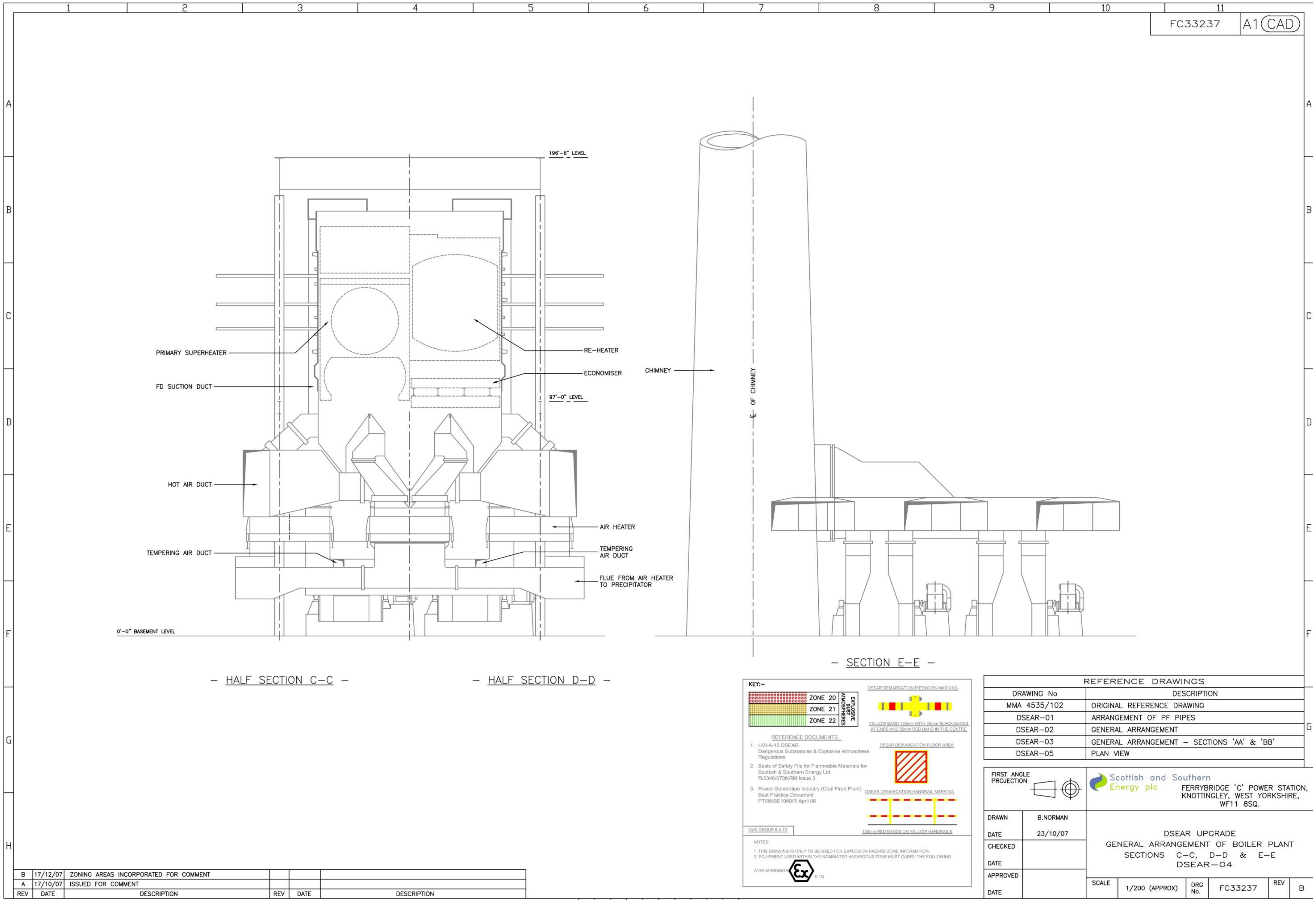

Figure 78. Half-sectional view of the Boiler Plant and Precipitators.

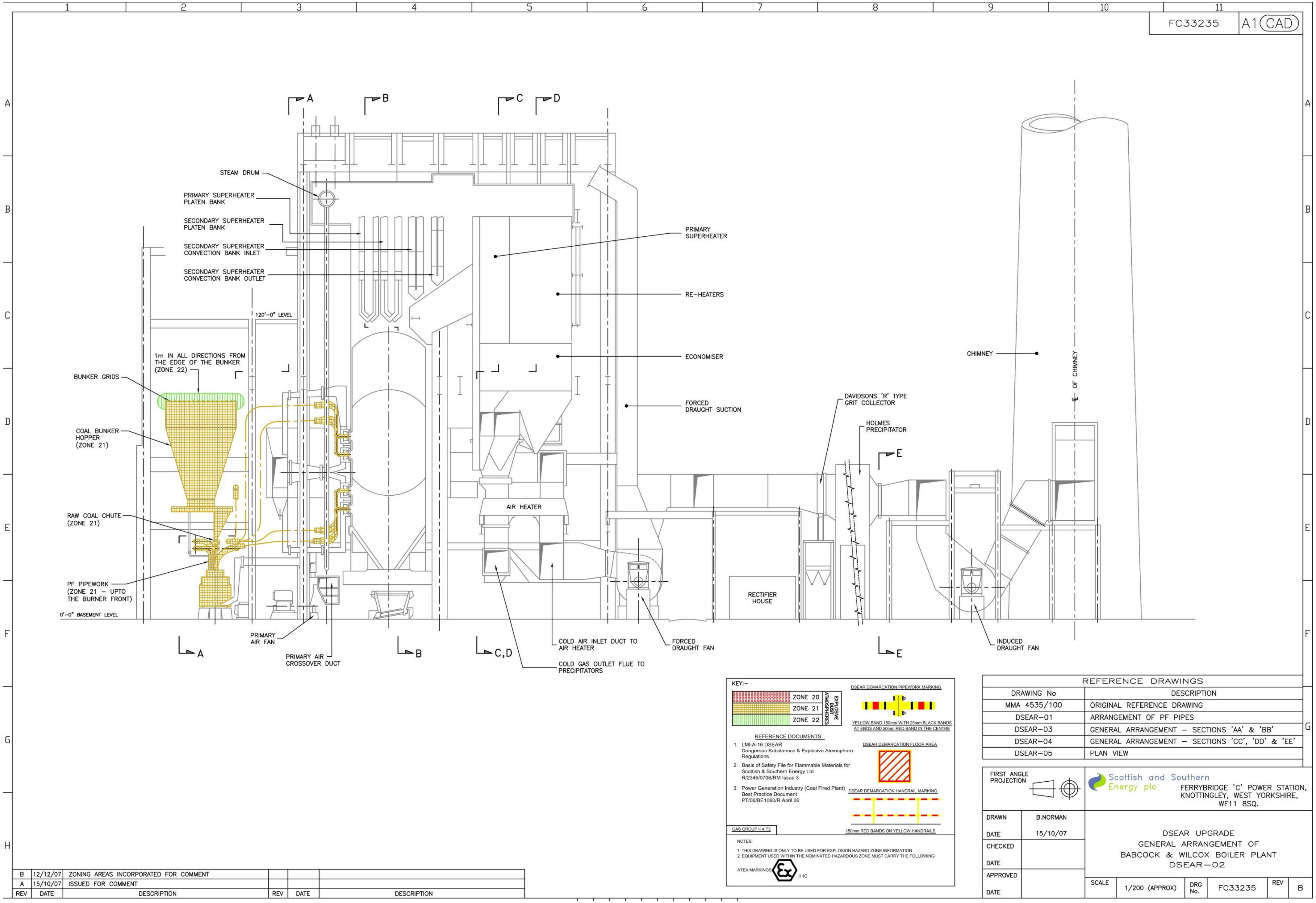

Figure 79. Elevation of the Mill Bay, Boiler Plan, Precipitators and Chimney.

Appendix C Historic England Listing Assessment

Decision Summary

This building has been assessed under the Planning (Listed Buildings and Conservation Areas) Act 1990 as amended for its special architectural or historic interest. The asset currently does not meet the criteria for listing. It is not listed under the Planning (Listed Buildings and Conservation Areas) Act 1990 as amended.

Name: Ferrybridge C Power Station

Reference Number: 1430640

Location

Ferrybridge C Power Station, Ferrybridge, West Yorkshire, WF11 8RD

The building may lie within the boundary of more than one authority.

County:

District: Wakefield

District Type: Metropolitan Authority

Parish: Non Civil Parish

National Park: Not applicable to this List entry.

Decision Date: 06-Oct-2015

Description

Reasons for currently not Listing the Building

CONTEXT Historic England is assessing Ferrybridge C Power Station for listing prior to the station's closure by 31st March 2016. It is part of a strategic approach to assess power stations prior to decommissioning and demolition. This approach aims to prevent delays in the planning process, which could potentially be caused by listing applications received from the public at a late stage in the decommissioning of the power station. As part of this strategic work an Introduction to Heritage Assets guide has been produced for power stations (June 2015, see Sources) and photographic recording has been carried out at several sites.

HISTORY Ferrybridge C is the third coal-fired power station to be built on a site situated on the River Aire near Ferrybridge in West Yorkshire. The first, Ferrybridge A Power Station, was built in 1926-7 with a generating capacity of 125 megawatts (MW). It closed in 1976 and was partly demolished but the boiler room and turbine hall were retained and are now used as offices and workshops, which are Grade II listed (List Entry No.1266191). Ferrybridge B Power Station was built in 1957-9 with a generating capacity of 300 MW but closed in 1992 and was demolished.

In 1961-66 Ferrybridge C Power Station was designed by the Building Design Partnership and engineered by the Midlands Project Group of the Central Electricity Generating Board (CEGB) with the civil engineering consultants Messrs. C. S. Allott & Son. It occupies a site of about 220 acres east of the A1 and west of the River Aire.

The CEGB became the body responsible for electricity generation in England and Wales in 1957, after production had been nationalised ten years earlier. Ferrybridge C was one of thirteen large new coal- and oil-fired power stations, which were largely released for construction by the CEGB in the early 1960s. The first to be constructed, although it opened later than Ferrybridge C, was West Burton Power Station, Lincolnshire. These sites, built on an unprecedented scale, mark the apogee of nationalised industry. All but three were a new generation of 2000 MW power stations comprising four large 500 MW units. Many were located in the Trent and Aire river valleys, close to a supply of cooling water and the Nottinghamshire, Derbyshire and Yorkshire coalfields. The CEGB had a statutory obligation to preserve amenity and submitted its power station proposals to the Royal Fine Art

Commission for approval. Sites were generally built to a standard template, but aware of the visual impact of these vast installations, the CEGB employed high calibre architects and landscape architects to augment the designs.

The principal buildings of Ferrybridge C Power Station (e.g. turbine hall and boiler house) were built with steel frames clad in Duralcote aluminium, in tones of grey and white with a semi-matt finish and a variety of textures. They were the first major buildings in Europe to be clad in this type of aluminium. Eight cooling towers were constructed to the north-east of the turbine hall. On 1st November 1965 three of the cooling towers collapsed in high winds due to weaknesses in their design and specification. Subsequently towers at Ferrybridge and other sites were modified and reinforced.

On 27th February 1966 Ferrybridge C Power Station first supplied electricity to the National Grid. Upon privatisation of the electricity industry, the power station passed in turn to: Powergen (1989), Edison Mission Energy (1999), American Electric Power (2001) and to Scottish and Southern Electric (SSE) (2004). In c.2009 Flue Gas Desulphurisation (FGD) plant was fitted to remove sulphur dioxide from gases produced at the power station. In 2011 a pilot carbon capture plant was opened and planning permission was given for a new 68 MW multifuel plant at Ferrybridge. A major fire on 31st July 2014 caused damage to the FGD plant of the existing power station. In 2015 SSE announced that the power station would close by 31st March 2016.

DETAILS Process: Ferrybridge C Power Station generates electricity by burning coal to turn water into steam, which then drives electric generators. The process can be summarised as follows (using figures based on the station’s full load operation in the 1960s). Approximately 32,000 tons of coal can be supplied daily to the coal stock area by rail, via a merry-go-round system, and a canal. From the coal stock it is moved via conveyor to the bunker bay and then the boiler house where it is fed into pulverising mills to form a powder, which then fuels four boiler furnaces. About 18,600 tons of coal is burnt each day when on full load. The heat produced converts water, within steel tubes lining the boilers, to superheated steam at a temperate of 568 degrees centigrade. The steam supplies four turbo-generators within the turbine hall, which convert mechanical energy into electricity that is then fed through a switch-gear and into the National Grid. Some of the steam is cooled in condensers after passing through the turbines, and then returned into the boilers to be re-heated. After use, the condenser water is circulated through eight cooling towers. These can cool 6.3m gallons of water per hour before it re-enters the system. Approximately 13m gallons of water are drawn from the River Aire each day to make up for evaporation losses. Waste gasses from the boilers pass through dust collectors and precipitators, designed to remove dust particles, before being dispersed via two chimneys. Ash and dust is also extracted from the boilers into hoppers, mixed with water to form a slurry, and then pumped either to the Brotherton Ings disposal area 1.5 miles away or to the Gale Common disposal area six miles away. The boilers, turbines and auxiliary plant are all operated from a central control room.

Structures: the site comprises the principal process buildings, accessed via Hinton Lane, at the west, the cooling towers at the east and the coal stock area to the north. The principal process buildings are, for the most part, rectangular buildings with flat aluminium roofs orientated east to west, and situated adjacent, or integrated, to one another north to south. At the north is the SWITCH HOUSE, which is 168m long by 44m wide and 23m high, and is formed of a steel frame clad in white Duralcote vinyl-coated aluminium on a concrete plinth. Electricity cables lead from the turbine house to the south into the 275 Kv switchgear and out into the National Grid via three double circuit overhead lines. The TURBINE HALL is steel framed and clad in light grey aluminium. It is 185m long by 64m wide and 33m high, and contains four 500 MW, single shaft, turbo-generators manufactured by C.A. Parsons & Co. Ltd. These are situated parallel to each other beneath a crane gantry. A CONTROL BLOCK projects from the centre of the north side of the turbine hall and is built of pre-cast concrete panels with full-height glazing on the north side. Photographs indicate that internally the main control room has instrumentation and control panels mounted around the perimeter, a linoleum floor and a suspended ceiling. WORKSHOPS and an ADMINISTRATIVE BLOCK are attached to the west side of the turbine house and are of two and three storeys with ribbon windows and felt roofs. The administrative block is built of brick in a quadrangle with an L-shaped two storey addition to the west, and later single storey buildings to the north. It contains offices, a canteen and mess rooms. A water treatment plant is attached to the east of the turbine hall and de-mineralises water before it enters the boilers.

The concrete BUNKER BAY and the BOILER HOUSE extend to the south of the turbine hall. The latter is 196m long, 45m wide and 62m high, and has a steel frame and cream-coloured aluminium cladding. It contains four reheat boiler units, designed and manufactured by Babcock & Wilcox Ltd, as well as 32 pulverising mills and four ash hoppers. Extending from the south are the precipitators, which feed gas into two reinforced concrete CHIMNEYS, 198m high and 10m in diameter at the top. Further south is a GAS TURBINE HOUSE, containing two (previously four) Bristol Siddeley 17.5 MW gas turbine units, used to start the station in the absence of an external power supply. Beyond it is the FLUE GAS DESULPHURISATION PLANT built in c.2009.

The natural draught COOLING TOWERS are to the east of the main complex and arranged in a lozenge array. They comprise eight reinforced concrete towers of cone-toroid design, which are 114m high and 91m in diameter at the base. A cold water pump house is located between them. North-east of the cooling towers is the coal stock area, supplied by canal and by a merry-go-round rail system. It contains the COAL-HANDLING PLANT; a steel framed building clad in aluminium, as well as a barge tippler and concrete hopper. The coal is moved from here by conveyors to the station bunker bay and boiler house.

ASSESSMENT The assessment of Ferrybridge C Power Station is set against the Principles of Selection for Listing Buildings (DCMS, March 2010) which state that particularly careful selection is required for buildings from the period after 1945. The Listing Selection Guide for Utilities and Communications Structures (April 2011) expands on this and explains that, as with all building types, utility buildings have to be assessed in terms of their intrinsic value: special architectural, planning, engineering and technological interest. Completeness can be an important factor, especially where processes can be illustrated on a single site, as can relative date and rarity.

The 1950s and 1960s saw the transformation of power station design, with a change from the ‘brick-cathedral’ model of the 1930s and 1940s such as London’s Bankside (1947, designed by Sir Giles Gilbert Scott and now Tate Modern), to a Modernist and anti-monumental type using lightweight cladding on steel frames, conceived simply as an enclosure of the generating plant, as found at Marchwood in Hampshire (1951-59 by Farmer and Dark), and here at Ferrybridge C. Architectural character came to depend on the massing of blocks in relation to chimneys, and often huge concrete cooling towers, which introduced continental forms of concrete construction from the 1920s. Some groups of cooling towers have enormous presence in the landscape, but opinion remains divided as to whether their contribution is an altogether positive one. There are exceptional sensitivities surrounding the issue of contamination at 1960s power stations, which are often suitable sites for recording rather than retention.

Judged against the relevant listing criteria, Ferrybridge C Power Station, a coal-fired electricity generating station that opened in 1966, is not recommended for designation for the following principal reasons: * Architectural interest: the power station is architecturally undistinguished and based on standard designs, whilst the planning of the site is altogether less well considered than other stations of the period; * Technological interest: the power station at Ferrybridge C is one of a generation of similar sites and is not considered to carry any major technological innovations; * Design and fitness for purpose: the cooling towers had to be rebuilt or altered following a collapse in 1965, due to weaknesses in their design and specification; * Intactness: several of the buildings have undergone alterations and partial rebuilding, following the collapse of the cooling towers in 1965 and a fire in 2014; * Rarity: the buildings, including the cooling towers, are of relatively common types which survive at many power station sites of this generation across the country; * Group value: although Ferrybridge C Power Station holds group value with the Grade II listed buildings of Ferrybridge A Power Station, this is not sufficient to confer special interest given the above shortcomings.

CONCLUSION Ferrybridge C Power Station is not recommended for listing.

SOURCES Central Electricity Generating Board, Ferrybridge ‘C’ Power Station – CEGB Opening Brochure (c.1967) Clark, Jonathan, ‘High Merit’: existing English post-war coal-fired power stations in context (2013) Clark, Jonathan, Historic England Introductions to Heritage Assets: 20th-Century Coal- and Oil-fired Electric Power Generation (June 2015), retrieved from: https://historicengland.org.uk/images-books/publications/iha-20thcentury-coal-oil-fired-electric-power-generation/

Appendix D Completed OASIS form

OASIS DATA COLLECTION FORM: England

List of Projects | Manage Projects | Search Projects | New project | Change your details | HER coverage | Change country | Log out

Printable version

OASIS ID: aecom1-346298

Project details

Project name	Ferrybridge 'C' Power Station; Building Recording of Main Station
Short description of the project	AECOM Infrastructure and Environment Ltd (AECOM) was commissioned by SSE Generation Ltd (SSE) to undertake a Level 2 Building Recording Ferrybridge 'C' power station (Figure 1). The building recording seeks to mitigate the impact of the demolition of the power station. The buildings were assessed for designation in October 2015 when it was announced that the power station was due to close. The decision was taken not to designate the power station. Further to that, the power station was granted a Certificate of Immunity from Listing (COI) in July 2017 (NHLE: 1448208). The site is located on the River Aire, near Knottingley in West Yorkshire (centred on NGR: SE 47473 24777). Ferrybridge is one of three coal-fired power stations built in this area, the other two being Eggborough and Drax.
Project dates	Start: 11-11-2018 End: 15-03-2019
Previous/future work	Yes / Not known
Any associated project reference codes	60474319 - Contracting Unit No.
Type of project	Building Recording
Site status	None
Current Land use	Industry and Commerce 1 - Industrial
Monument type	COAL FIRED POWER STATION Modern
Significant Finds	N/A None
Methods & techniques	"Photogrammetric Survey"
Prompt	Voluntary/self-interest

Project location

Country	England
Site location	WEST YORKSHIRE WAKEFIELD KNOTTINGLEY Ferrybridge 'C' Power Station
Postcode	WF11 8RA
Study area	0 Square metres

Site coordinates	SE 47473 24777 53.71701975101 -1.280563978291 53 43 01 N 001 16 50 W Point
Height OD / Depth	Min: 0m Max: 0m

Project creators

Name of Organisation	AECOM
Project brief originator	Consultant
Project design originator	AECOM
Project director/manager	Amy Jones
Project supervisor	Gillian Scott
Type of sponsor/funding body	Landowner
Name of sponsor/funding body	SSE Generation Ltd

Project archives

Physical Archive Exists?	No
Digital Archive recipient	SSE Generation Ltd
Digital Contents	"none"
Digital Media available	"Images raster / digital photography"
Paper Archive recipient	SSE Generation Ltd
Paper Contents	"none"
Paper Media available	"Plan","Report"

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Ferrybridge 'C' Power Station; Building Recording of the Main Station
Author(s)/Editor(s)	Scott, G
Other bibliographic details	60474319
Date	2019
Issuer or publisher	AECOM
Place of issue or publication	Newcastle upon Tyne
Description	Colour A4 pdf report with A3 illustrations.

Entered by	Gillian Scott (gillian.scott@aecom.com)
Entered on	19 March 2019