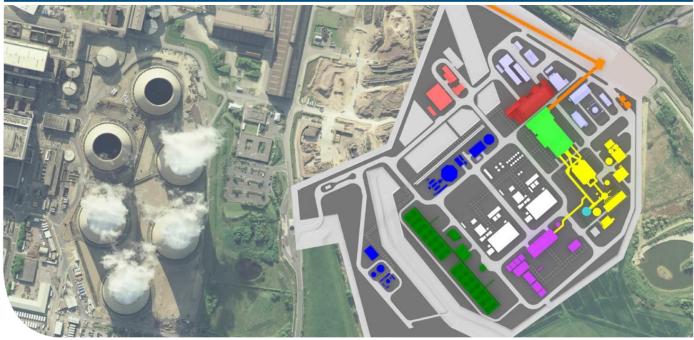


**K28: Oxy Power Plant Plot Plan** 

Technical: Oxy Power Plant















### Disclaimer

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# **Key Words**

Term	Definition
Air Quality Control System	Technology used to remove impurities, particulates SOx and NOx from waste gases in order to comply with environmental standards
Air Separation Unit	A unit whose function is to separate oxygen from the air for use in the oxyfuel process
Carbon Capture & Storage	A technology which reduces carbon emissions from the combustion based power generation process and stores it in a suitable location
Gas Processing Unit	Unit in which the processing and compressing of CO <sub>2</sub> gas takes place before transportation to storage
Oxyfuel	Combustion of fuel within an oxygen rich environment, with resultant flue gas being high in CO <sub>2</sub>
Oxyfuel Boiler	The boiler within the Oxy-Power Plant capable of producing full load in either the air or oxy-fired mode of operation
Oxy Power Plant	A power plant using oxyfuel technology
Plot Plan	Layout of main items of equipment and buildings
White Rose	The White Rose Carbon Capture and Storage project





## **Executive Summary**

This Oxy Power Plant Plot Plan was generated as part of the Front End Engineering Design (FEED) contract with the Department of Energy and Climate Change (DECC) for White Rose, a wholly integrated full-chain Carbon Capture and Storage (CCS) project. This document is one of a series of Key Knowledge Deliverables from White Rose to be issued by DECC for public information.

White Rose comprises a new coal-fired ultra-supercritical Oxy Power Plant (OPP) of up to 448 MW $_{\rm e}$  (gross) and a transport and storage system that will take the carbon dioxide from the OPP and transport it by pipeline for permanent storage under the southern North Sea. Around 90% of the carbon dioxide emissions from the OPP will be captured and stored and the OPP also has the option to co-fire biomass, further reducing emissions.

Delivery of the full-chain project and OPP is through Capture Power Limited (CPL), an industrial consortium formed by Alstom, BOC and Drax, together with National Grid who are responsible for the transport and storage network.

The OPP site is located on land adjoining the existing Drax Power Station in North Yorkshire and occupies an area of approximately 27 hectares. The OPP Plot Plan shows the layout of the main items of equipment and the main buildings. The Introduction to the OPP Plot Plan also describes the key components of the OPP and the considerations taken into account to optimise the layout of these components within the OPP site.





### 1 Introduction

#### 1.1 Background

The White Rose Carbon Capture and Storage (CCS) Project (White Rose) is an integrated full-chain Carbon Capture & Storage Project comprising a new coal-fired Oxy Power Plant (OPP) and a transport and storage network that will take the carbon dioxide from the OPP and transport it by pipeline for permanent storage under the southern North Sea.

The OPP is a new ultra-supercritical power plant with oxyfuel technology of up to 448 MW<sub>e</sub> gross output that will capture around 90% of carbon dioxide emissions and also have the option to co-fire biomass.

One of the first large scale demonstration plants of its type in the world, White Rose aims to prove CCS technology at commercial scale as a competitive form of low-carbon power generation and as an important technology in tackling climate change. The OPP will generate enough low carbon electricity to supply the equivalent needs of over 630,000 homes.

White Rose is being developed by Capture Power Limited, a consortium of Alstom, BOC and Drax. The project will also establish a CO<sub>2</sub> transportation and storage network in the region through the Yorkshire and Humber CCS pipeline being developed by National Grid.

#### 1.2 Scope

This document provides the Plot Plan for the OPP indicating the layout of the main items of equipment and the main buildings (Section 2).

The location, key components and optimisation of the OPP layout are described below.

#### 1.3 Location of OPP

The OPP site is located on land adjoining the existing Drax Power Station in North Yorkshire and occupies an area of approximately 27 hectares.

The OPP location relative to Drax Power Station is illustrated in Figure 1.1









Source: CPL

#### 1.4 Overview of OPP components

The OPP includes the following main components:

- Oxy-fuel boiler, steam turbine generator and other power block components;
- Air Separation Unit (ASU) that provides the oxygen for the oxy-fuel combustion process;
- Air Quality Control Systems (AQCS) that clean the flue gas to reduce atmospheric pollutants arising from combustion, the main components of which are the Electrostatic Precipitator (ESP) and Flue Gas Desulphurisation (FGD) unit; and
- Gas Processing Unit (GPU) to process and compress the CO<sub>2</sub> rich flue gas to achieve the required CO<sub>2</sub> specifications and pressure for onward transport and storage.

#### 1.5 Optimisation of the OPP Plot Plan

The general layout for the OPP components is shown in Figure 1.2.







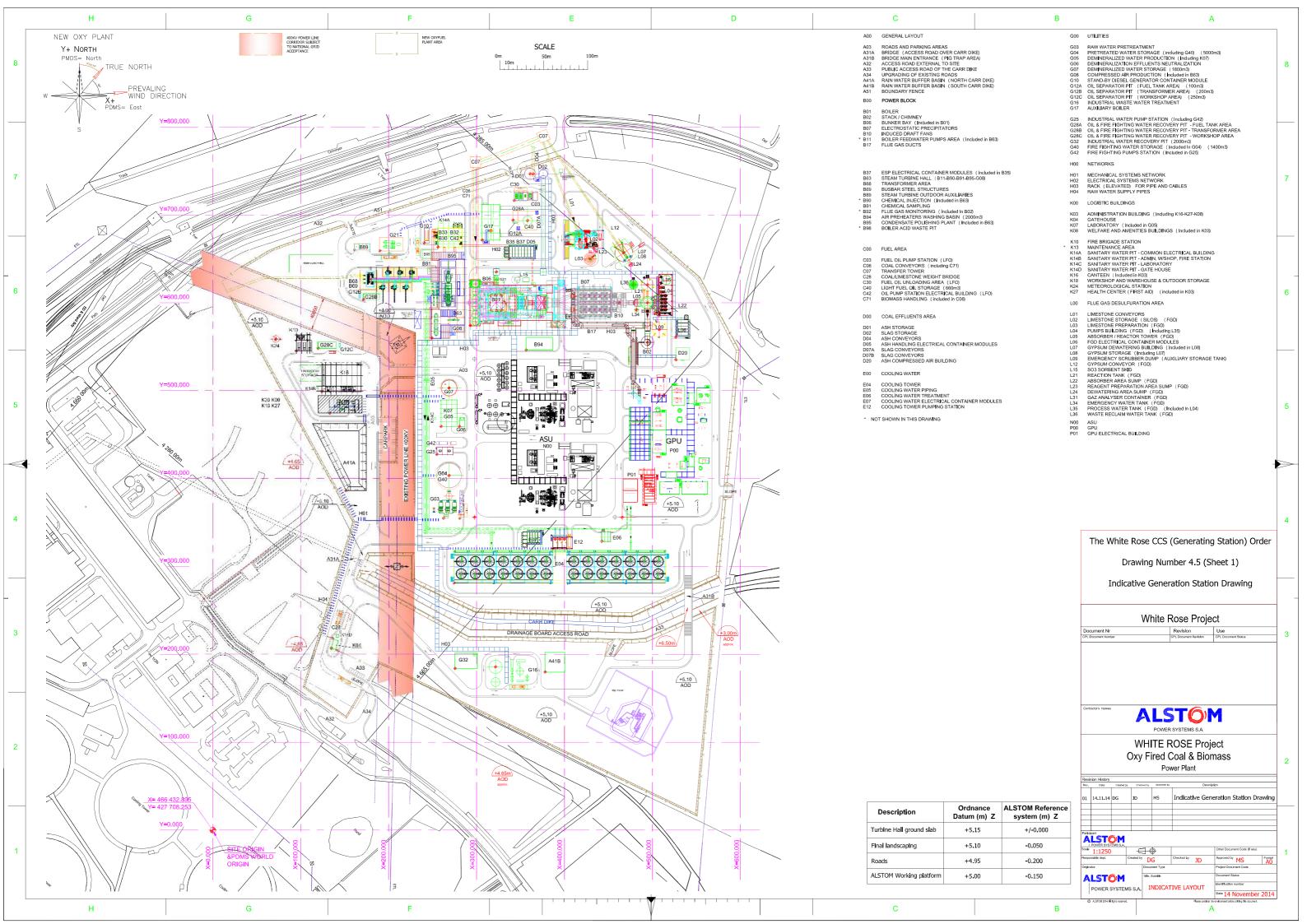


Source: CPL

The general layout for the OPP components has been optimised to take into consideration the location of:

- Boiler, turbine hall, and power generation and transformers close to the coal / biomass delivery point;
- AQCS (indicated as Flue Gas Abatement in Figure 1.2) in line with the power block axis to simplify duct routing;
- ASU as close as possible to boiler in order to minimize the oxygen duct length and pressure drop;
- The existing High Voltage (HV) line and associated corridor;
- The interconnection points with existing Drax facilities including fuel supply, access routes and utilities; and
- The common cooling towers (supplying the cooling water to the power block, ASU and GPU) installed south of the site (axis in main wind direction).







# 3 Glossary

Term	Definition
AQCS	Air Quality Control Systems
ASU	Air Separation Unit
CCS	Carbon Capture Storage
CPL	Capture Power Limited
DECC	Department of Energy and Climate Change
ESP	Electrostatic Precipitator
FEED	Front End Engineering Design
FGD	Flue Gas Desulphurisation
GPU	Gas Processing Unit
OPP	Oxy Power Plant

