Mining Remediation Authority

A practical illustrated guide to identifying and understanding and orientating coal mine plans

March 2026

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Summary

Coal mine plans provide essential information about the history and legacy of coal mining across Great Britain. Although their style and level of detail vary widely—from ornate Victorian manuscripts to modern sheets—they all share the same purpose: to record what was mined, where, and when, to help manage safety, ownership, and future land use.

This guide provides a basic understanding of what coal mine plans show, their potential limitations, how to orientate them, and how to interpret them effectively, though it is not intended to be exhaustive. A glossary is included at the end of common terms that can be found on mine plans, within this document, and related to the wider industry.

Coal mining spanned centuries, and, as such, these plans differ significantly in accuracy, completeness, and clarity. Early plans may show only basic outlines of workings, while later plans, especially after national standards were introduced in the mid-20th century, record far more detail.

Common key features of mine plans can include:

- The **extent of the workings** (in one or more seams) at the time of the plan construction are typically illustrated as coloured areas or outlines that can have an explanatory legend somewhere on the map to help with identification.
- The **location of mine entries** (shafts and adits) can be illustrated using a wide variety of symbology from circles to rectangles. Care must be taken to not mis-identify them as surface features such as wells, chimneys, underground shafts between seams that do not reach the surface (often referred to as staple shafts), or even, overlying text.
- **Descriptive information** such as colliery name, seams worked, map scale, map orientation (north arrow), and legend.
- **Surface features** are common to many plans and were used to reference mining features to. Such features that may stand the tests of time are churches, field boundaries, and some road and rail networks.

However, all plans have limitations. Some features were never recorded, some were lost through time or colliery mergers, and many documents have degraded—fading colours, blurred ink, and distortions make interpretation difficult. Symbology, scales, units, and plan orientation vary between regions and timeframes, meaning caution is needed when interpreting mine entries, depths, levels, and workings extents.

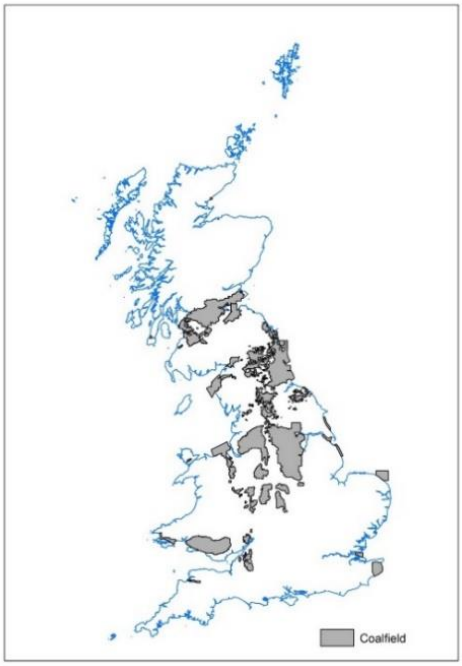
As a result of these uncertainties, mine plans should always be viewed as the *best available information*, not a definitive representation of what lies underground. Their value increases significantly when used alongside other data such as geological maps, borehole records, LiDAR, or multiple plans from different dates, all of which help build a clearer and more reliable picture of historic mining activity.

Coal mining history of Great Britain

The UK's coal mining heritage stetches back to the Stone Age, evidenced by flint axes discovered embedded in coal. Its use expanded significantly during Roman times, when coal supported activities such as ironworking and lime burning, as shown through ash analysis at archaeological sites.

Coal mining at first concentrated on shallow, easily reached seams via surface mine or bell pits, but as demand increased and technology improved, extraction pushed into progressively deeper, more complex, and hazardous environments. This shift required the development of systems for ventilation, roof support, and water management to keep miners safe. Once workings were exhausted, mines were often simply abandoned with little regard for future risks, a situation that persisted until more structured, safety-focused regulation began to emerge in the 1800s. The result is a substantial and enduring legacy of historic mine workings that requires consideration across much of Great Britain.

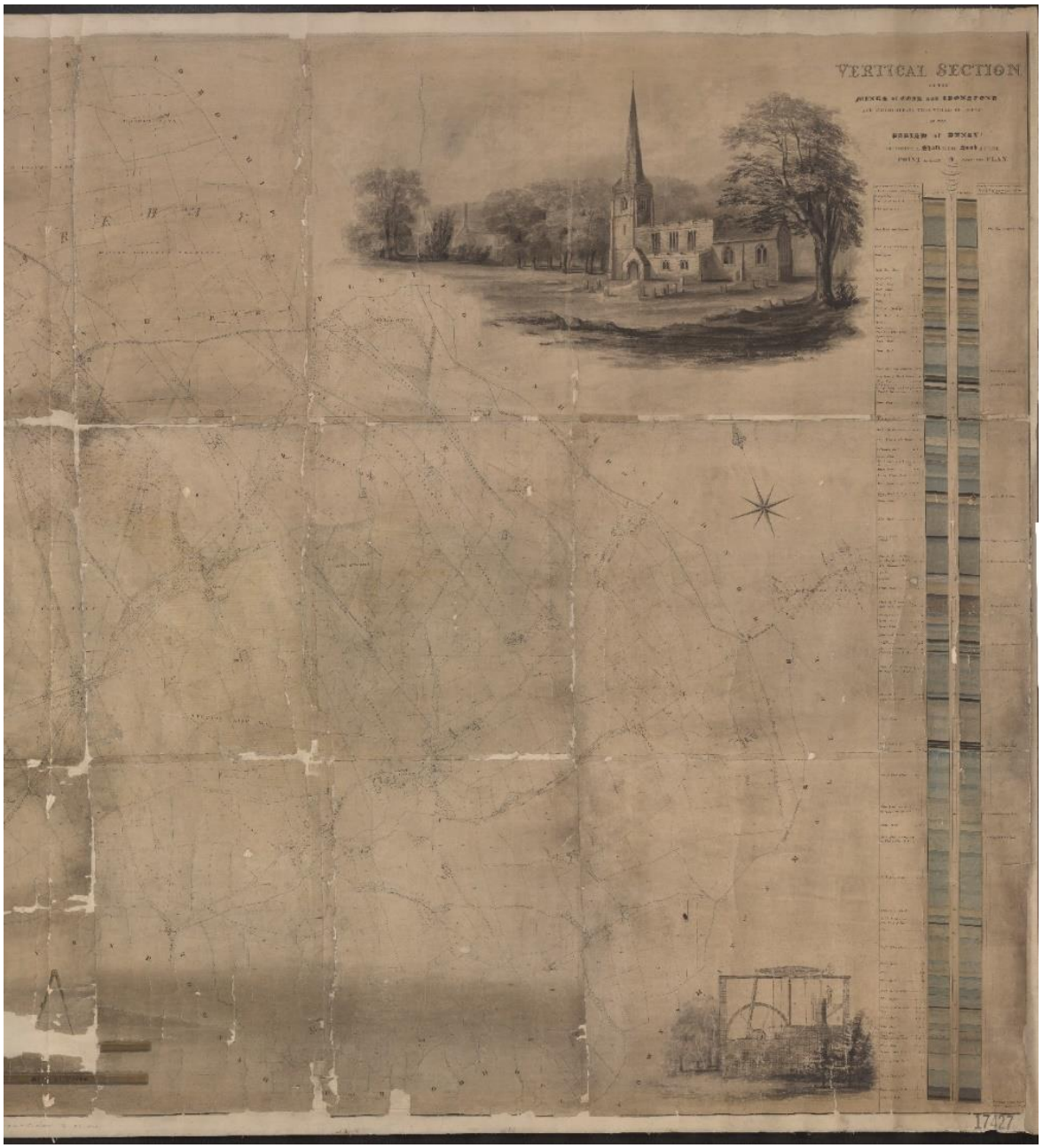
Historically, mineral rights are complex, often severed from the surface land ownership. Today, most minerals are privately owned with the Crown retaining rights to gold, silver, oil, and natural gas. Since denationalisation in 1994, the Coal Authority, now Mining Remediation Authority, own almost all of the coal in England, Scotland and Wales on behalf of the nation. It now manages the effects of past coal mining to protect the public and safeguard the environment from historical mining issues. Coal mining legacy can affect anyone - the public, planners, developers, infrastructure, landowners, housing, water (surface and subsurface), and the emergency services.



The coalfield areas across Great Britain.

Why coal mine plans exist

Coal mine plans in Great Britain vary enormously in style, size, age and purpose – ranging from ornate Victorian manuscripts to simple sketches and modern, digitally produced sheets. They can be as small as A5 or extend over several metres.



Mine plan example: 17427 1 of 2 (part A).

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Mine plans were historically created for several reasons:

- Underground navigation: showing the layout of roadways, workings, and hazards.
- Legal compliance: required following mine abandonment from 1872 onwards.
- Ownership and royalties: documenting the ownership, and extent and timing of coal extraction.
- Public safety: recording what remained underground after mining ceased for both the development of new mines nearby and understanding the surface impacts of mining activities.

To preserve this diverse collection before it became too fragile to handle, the then Coal Authority began scanning the entire archive of over 120,000 plans in 2003, a process that took over five years. These scanned plans form the basis of those available to view digitally.

This guide is designed to help users gain a basic understanding of almost any type of coal mine plan encountered – whether an official abandonment plan, a detailed working plan, a composite plan, or a simple sketch.

Development of legal requirements

The statutory requirement to keep mine plans began with the Coal Mines Inspection Act 1850, which first mandated “accurate” plans. This was strengthened by the Mines Inspections and Regulations Act 1860, which introduced requirements for notifying mining activities and mine abandonment.

A major shift occurred with the 1872 Coal Mines Regulation Act and the Metalliferous Mines Regulation Act which required official abandonment plans to be deposited with the Secretary of State within three months of mine closure and were kept confidential for the following decade. The aim was to reduce the risk such as sudden inrushes of water from adjacent old workings.

Historically, secrecy between competing mine operators meant that many plans recorded only minimal details – often just the outline of workings, shaft positions, and a north arrow – whilst more detailed plans were retained on-site and, potentially, lost over time.

Legislation continued to be introduced requiring formal qualification of mine managers and surveyors and setting mapping standards such as scale and frequency of update.

In 1935, the Institute of Mine Surveyors and the Royal Institution of Chartered Surveyors issued the first statutory standards for mine plans and surveys. These standards marked the beginning of the consistent use of the Ordnance Survey National Grid instead of local or surface-feature-based referencing.

As mining expanded, some collieries were physically linked, especially during the Second World War to provide emergency escape routes in the case of bombing, as well as to improve operational efficiency.

A major shift occurred in 1951-1952 when the National Coal Board introduced a comprehensive Code of Surveying Practice. This defined strict standards for scales, coordinates, datums, colour schemes, pen types, lettering styles, paper, accuracy, and storage. These requirements brought consistency and allowed plans to be stored flat in drawers. Furthermore, the Mines and Quarries Act 1954 required mine managers to keep accurate plans of abandoned and active workings in a mine.

In the wake of the Aberfan disaster in 1966 regulations tightened on tip surveying with the requirement to show more detail – contours, land use, services, buildings, and surface drainage (known and suspected). The Code of Practice was also revised again, calling for improved accuracy, using Ordnance Datum, and introducing full metrification of plans. Although coordinates became metric, many other features such as fault displacements and contouring remained in feet, requiring significant effort to convert.

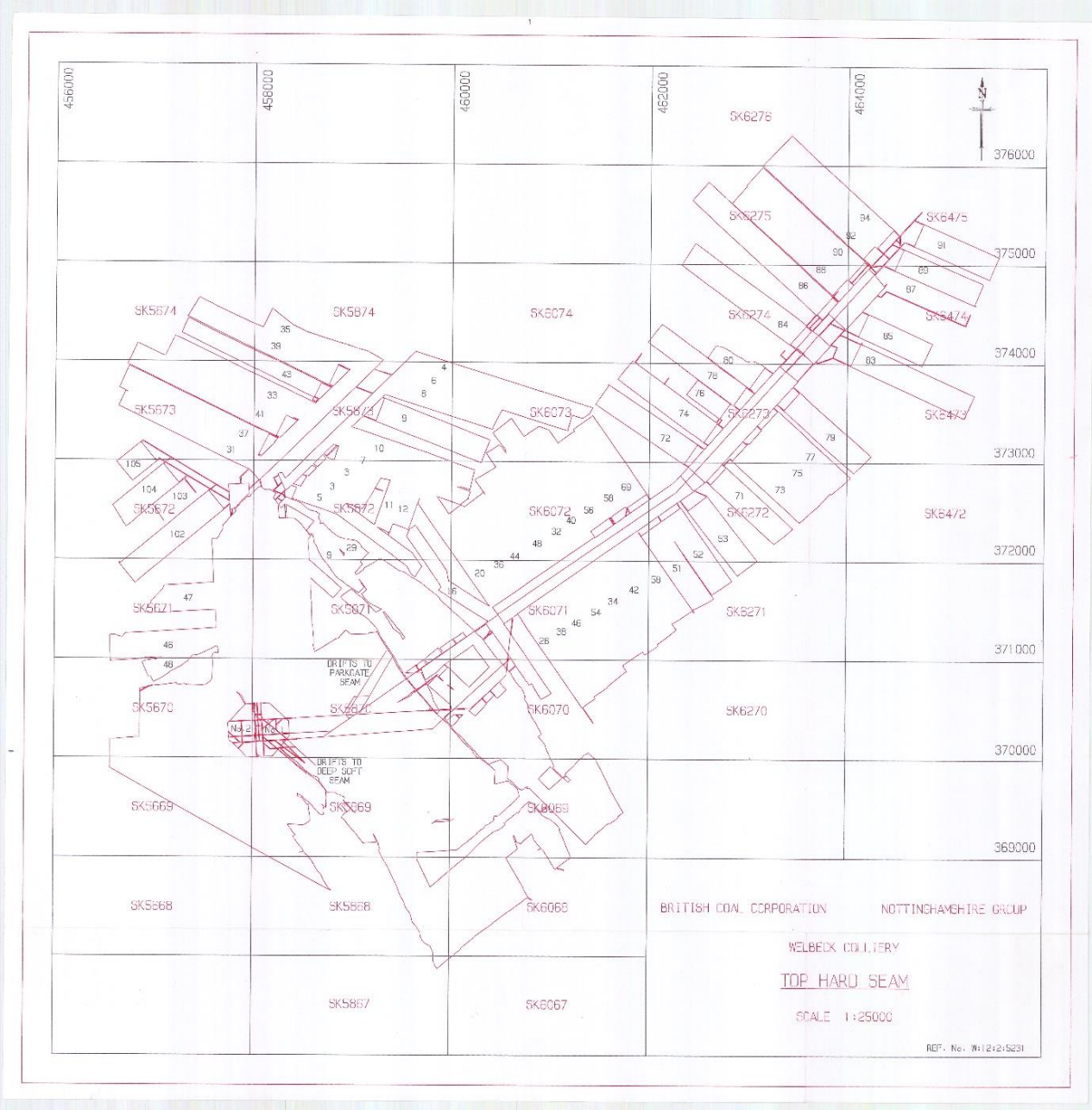
Coal mine plans

Types of plans

Several types on plan exist:

Key Plans

Key plans are usually simplified maps used as a reference guide to show the overall layout of a mine, its boundaries, and a relationship between different, more detailed, mine plans sheets. This provides a comprehensive overview of the site including surface features at the time of plan construction.



Mine plan example: 16081 Top Hard Seam Key Plan.

Working plans

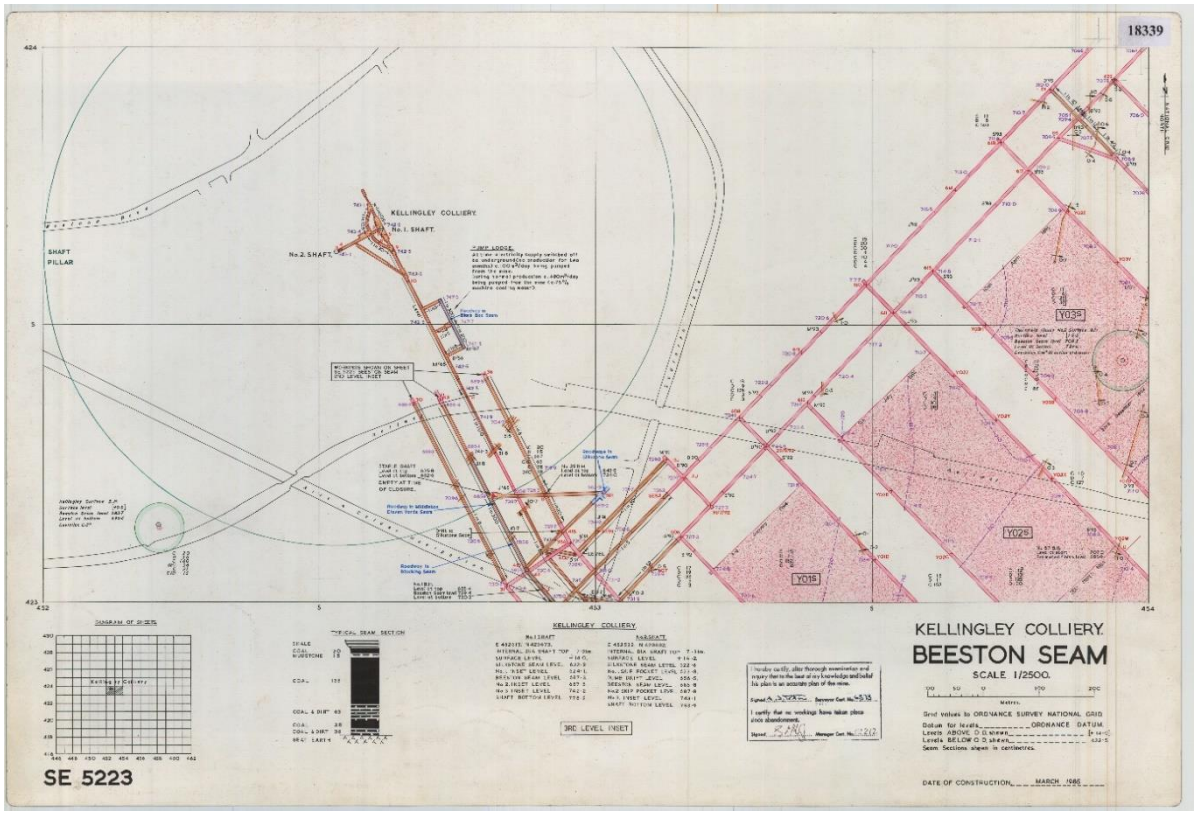
These are plans that record progress at intervals during active mining containing the full details of the mine layout including roadways, levels, gradients, dates of working etc. Upon completion the final plan became the abandonment plan as thus part of the catalogue.

Abandonment plans

Abandonment plans are usually certified records showing the state of mine workings at the time the colliery closed. They illustrate the final extents of the worked areas, any remaining pillars of unworked coal left for support, the condition of shafts (such as whether they are open, capped or filled), the presence of water bodies or flooded workings, the date of abandonment, and an official signature.

All abandonment plans being deposited under statute with the Health and Safety Executive (HSE) are required to include a signature of the Surveyor (signed off for accuracy) and the Manager (signed off for completeness i.e. that no further workings have taken place.

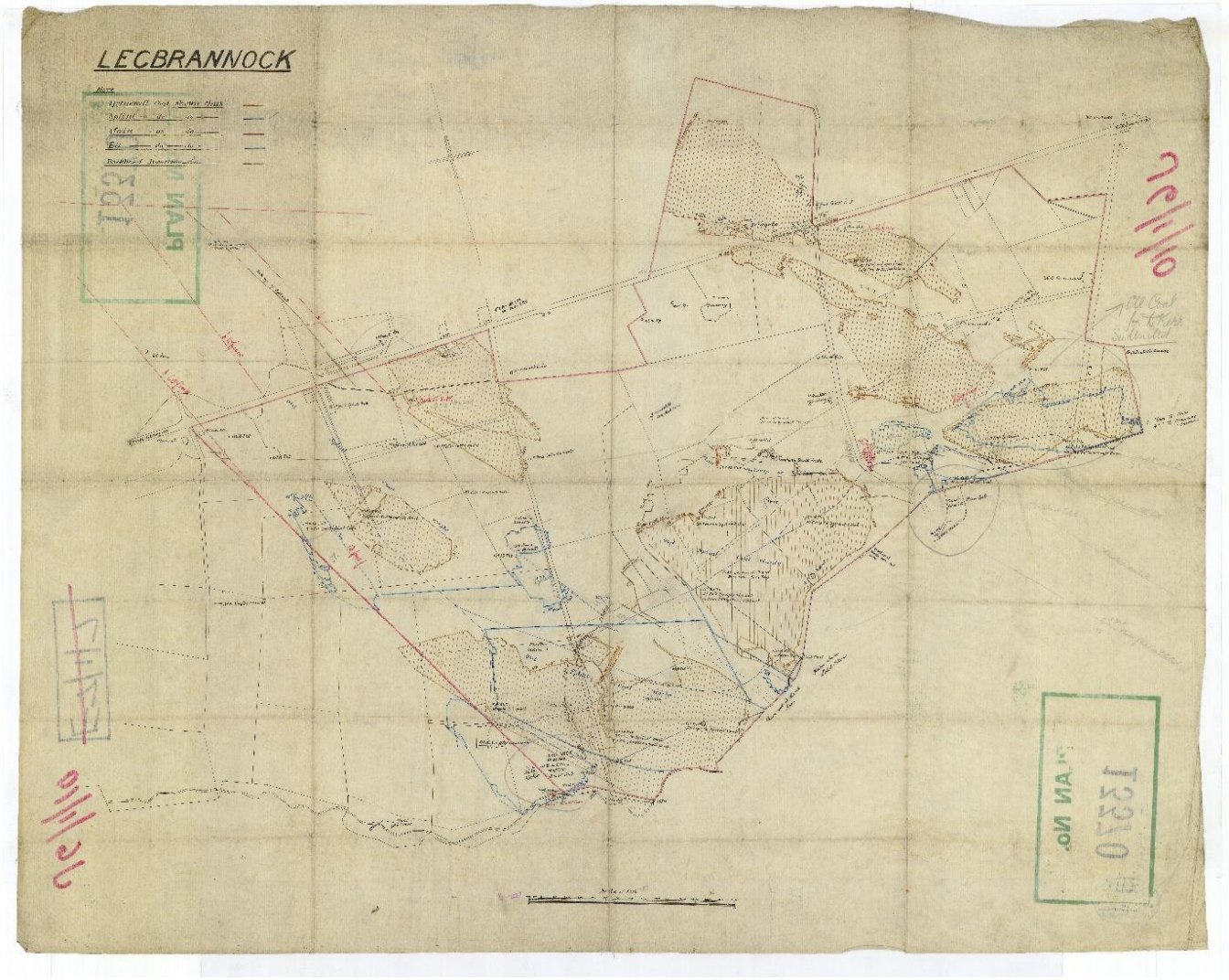
Not all abandonment plans in the catalogue meet these criteria though. Upon its creation in 1994 the then Coal Authority, now Mining Remediation Authority, relaxed the requirements and since then abandonment plans are catalogued based on if they show unique information. They do not need to be deposited with the HSE or comply with the requirements of the 2014 mining regulations, formerly the Mines and Quarries Act 1954.



Mine plan example: 18339 44 5223 17 of 35.

Composite plans

These plans show many seams and / or collieries on the same plan.



Mine plan example: S2127.

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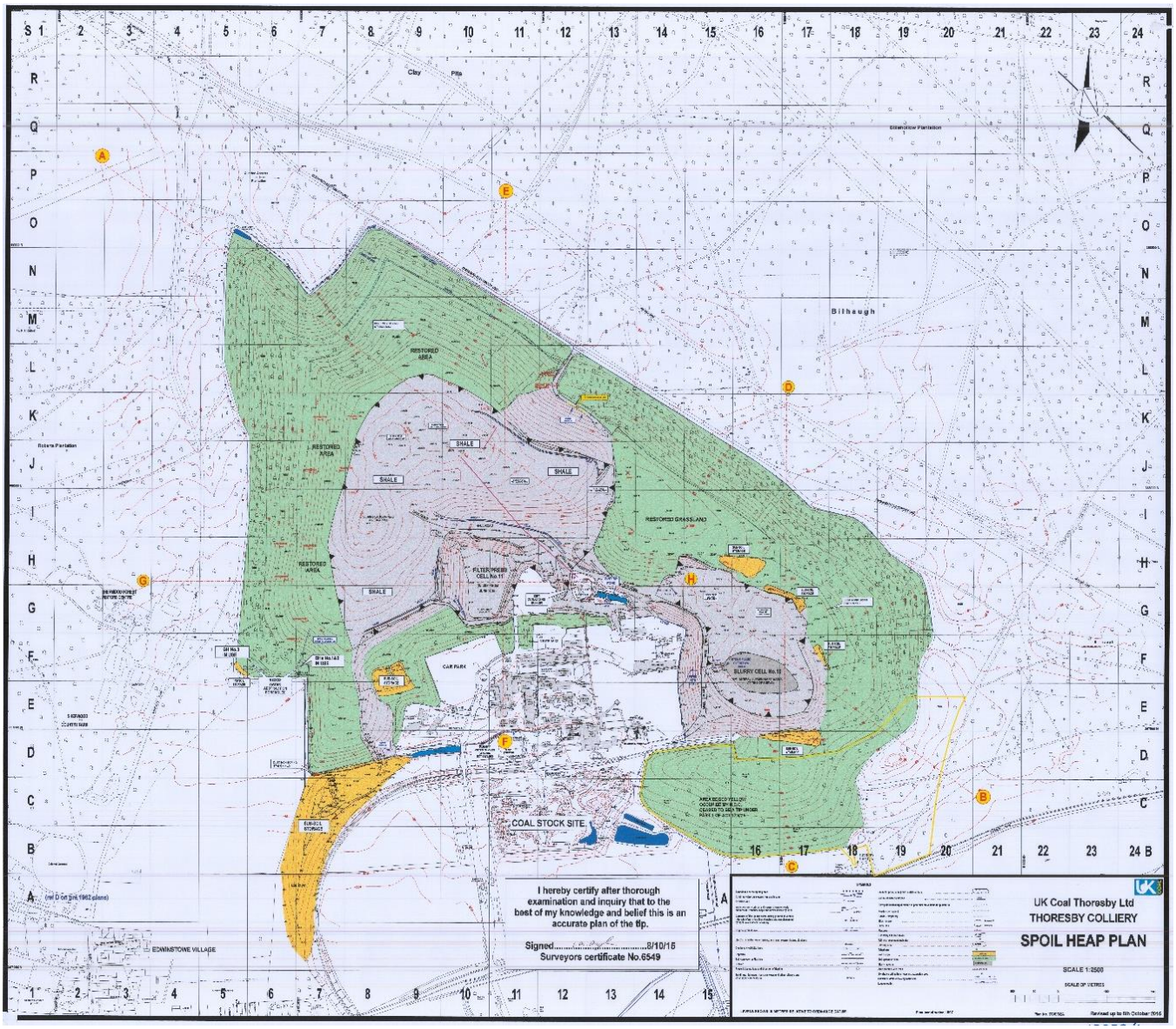
Tip Plans

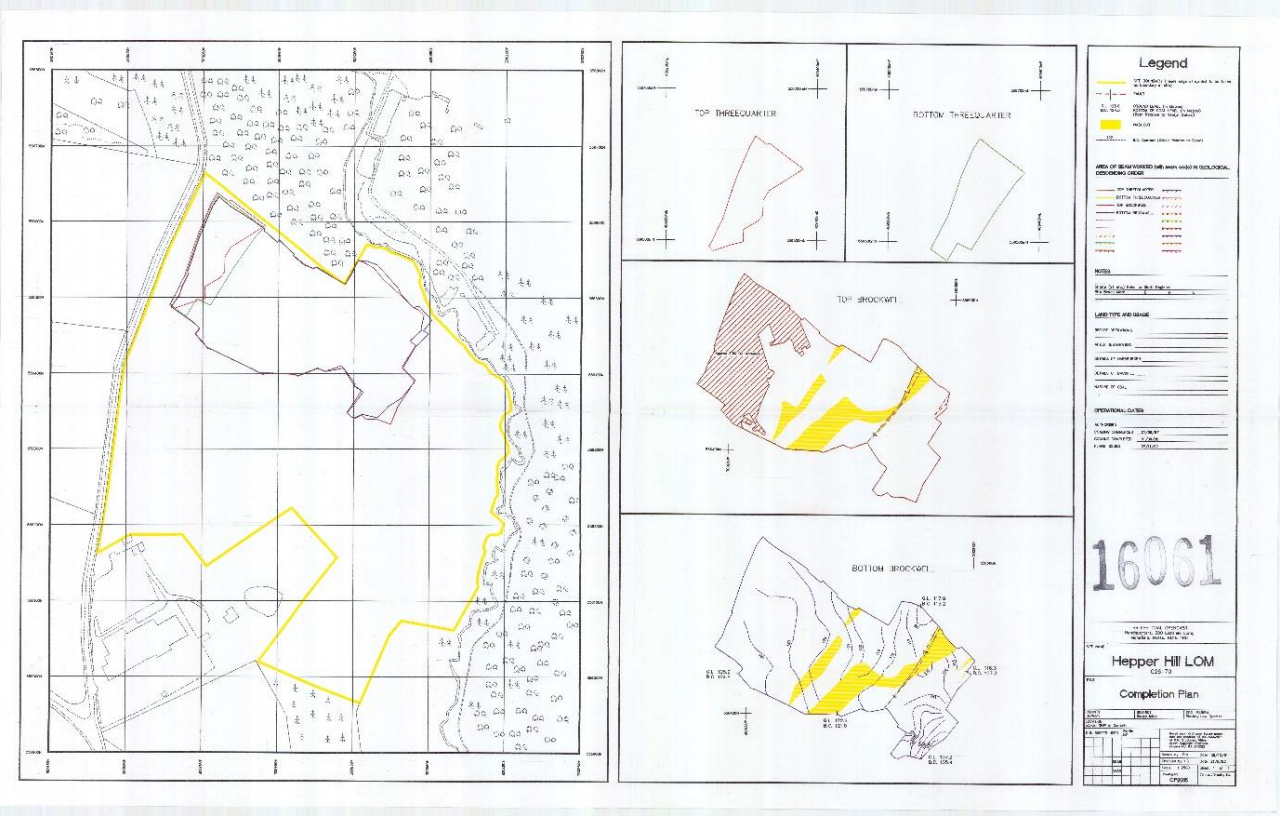
These plans represent the extent and features related to the deposition of mine working waste material on the surface typically covering the site name, site location, scale, topography, drainage, geology, and surface features.



Mine plan example: 18332 Tip Plan 2015.

Opencast

When an opencast, or surface, mine reaches the end of its working life, the operator must prepare an opencast completion plan showing details such as the opencast location, extents of seams worked, their depths, ground levels, slopes, contours, and any water features. Whilst their style may vary, they typically also include additional details such as overall site layout, coordinate, scale, surface features, location of any boreholes, geology, author details, shaft details, old workings encountered, and explanatory legend. These plans can be as a composite plan and / or broken down by seam. Although it was not mandatory for these to be stored with the Mining Remediation Authority many were subsequently inherited and have since been incorporated into the collection.



Mine plan example: 16061.

Other plans

A number of other plans were typically recorded in the twentieth century mining practice including colliery surface plan, plans of ventilation, layout, and pumping. Whilst the Mining Remediation Authority may hold some of this information, it was the abandonment plans that were mandated to be stored.

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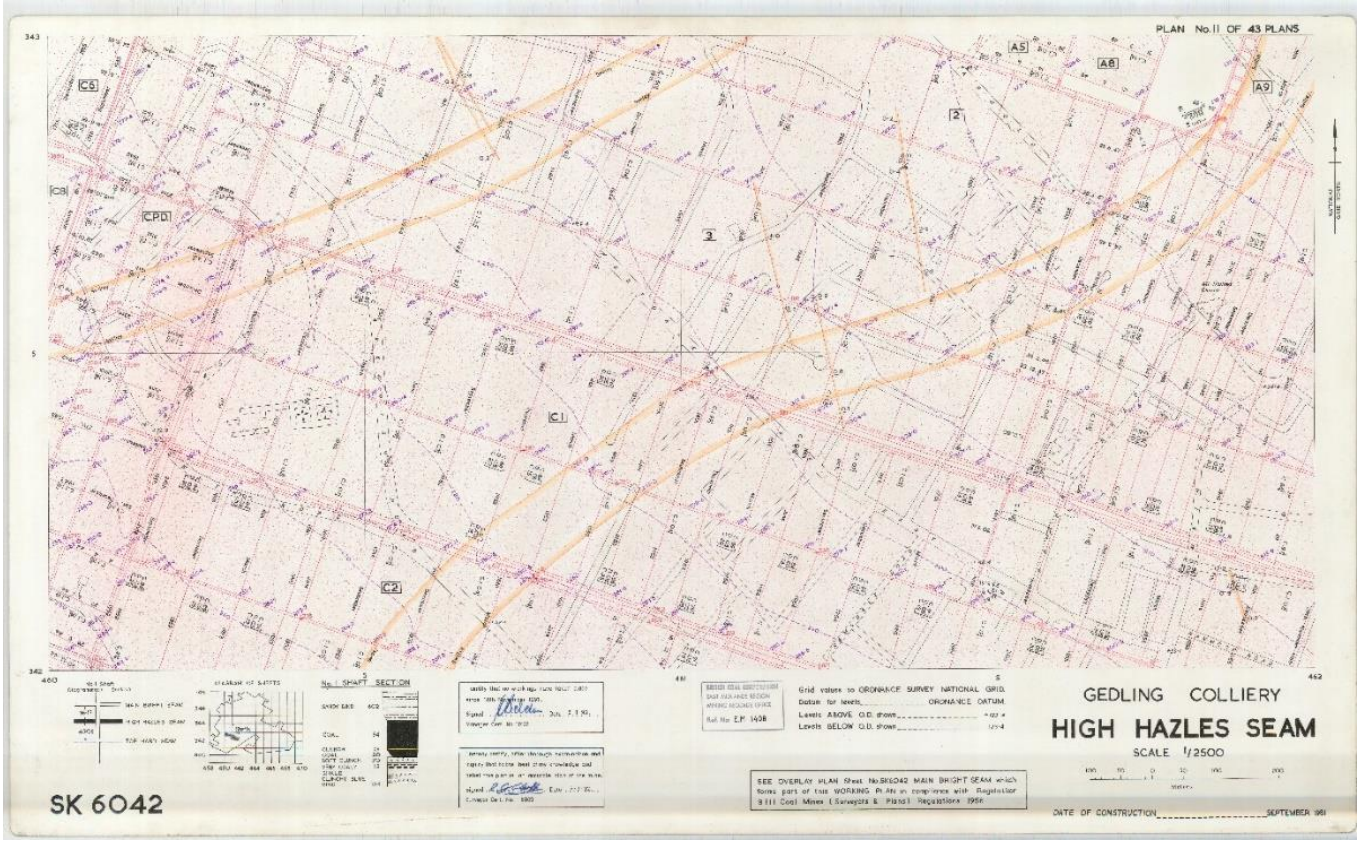
Private ownership plans

There are a number of plans marked PO0 (Private Ownership) or 0 in the geographic catalogue. Most, but not all, were added to the catalogue between 1928 and 1931 in response to two inrush incidents in 1923 and 1925 when the Secretary for Mines made a widespread appeal in July 1925 for plans of old workings not covered by the statutory deposition requirements. Either the actual plan, or details of the plan, where the custodian did not wish to relinquish their plan(s), were deposited. Pertinent information was extracted. Today the custodian details are typically unknown.

Plan identification

Plans in the collection can be identified in two ways:

1. Traditionally, each plan has a **Catalogue number**. This is an alphanumerical code applied to a plan or a series of plans containing related characteristics i.e. workings from the same coal mine. Coal plans are differentiated from those of other minerals as the latter are typically prefixed with the letter 'OM.'. Where there are a number of sub-plans one of the following is required:
    - **Sheet number**: for more modern plans this provides coordinate information at the kilometre scale. For example, sheet number 45 3842 is NZ 3842 ((A Beginner's Guide to Using Grid References | OS GetOutside) is 438,000 Easting, 542,000 Northing from the lower left hand corner of the plan.
    - **Sheet information**: older plans are typically differentiated by this field. For example, "2 of 2" means the second plan of two.
2. Recently, however, an additional unique numerical code (**Item ID**) has been applied to each plan to enable easier referencing of specific plans within the Mine Plan Catalogue hosted, in a joint enterprise, by the British Geological Survey (BGS).



Mine plan example: EM1408 43 6042.

Using the plan viewers

Coal mine plans can be searched and viewed through two different systems, each offering distinct functionality. Both systems also allow users to provide feedback on individual plans and explore options for purchasing copies.

Mine Plans Catalogue

Location: [Mine Plans Catalogue]

This joint enterprise with the BGS provides a text-only search interface including the BGS's own non-coal plan archive. Users can search by colliery or mine name, record type, mineral (all Mining Remediation Authority records are collated under the singular theme of '*coal and associated minerals*'), county, Mining Remediation Authority catalogue number, BGS Item ID, and seam name.

Scans for selected plans will open in a separate tab. Map navigation functionality is supported for either mouse or keyboard operation (cursor keys or W (up), S (down), A (left) and D (right)). Zooming

can be achieved by mouse or clicking in the plan and using the '+' and '-' keys, and the plan can be rotated using the on-screen buttons or pressing R for multiples of 90° clockwise and Shift R for multiples of 90° anticlockwise.

Primary plan reference field: BGS Item ID.

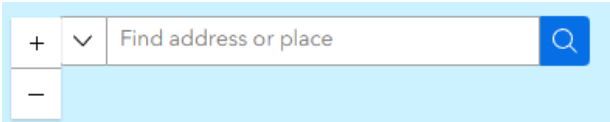
Purchase and feedback on the plan either:

- Click the Item ID for your chosen plans and the links are at the ops of the page or,
- Navigate to the Mine Plans Catalogue Search landing page and the links are in the text below the search

Mining Remediation Authority Map Viewer

Location: Mining Remediation Authority Map Viewer under the *Coal Mining, Planning* and *Mine Water Heat* map themes with the '*Mine Plans*' layer enabled / toggled on, you can zoom in to see the mine plan workings extents.

This viewer offers both geographic and text-based searching. Users can search by geographic location (address, coordinates, What3Words), colliery name, and catalogue number using the arrow to the left of the '*Find address or place*' box in the top left.



Search results list all sub-plans associated with the returned catalogue number entries. All plans open in the Mine Plans Catalogue Map Viewer for a consistent viewing experience.

Primary plan reference field: Catalogue Number.

As results are consolidated at the Catalogue Number level, the extents of individual sub-plan are *not shown*. A single search result may therefore contain multiple sub-plans.

Geographic search outputs highlight, in cyan, the extents of mine workings (not plan boundaries). These extents are divided into graticule squares, derived from the Ordnance Survey County Series Quarter Sheet system, each measuring 400 yards x 400 yards.

Purchase and feedback on the plan: click the 'Help' icon and select the appropriate option or the help file itself.

Interoperability

As the two viewers use different primary reference fields, it is essential to record the Catalogue Number of any plan identified in the Mine Plan Catalogue so it can be located with the Mining Remediation Authority Map Viewer.

A note of caution

Mining Remediation Authority archive data is continuously reviewed and updated, but errors and inconsistencies may have occurred over the lifetime of the archive. We strive to maintain and improve the accuracy and integrity of the collection.

If you identify a potential metadata error, please report it the Plan Feedback form associated to the plan in the search results. All feedback is reviewed regularly, and verified updates are included in future data update releases, issued at least four times a year.

Common features on coal mine plans – pre-1950's

The following provides a general overview of features typically found on coal mine plans created before the 1950s in Great Britain. As plan styles and levels of detail vary enormously across regions and time periods, not every feature described will appear on every plan, and the way features are depicted may differ widely.

All plans should be treated as the *best available information*, not as complete or fully accurate records. Many features were not consistently documented and the long history of coal mining means that gaps, omissions, and unknowns are common. The age of a plan also affects its clarity: colours used to distinguish seams may have faded significantly, often leaving different seams represented in very similar sepia tones.

A glossary of common mining and mapping terms is included below to support interpretation of the features and the terminology frequently encountered on these plans.

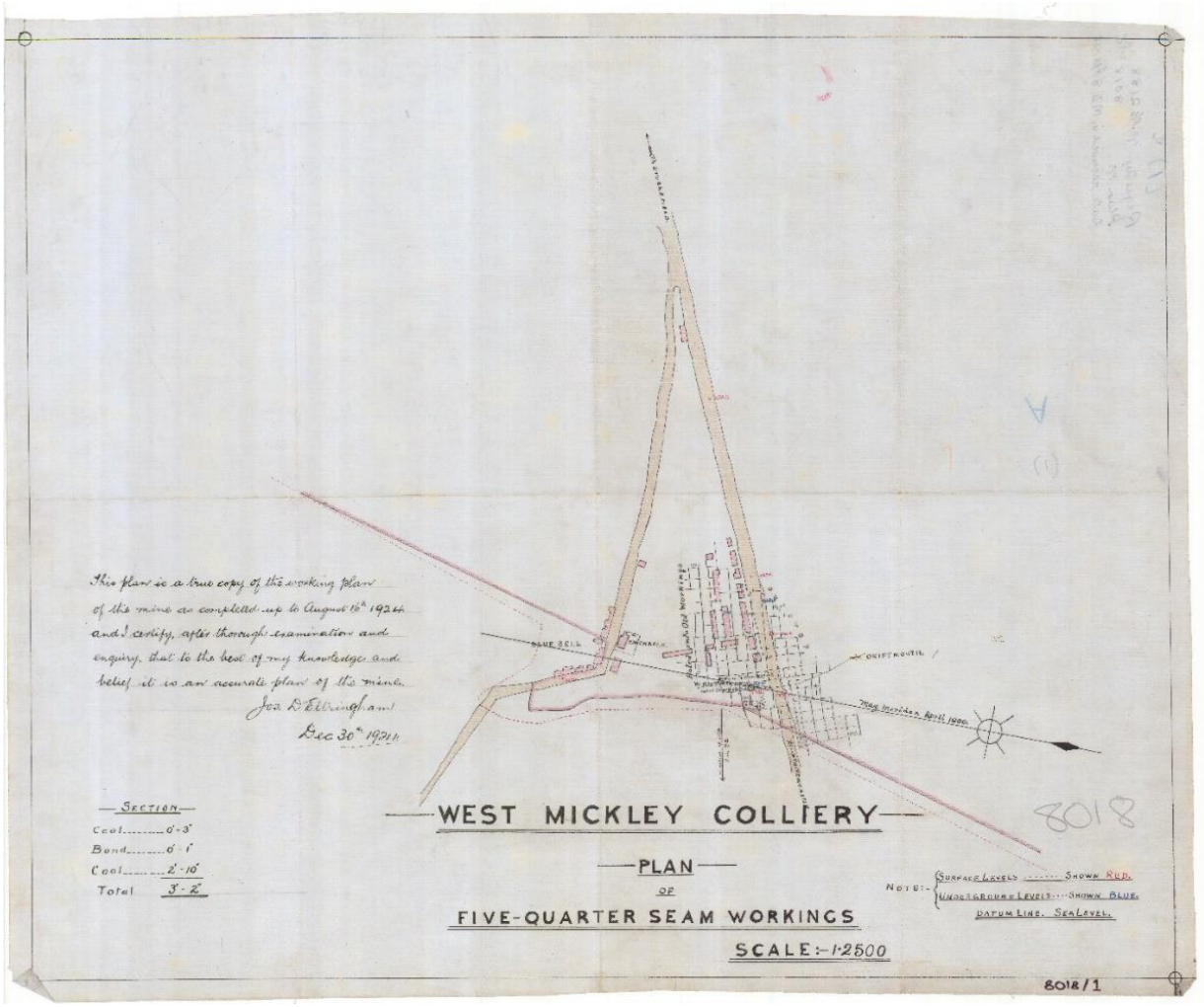
Descriptive information

Many plans contain important peripheral information describing the plan, its history potential, and the features that enable meaningful data to be derived.

Orientation

Historically, it did not follow that north was denoted straight up on a plan as is typical today. Many plans have north arrows, but their location and size vary greatly. When older plans have a north

arrow, it is often locally measured magnetic north, which may differ from the modern grid north by several degrees.



Mine plan example: 8018 1 of 5.

Scale and units

Whilst the distance units of modern plans are in metres, this has varied over time and across and within the different coalfield areas. Units such as chains, furlongs, feet, and yards etc are common. More obscure areal units such as acres, roods and perches are also found.

Similarly, over time many different scales have been used (a modern translation is included in the brackets) such as 2 chains to 1 inch (1:1,584), 1 inch to 1 mile (1:63,360), 160 feet to 1 inch (1:1,920), 6 inches to 1 mile (1:10,560) etc. Modern plans use a metric scaling such as 1:2,500.

Datum

Most standardised metric plans use National Grid Ordnance Datum (mean sea level at Newlyn, Cornwall) with levels shown in metres above or below Ordnance Datum. Many older plans have few depths or levels, or none at all. The older plans that do show levels may record them relative to an arbitrary datum. Using an arbitrary datum was a useful way of avoiding the use of positive and negative values on the same plan.

Common historical datums:

- Mean sea level (established in 1840 in Liverpool)
- Mean sea level (established 1912 to 1921 in Newlyn, Cornwall)
- 10,000 feet below sea level (adopted as coal mine workings became deeper)

Legend

Plans can have a legend or key describing the details of the plan illustration.

Regional inset maps

A small inset map can be found on some plans illustrating the location of the plan in question in relation to the wider worked area or general geography.

Geological information

Some plans include small inset diagrams showing the geology surrounding or down to the seam being worked, often with the thicknesses of the different strata recorded. These can be in the form of seam sections, shaft sections, and / or summarised borehole logs.

Others contain cross-sectional 'slices' through the ground, illustrating the geological and mining features expected or known to be present. These are often referenced to the main plan to understand the location.

Some plans contain an inset diagram showing the seam illustrated at the shaft and the insets above and below.

Plan information

Surface features

Older plans typically do not have coordinate grids, so varying degrees of surface detail are shown from which features were referenced and that can be used today to help identify the plan's

location. Certain long-lasting buildings and landscape features – such as churches, field boundaries, and some road and railway layouts – often remain recognisable over time and can therefore assist in precisely locating a plan. Some older plans will have no surface detail as it was not a requirement to include surface features on mine plans before 1896.

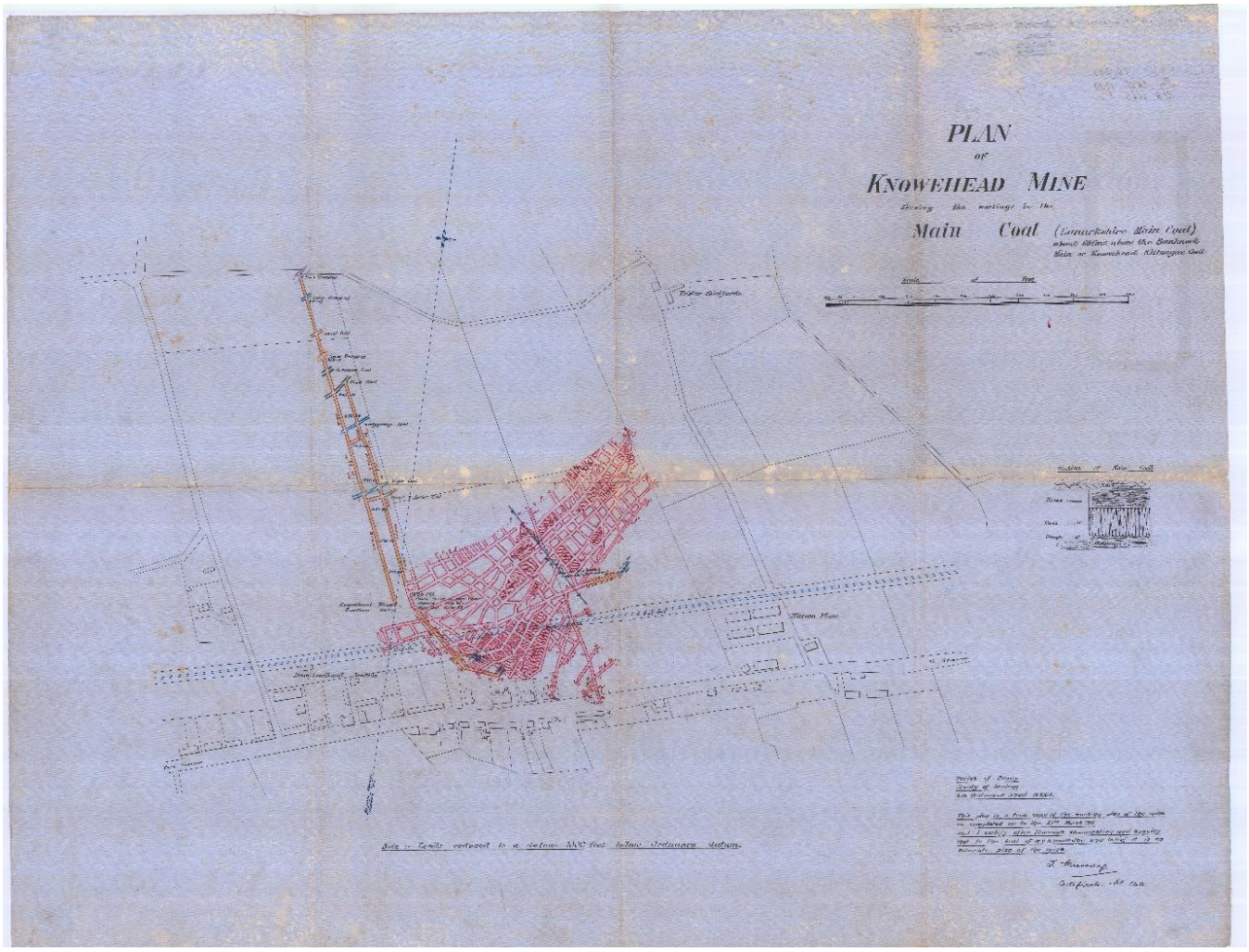
Mine entries

Shafts can be shown in many different ways including varieties of dots, circles, squares, or rectangles as discrete entities. Their representation varies over time and between regions They vary over time and within and between regions; for example, shafts are often seen as open rectangles in Scotland. They can be labelled, numbered, or left unmarked.

Adits are also shown using a variety of symbols but are typically connected to a roadway leading into the workings.

Bell pits are typically not depicted on plans because they predate formal recording requirements. Where they do appear, they are more often described through text such as ‘zones of bell pit workings’ or ‘old shafts’ rather than shown with symbols. These shallow features commonly occur near outcrops or shallow seams.

Care must be taken not to confuse mine entry symbols with surface features such as wells, chimneys, or even nearby text.



Mine plan example: 10254 2 of 6 illustrating rectangular shaft designations in Scotland.

Workings, seams, roadways, and levels

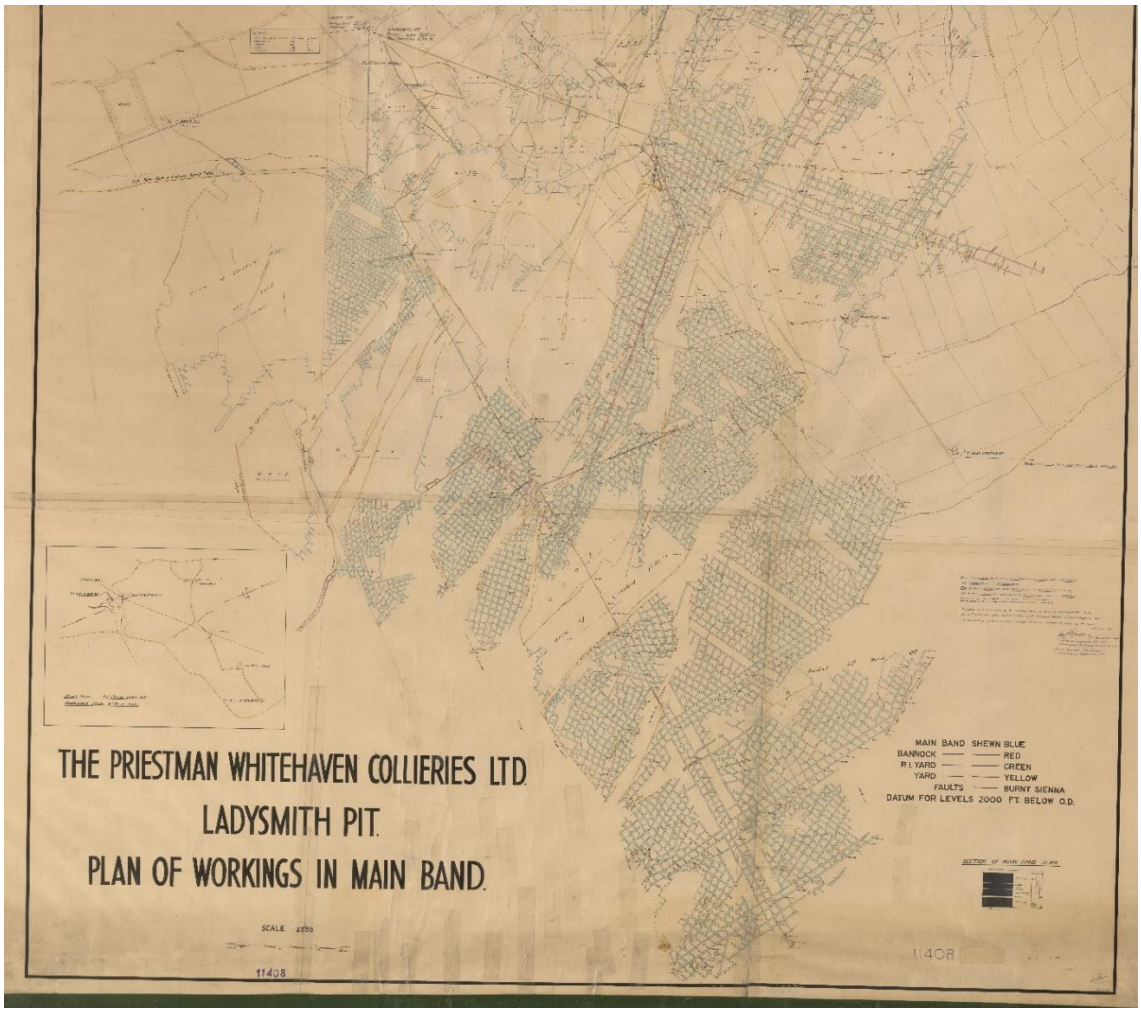
The core component of most mine plans is the depiction of the workings. British coalfields commonly contain multiple coal seams overlying each other, and plans may therefore show workings in one or several seams across the mapped area. Seam names and their variants differ between coalfield, and correlations across these areas is not always consistent.

Plans also vary greatly in their level of detail and complexity, reflecting the different mining methods used over time. For much of the pre-modern era, the dominant mining method was partial extraction by pillar and stall working, also known by several equivalent terms room and pillar, pillar and stoop, room and bord, or post and stall. This system was characterised by a grid-like pattern of short excavations radiating out from the mine entry, with solid pillars of coal

intentionally left in place to support the roof. In many mines, these pillars were later robbed – partially or wholly excavated near the end of mining to maximise coal extraction – meaning that the final geometry at abandonment is often uncertain. Another method of mining by total extraction, whereby virtually all of the coal is removed and the roof allows to collapse behind.

Roadways connecting different seams, linking to adjacent mines, or providing access to the surface are often shown on plans. Both workings and roadways may include additional surveyed information such as levels, seam thickness, and dates worked.

Although the primary focus of these plans is coal, other minerals – such as ironstone – were sometimes worked in association with coal, and their workings are typically represented in a similar manner.

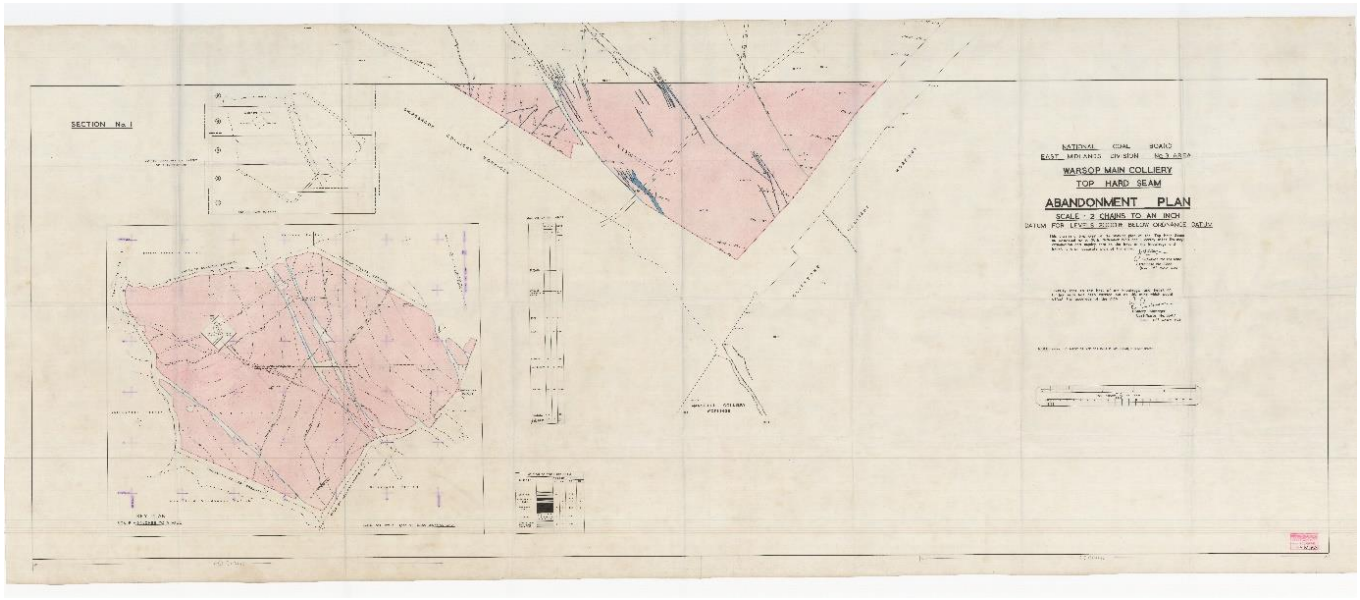


Mine plan example: 11408 1 of 1 (Part B) pillar and stall workings with levels in feet.

Boundaries, pillars, and barriers

An important feature of many plans are areas denoted as pillars or barriers to working. These are effectively protection zones for surface features within which underground working is prohibited. Such features can be around the shaft, under railways and rivers, and particular surface buildings.

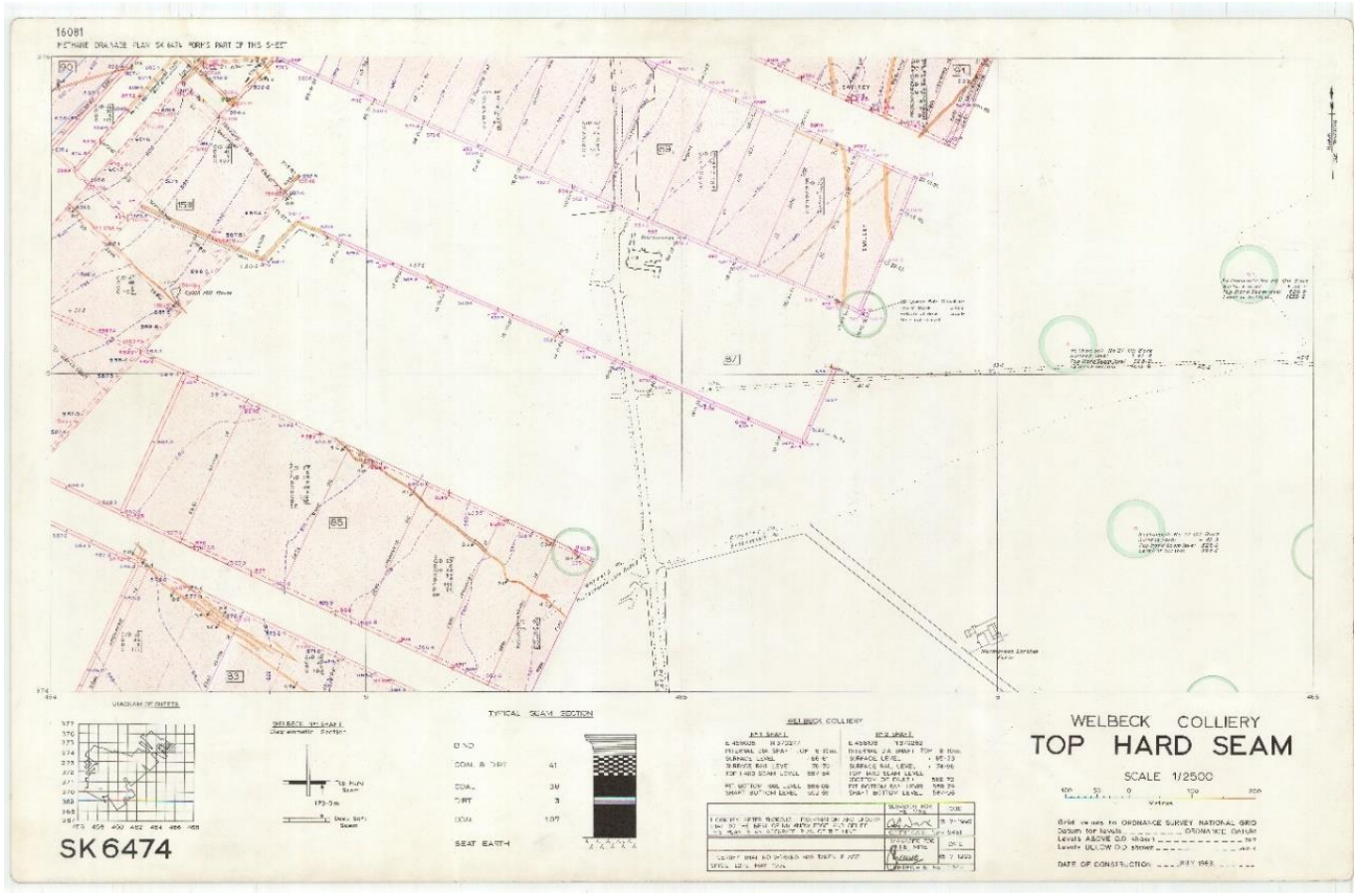
Plans can also show mineral ownership areas.



Mine plan example: EM553 1 of 8 illustrating shaft pillar support.

Geological faults and hazards

Alongside details of the workings, plans can also show related geological information that can offer barriers to workings such as the position of faults (and potentially their throw, or displacement, amount) or geological features such as dykes (igneous intrusions creating barriers to mining), washouts (local absence of a coal seam), and swilleys (local thickening of a coal seam).



Mine plan example: 16081 43 6474 illustrating in-seam faults and a swilley.

Standard mine plans – post-1950

The major step towards consistency in mine plan production occurred in 1951–1952 when the National Coal Board introduced a comprehensive Code of Surveying Practice. This code set strict requirements for plans scales (1:2,500 on 2x1km sheets), coordinate systems, datum (10,000 feet below sea level), colour schemes, pen types, lettering styles, paper specifications, and accuracy standards. This standardisation ensured that new plans could be stored flat and catalogued systematically.

In 1966, plan units were formally converted to metric, and the datum returned to sea level (Ordnance Datum).

Technological advances during this era enabled mining at greater depths and scales. As a result, longwall mining became a dominant method. In this system, a long block of coal (or panel) is extracted by machinery that traverses the coal face between two access roadways – the maingate

(or headgate) and the tailgate. Hydraulic roof supports hold the roof in place as the face, advancing or retreating, as the machinery progresses and allowing the roof behind to collapse in a controlled manner.

A glossary of common mining and mapping terms is included below to support interpretation of the features and the terminology frequently encountered on these plans.

Descriptive information

For each plan, where applicable, the following information is recorded:

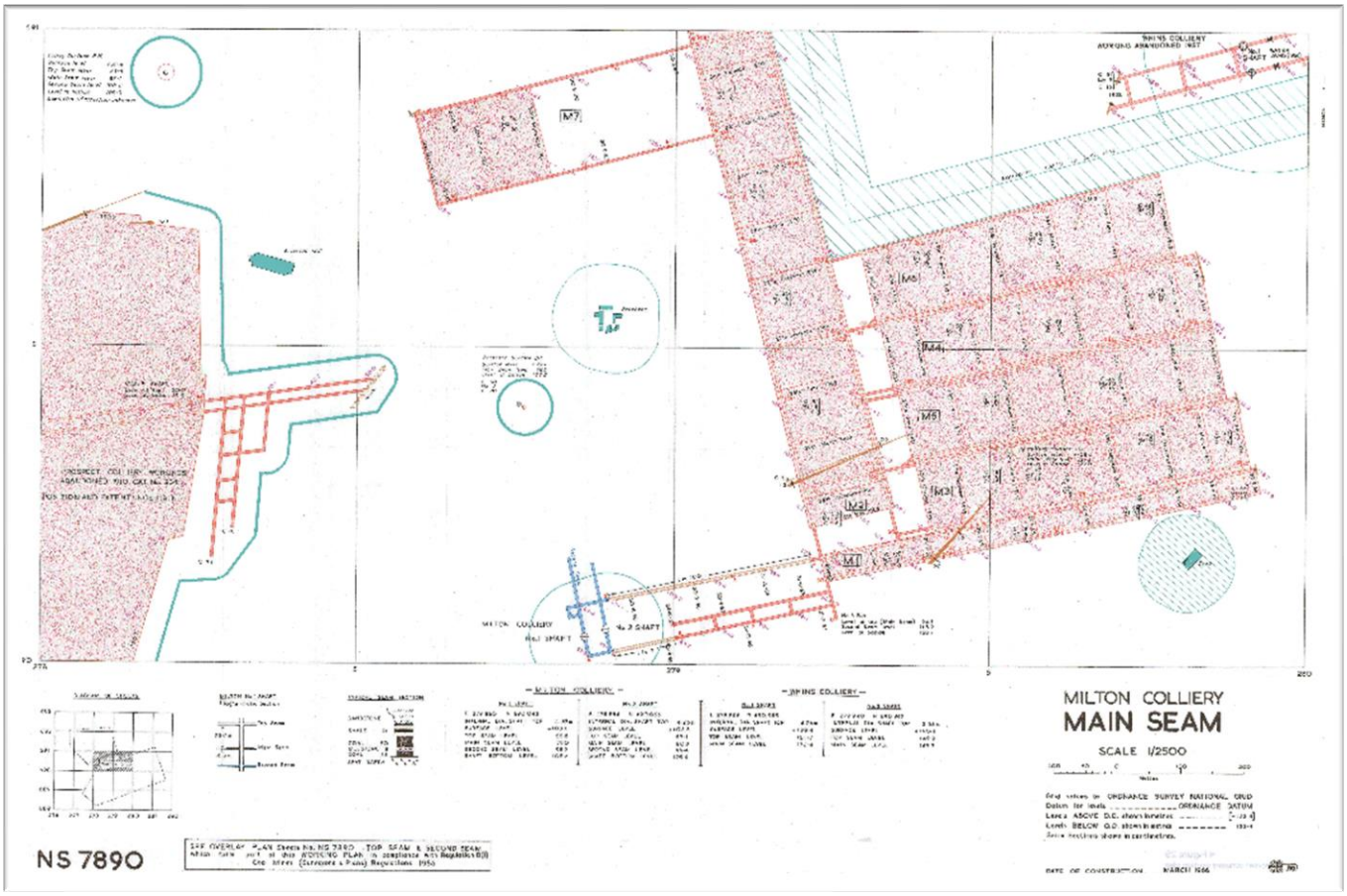
- Colliery name
- Seam name
- North arrow
- Scale information – in text and graphically
- National grid reference
- Datum to which the levels refer
- Seam section units
- Date of construction
- Colliery shaft information – coordinates, diameter, and various level data
- Seam section – typical cross-section above and below the plan
- Diagram of seams within 37m above and below the plan typically related to a shaft
- Reference to the larger area – inset map of related sheets
- Textual reference to associated plans

Plan information

For each plan, where applicable, the following information is recorded:

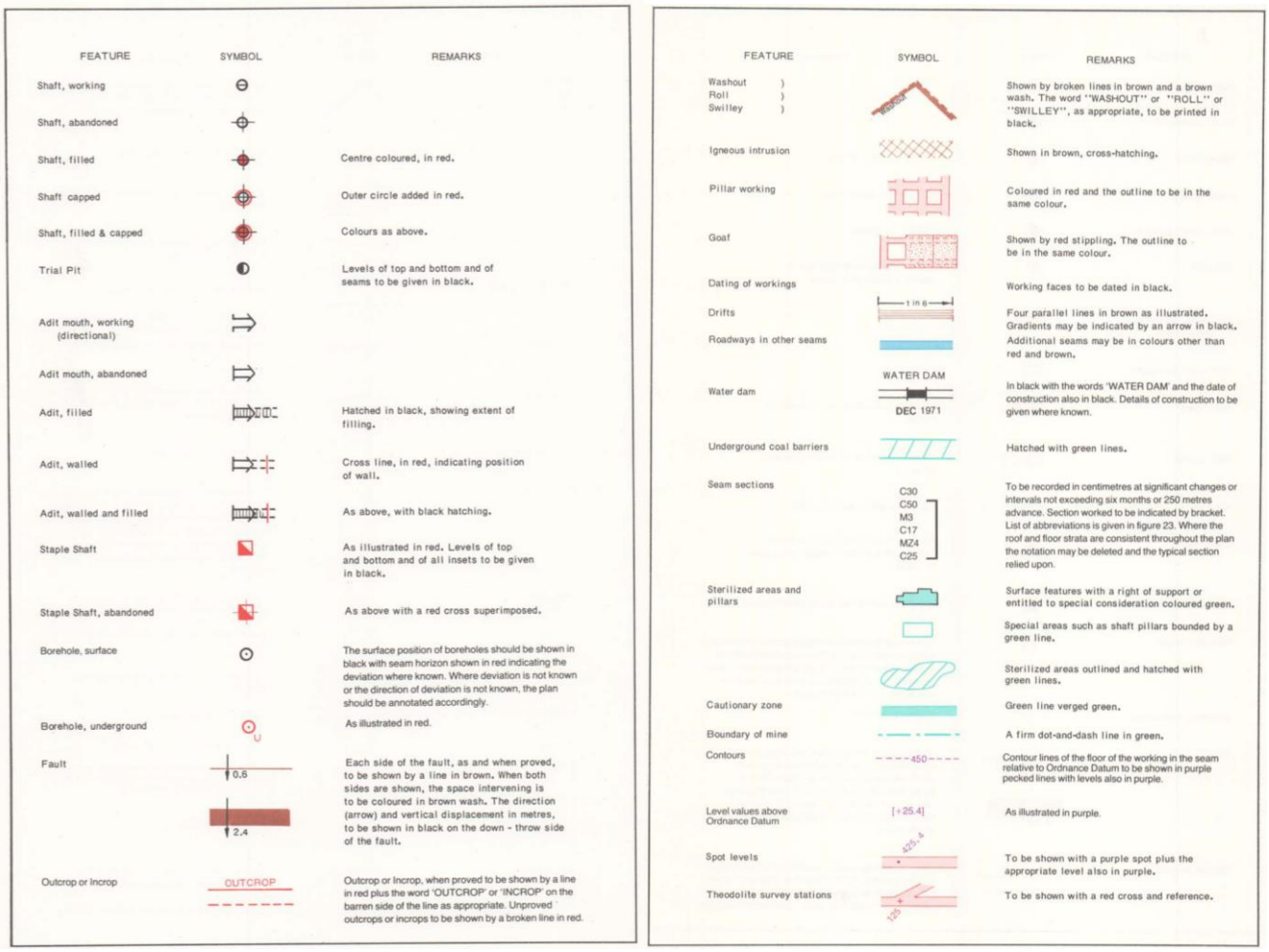
- Coordinate grid with 500m interval gridlines
- Surface landmarks
- Shafts / adits with names
- Old shafts / adits
- Workings and worked areas with levels, dates of extraction, names / number of the district / face
- Roadways connecting within and between seam and the surface
- Pillars of support
- Cautionary zones
- Surface position of boreholes with associated findings and levels
- Seam sections (in cm) at various points on the map

- Water dams and details
- Geological structures
- Old workings



Mine plan example: fictional colliery taken from National Coal Board Surveying Practice CR/1.

The following are the actual symbols and colour scheme required for such statutory working plans.



FEATURE	SYMBOL	REMARKS
Shaft, working		
Shaft, abandoned		
Shaft, filled		Centre coloured, in red.
Shaft capped		Outer circle added in red.
Shaft, filled & capped		Colours as above.
Trial Pit		Levels of top and bottom and of seams to be given in black.
Adit mouth, working (directional)		
Adit mouth, abandoned		
Adit, filled		Hatched in black, showing extent of filling.
Adit, walled		Cross line, in red, indicating position of wall.
Adit, walled and filled		As above, with black hatching.
Staple Shaft		As illustrated in red. Levels of top and bottom and of all insets to be given in black.
Staple Shaft, abandoned		As above with a red cross superimposed.
Borehole, surface		The surface position of boreholes should be shown in black with seam horizon shown in red indicating the deviation where known. Where deviation is not known or the direction of deviation is not known, the plan should be annotated accordingly.
Borehole, underground		As illustrated in red.
Fault	0.6 / 2.4	Each side of the fault, as and when proved, to be shown by a line in brown. When both sides are shown, the space intervening is to be coloured in brown wash. The direction (arrow) and vertical displacement in metres, to be shown in black on the down - throw side of the fault.
Outcrop or Incrop	OUTCROP	Outcrop or Incrop, when proved to be shown by a line in red plus the word 'OUTCROP' or 'INCROP' on the barren side of the line as appropriate. Unproved outcrops or incrops to be shown by a broken line in red.

FEATURE	SYMBOL	REMARKS
Washout / Roll / Swilley		Shown by broken lines in brown and a brown wash. The word "WASHOUT" or "ROLL" or "SWILLEY", as appropriate, to be printed in black.
Igneous intrusion		Shown in brown, cross-hatching.
Pillar working		Coloured in red and the outline to be in the same colour.
Goaf		Shown by red stippling. The outline to be in the same colour.
Dating of workings		Working faces to be dated in black.
Drifts	1 in 6	Four parallel lines in brown as illustrated. Gradients may be indicated by an arrow in black. Additional seams may be in colours other than red and brown.
Roadways in other seams		
Water dam	WATER DAM / DEC 1971	In black with the words 'WATER DAM' and the date of construction also in black. Details of construction to be given where known.
Underground coal barriers		Hatched with green lines.
Seam sections	C30 / C50 / M3 / C17 / MZ4 / C25	To be recorded in centimetres at significant changes or intervals not exceeding six months or 250 metres advance. Section worked to be indicated by bracket. List of abbreviations is given in figure 23. Where the roof and floor strata are consistent throughout the plan the notation may be deleted and the typical section relied upon.
Sterilized areas and pillars		Surface features with a right of support or entitled to special consideration coloured green.
		Special areas such as shaft pillars bounded by a green line.
		Sterilized areas outlined and hatched with green lines.
Cautionary zone		Green line verged green.
Boundary of mine		A firm dot-and-dash line in green.
Contours	450	Contour lines of the floor of the working in the seam relative to Ordnance Datum to be shown in purple pecked lines with levels also in purple.
Level values above Ordnance Datum	[+25.4]	As illustrated in purple.
Spot levels		To be shown with a purple spot plus the appropriate level also in purple.
Theodolite survey stations		To be shown with a red cross and reference.

Standard mine plan symbology

Understanding what coal mine plans do not show

Given that mine plans are primarily for underground navigation, safety, and royalty payments determination, then plans may not include the following:

- Pre-1850 workings (typically unrecorded).
- Collapsed roadways post-survey.
- Robbed pillars.
- Partial extraction not updated.
- Plan details lost due to colliery mergers.
- Plan details lost due to time pressures of plan reproduction.
- Eary plans only contain the bare minimum information (see above).
- Details of mining disasters.

Plan limitations and reliability

Coal mine plans are an invaluable resource – whether preserved in their original format or viewed as digital scans – but must always be regarded as the *best available information*, and not necessarily complete, fully accurate, or definitive records of mining activity. Their reliability is shaped by the surveying practices, technological constraints, legislative requirements, and operational priorities of the time in which they were produced. Consequently, both the content and quality of the plans can vary substantially across regions and historical periods.

Why mine plans can be incomplete or inaccurate

Original mine plans display significant variation in style, accuracy, and completeness, influenced by local surveying standards, the expertise of individual surveyors, the extent of secrecy that often existed between competing mine operators, and the evolving legislative environment in what the plan was produced.

Pre-1850s (before legislation) workings were rarely recorded and many early plans include only minimal detail – sometimes little more than the outline of the workings, shaft location, and a north arrow. In many cases this was an attempt to preserve operational confidentiality from competitors. As the coal industry grew, colliery mergers may have resulted in earlier detail not being carried forward to newer plans and time pressures may have resulted in incomplete updates or omissions from plans. Additionally, plans sometimes include other minerals, such as ironstone, where co-extraction was economically viable, introducing further complexity in interpretation.

With physical documents of various types of material, age takes its toll. Colours fade, inks blur, and annotations may distort due to moisture, folding, creasing, or chemical deterioration. Once distinct features can appear almost identical – especially where several originally coloured seams now look the same shade of sepia.

A number of key plan elements reflects mapping conventions of their time or location. This means that:

- North is not always “up”
- Units vary (feet, yards, chains, fathoms, metres). The introduction of metric coordinates did not remove all imperial remnants: certain features such as fault throws and contouring, continued to be recorded in feet well into the modern era.
- Scales differ widely, sometimes using chains-to-inches, conventions unfamiliar today.
- Datums differ, ranging from Ordnance Datum (sea level) to arbitrary local datums (e.g. 1,000 feet below sea level).

- Symbology is not standardised historically. For example, mine entries may be represented by dots, circles, squares, or rectangles, depending on the region or period. Care is required to ensure that mine entries are not confused with surface features such as wells, chimneys, or even text placed nearby.

As legislation developed, so did the level of detail recorded, and the accuracy standards required.

Plans may also include workings for other minerals, adding further complexity.

Not every mine plan survived nor was every mine plan officially submitted. The archive is not exhaustive. As such the archive does contain gaps where documents were lost or destroyed, private plans were never deposited, and supplementary plans were not mandated for retention and were thus lost.

Metadata accompanying scanned plans may contain errors, reflecting legacy cataloguing practices or misinterpretation of old handwriting.

Older plans often lack coordinate grids and rely instead on surface features such as churches, field boundaries, or roads for location referencing. These features may have changed significantly or disappeared, leading to uncertainty in modern georeferencing.

Digitisation, whilst essential for preservation, can introduce its own limitations including loss of fine detail, reduced colour differentiation, warping or distortion from scanning oversized, fragile, or folded originals, and corruption of images during scanning. However, the scanning undertaken was with a state-of-the-art flatbed scanning system, the largest in Europe, to reduce any potential limitations.

Reducing Uncertainty

As individual plans can contain omissions, distortions, or conflicting information, reliability should always be assessed in context. Important considerations include:

- When the plan was made.
- Whether it is a signed official abandonment plan.
- Whether scales, datums, and north arrows are present and consistent.
- How well the features match known geology or surface plans or other mine plans in the same seas in the same area.

For best results, cross-checking mine plans with other available data is recommended such as mine plans of different dates, geological maps, borehole logs, LiDAR, and historical mapping. A combined approach helps build a far more reliable understanding than any single plan can provide.

For more information

- Ordnance Survey map symbols: Ordnance Survey Characteristic Sheets - Map Images - National Library of Scotland
- Understanding British geology: Discovering Geology - British Geological Survey
- Grid references: A Beginner's Guide to Using Grid References | OS GetOutside

How to orientate historical coal mine plans

This is a straightforward, practical guide to interpreting historical mining plans and relating them to their real-world locations, using freely available tools and information. It is intended for those with an interest in mining history and is **not suitable for development or related purposes** for which other standards and requirements apply.

Why orientation matters

Historical coal mine plans were created at different times by different surveyors using different mapping conventions since the requirement to create them come into being. On older plans, for example, north is often not towards the top, and many plans lack modern coordinate grids, instead relying on longstanding surface features and buildings as reference points; these features are crucial for locating a plan accurately.

This guide explains, step-by-step, how anyone can take digital copy of a mine plan and work out where the workings and features are crucial today for locating a plan accurately.

What you need before you start

To orientate a coal mine plan effectively, you will need:

- The mine plan open in the viewer (or appropriate viewer if purchased).
- Awareness what mine plan show and their limitations (see Coal mine plans section above).
- Access the Mining Remediation Authority Map Viewer.
- Access to modern mapping and mapping conventions e.g. Google Earth, Google Maps, Ordnance Survey Maps, or equivalent.

- Access to historical mapping and conventions e.g. National Library of Scotland, Ordnance Survey Characteristic Sheets - Map Images - National Library of Scotland, FieldenMaps.info / OS Map Series Illustrated Guide.
- Coordinate conversion system e.g. Fielden maps coordinates converter.
- An eye for detail.
- Patience.

Although not necessary, for added context it may be useful to access geological maps and borehole records from the British Geological Survey (BGS) BGS Geology Viewer (BETA) | GeoIndex - British Geological Survey

Quick reference checklist

Mine plans come in many different formats, and no plans necessarily contain exactly the same information. The process outlined below represents the most effective route for spatially locating a plan, but it is important to recognise that is not a definitive guide as some features may be absent or difficult to find on some plans. These variations can influence how straightforward or complex the orientation process becomes.

1. Find the plan in the Mining Remediation Authority Map Viewer.
2. Find the coordinate / coordinate grid.
3. Find the north arrow.
4. Identify key surface features.
5. Assess the reliability of what you see.

Locating and orientating a mine plan

Before attempting to align your chosen mine plan with a modern map, spend some time examining the document itself. Historical coal mine plans vary enormously in the information that they contain, their clarity and mapping conventions used. This first stage helps to identify what clues the plan provide and where challenges may arise.

Find the plan in the Mining Remediation Authority Map Viewer

The easiest way to approximate the location of a mine plan without coordinate starts by using the Mining Remediation Authority Map Viewer. You may already have used this method to identify the plan you are interested in.

Otherwise, within this tool there is a layer called ‘Abandoned Mines Catalogue’ within both the Planning map themes that cover the extents of the mine workings shown by Catalogue Number.

Remember, the primary mine plan reference used by the Mining Remediation Authority is the Catalogue Number that can represent many sub-plans defined by the sheet number or sheet information.

These mapped extents do not reflect the edges of the plan and are broken into what are called graticule squares. This is a referencing system adopted from the Ordnance Survey County Series Quarter Sheet mapping with each graticule square measures 400 yards x 400 yards.

Using the search function input the Catalogue Number for the geographic extent of the plan denoted by a cyan coloured area on the map. If you have used the Item ID you will need to re-search for this plan in the Mine Plans Catalogue to determine its Catalogue Number.

- The plan and its mine workings extent can be directly seen
- Looking at the whole of the mine plan and the shape of the working against the shape of the 'Abandoned Mines Catalogue' area. This potentially helps orientate the plans.
- Switch on other layers in the Mining Remediation Authority map viewer such as mine entries as these can future be used to orientate the plan.

Find the coordinates / coordinate grid

Many older plans do not contain coordinates or a coordinate grid, relying instead on surface features for reference. Where grids do exist (typically post-1950) they may include kilometre grid lines or sheet numbers indicate precise National Grid references (see Plan identification section above).

- Look for gridlines or numerical references along the plan edges.
- Note any sheet numbers or references that may help location the plan within the national mapping system.

With coordinates you can directly correlate the mine plan to modern mapping.

Find the north arrow

A critical feature of most plans is the north arrow to orientate the plan and thus identifying this and re-orientating the plan is a key first action. Historically, it did not follow that north was denoted straight up on a plan. When older plans have a north arrow, it is often locally measured magnetic north, which may differ from the modern grid north by several degrees. North arrows can be located anywhere on the map – sometimes small and faint, sometimes elaborate, large, and central.

- Scan the plan edges for the north arrow. If absent, check the rest of the plan,
- If you find one, rotate the plan to orientate north approximately upwards.
- Be careful not to confuse other potential arrow features with the north arrow such as geological dip arrows. North arrows will typically be represented with an 'N' or 'North' or an identifiable compass design.

If the north arrow is missing, orientation will depend on surface features (see below).

Identify key surface features

Older plans often rely on recognisable surface features rather than coordinates. These may include churches, field boundaries, and historic road or railway alignments, which often survive the tests of time. If possible, have the mine plan and modern plans side by side and look for:

- Place names – place names are typically retained over time and thus provide a broad means to locate a mine plan.
- Churches and older buildings – these are especially useful as many churches have been in the same place for centuries and make for robust reference points.
- Field boundaries – whilst the expansion of towns and villages has consumed surrounding fields over the years their boundaries are often preserved as the boundaries of housing estates.
- Old roads and railways – less precise as layouts and sizes can change over time, major roads and long-standing railway lines still follow historical alignments and thus offer an approximate means of locating the mine plan.
- Mine entries (shafts, adits, and bell pits) – see previous guide Mine entries are shown in many different ways: dots, circles, squares, rectangles. Symbols vary across regions and eras. Care is needed not to confuse them with wells or chimneys.
- Coast / water bodies / rivers.

It may be that the landscape has changed substantially over time in which case an intermediate historical map may be needed to help correlate, Such plan can be accessed from sites such as the National Library of Scotland with a coordinate conversion sites e.g. Fielden maps coordinates converter potentially helpful in cross-referencing locations. Further assistance in understanding old map symbols can be found here: National Library of Scotland, Ordnance Survey Characteristic Sheets - Map Images - National Library of Scotland, FieldenMaps.info / OS Map Series Illustrated Guide.

Assess the reliability of what you see

After aligning the plan with the real world, the final step is to judge how trustworthy the interpreted information is. Mine plans are valuable but must always be regarded as the best available information, and, often, not definitive truth until the advent of modern standardised mapping requirements.

Factors affecting reliability:

- Date of the plan (older plans are often less accurate).
- Presence of key information such as scale, datum, and north arrow.
- Completeness and clarity—faded colours, lost detail, and inconsistency with other mine plans in the same seam in the same area complicate.
- Surveying standards at the time (post-1950 plans follow strict conventions).
- Whether surface features match from mine plans to modern maps.

Confidence can be improved by looking at the mine plan potentially in correlation to other mine plans of different dates, geological maps, and borehole logs for instance.

A rewarding exercise

Locating and orientating old mine plans is not easy – this is normal. Interpretation is often about assembling clues from several sources to solve the puzzle and is as much an art as it is a science. Even for seasoned professionals accustomed to historical mine plans, the enormous variety can throw in surprises. It is, though, a rewarding exercise when patience pays off and it all comes together. It will get easier with time, practice and it will become easier to spot features, locate and orientate the plan.

Glossary of useful terms

Abandoned Mines Catalogue (AMC): the national archive held at the Mining Remediation Authority of coal mining and related plans pertaining to the history of coal mining in Great Britain.

Adit: the entrance to a horizontal or inclined roadway or tunnel from the surface, driven to allow ingress and egress of people, material, and minerals to shallow coal mines, or to provide drainage for a mine.

Air pit or **shaft**: shaft used expressly for ventilation.

Aquifer: an underground layer of water-bearing material consisting of permeable or fractured rock or unconsolidated material that can contain or transmit groundwater.

Azimuth: the direction from north (in degrees) that an adit runs e.g. an azimuth of 90 means the adit is running due east.

Bell pit: an ancient method of mining minerals at shallow depth (usually up to twenty metres depth). The name derives from the cross section of the mine in being bell shaped and were often abandoned when the unsupported roof collapsed. Such features are typically untreated and are filled with unconsolidated, excavated material from other bell pits.

Bord and pillar: See Pillar and stall.

Borehole: a hole made by a drill, augur or other tools of variable size and depth with the aim of exploring strata in search of minerals, for water, and other purposes. The term can also refer to a hole drilled in the coal face for blasting purposes or drilled into the sides of worked areas to prove the position of old workings and faults, or for venting gas / water accumulations.

British Coal Corporation (BCC): was a state-owned statutory corporation responsible for managing the nationalised coal industry in Great Britain, operating from 1987 to its effective dissolution in 1997. It was created by the Coal Industry Act 1987 with the renaming of its predecessor the National Coal Board (NCB). See National Coal Board. With the passing of the Coal Industry Act 1994 its functions were transferred to the Coal Authority from 31 October 1994.

Coal: a combustible, carbon-rich, black, or brownish-black sedimentary rock formed as layers called coal seams and historically used primarily as a non-renewable fossil fuel to generate electricity and

heat. Formed over millions of years from buried plant matter subjected to high heat and pressure, it is found in underground or surface seams.

Coalfield: an extensive area containing significant and exploitable deposits of coal.

Coal Authority: established under the Coal Industry Act 1994, it is a UK executive non-departmental public body sponsored by the Department for Energy Security and Net Zero (DESNZ). It owns, on behalf of the country, most of the coal in England, Scotland and Wales and manages the effects of past coal mining. See also Mining Remediation Authority.

Coal seam: a distinct, horizontal, or inclined layer of coal

Colliery: a place where coal is mined with its associated mine, building, and machinery. See Pit.

Dam: an artificial, subterranean barrier constructed within mine working to block tunnels, manage groundwater flow, or isolate abandoned, flooded sections.

Datum (vertical): a fixed, known reference point, line, or surface used for measuring elevations (vertical positioning). Often refers to Ordnance Datum more recently but is highly variable across coal mine plans.

Day level: see Adit.

Depth: the distance from the surface to the base / floor of a particular seam of worked coal or shaft.

Dip: the angle of inclination of a coal seam measured downwards from the horizontal plane. Typically written as a percentage or one in a number of metres e.g. 1 in 4.

District: a specific, designated, and often named area of the underground workings where active extraction of a particular seam occurs divided for the purposes of supervision or ventilation.

Downcast shaft: a shaft through which fresh air enters a mine.

Downthrow: the downward displacement of strata which is typically caused by faulting causing a coal seam to be partially or entirely abruptly cut off and brought below the original level.

Drift: see Adit

Dyke or dike: an intrusive sheet-like, vertical, or near-vertical body of igneous rock that cuts across older, pre-existing layer of rock formed a magma forced its way into crack and solidified.

Engine: generally refers to a powerful, stationary machine – historically powered by steam, later by electricity – designed for tasks such as hoisting coal, personnel, and equipment in a mine shaft. See also Gin.

Engine pit: the shaft where the pumping engine was located.

(Coal) face: the exposed, vertical surface of a coal seam within a mine where coal is actively being cut, removed, or extracted.

Fan drift: a part of the mine's ventilation system comprising a short tunnel from the top of the upcast shaft to the fan chamber along which the whole of the return air is drawn out by the fan.

Fault: a fracture or disturbance of the strata along which displacement has occurred breaking the continuity of the coal.

Floor: the underlying surface beneath a coal seam upon which miners walk and machinery is placed for example.

Furnace or **furnace pit**: a large coal fire at or near the bottom of an upcast shaft for producing a current of air for ventilating a mine.

Gate: a tunnel serving the coal face. See also Maingate and Tailgate.

Gin: short for engine, is a historically, horse-powered hoisting machine used to lift coal, water, and workers from shallow pits. See also Engine.

Graticule Squares: a referencing system using Ordnance Survey County Series Quarter Sheet mapping (each graticule square measures 400 yards x 400 yards). It was used by the National Coal Board (NCB) / British Coal Corporation (BCC) to indicate the geographic extent of the workings (not mine entries) contained on any given abandoned mine plan.

Goaf or **gob**: is the void or abandoned areas left behind after coal has been extracted from a seam and, potentially, the roof allowed to collapse.

Gob road: a way in the mine carried through a goaf. See Goaf.

Heading: a roadway that is in the process of development.

Headgate: see Maingate.

Inbye: going into the interior of a mine, away from shafts and other openings.

Incline: See Roadway.

Inrush: a sudden, uncontrolled, and usually violent inflow of material—typically large volumes of water, sludge, mud, or gas—into underground workings. Often occurring when mining intersects older unknown workings, disrupts geological structures like faults, or intersects aquifers, inrushes pose severe risks, including catastrophic mine flooding, equipment destruction, and fatalities.

Inset: an opening part way down a shaft giving access to intermediate levels.

Intake: an airway or road going inbye along which fresh air travels into the mine starting at the bottom of the downcast shaft. Also, general name for fresh air descending into a colliery.

Level ([1]): surveyed elevations typically measuring the vertical height of the floor or seam in specified units (e.g. feet, metres) relative to a stated level (e.g. 10,000 feet below sea level or Ordnance Datum).

Level ([2]): a horizontal or slightly inclined roadway often used to drain water from a mine.

LiDAR (**Li**ght **D**etection **A**nd **R**anging): is a remote sensing method that uses pulses of light to measure distances and create precise 3D representations of the Earth's surface, environment, and objects.

Longwall mining: highly productive mining method whereby a long block of coal (panel) is extracted by cutting machinery that continuously traverses the coal face between two access tunnels called the maingate or headgate and the tailgate.

Maingate (or headgate): in longwall mining the main roadway that would supply power, ventilation, and access to the machinery

Main road: the principal underground way in a district along which the coal is conveyed to the shafts.

Metadata: 'data about data' that provides context, description, and structural information to make data easier to find, understand, use, and manage.

Mine entry: collective name for entry and egress locations from mines. See also Shaft, Adit or Bell pit.

Mining Remediation Authority: formerly known as the Coal Authority from which it retains and carries out all duties in protecting the public and safeguarding the environment from historical mining issues. See also Coal Authority.

Mine water: water that accumulates in active or abandoned workings, originating from groundwater seepage, surface infiltration, or operational drainage. During mine operation it is often pumped out to maintain safety during operation.

Mine workings: the specific area where coal is or has been extracted including the active coal face, roadways, shafts, etc.

Mineral: "all substances in or under land of a kind ordinarily worked for removal by underground or surface working, except that it does not include peat cut for purposes other than for sale." Town and Country Planning Act 1990.

National Coal Board (NCB): a statutory corporation set up under the Coal Industry Nationalisation Act 1946 and established on 12 July 1946 to manage the nationalised coal mining industry. Taking control on 1 January 1947, it managed over nine hundred pits, overseeing production, safety, and welfare. As a consequence of the Coal Industry Act 1987, it was effectively renamed the British Coal Corporation (BCC). See British Coal Corporation.

National grid: a common contraction of the British National Grid (BNG) that is a geographic referencing system used for Ordnance Survey (OS) mapping in Great Britain. See also: A Beginner's Guide to Using Grid References | OS GetOutside

Non-coal: any mineral other than coal such as ironstone, sandstone, fireclay etc that may have been worked in conjunction with or separate from coal.

Opencast: the excavation of near-surface coal in the form of extensive open pits without the necessity to use mine entries. Can also be referred to as surface mining.

Ordnance Datum (OD): a contraction of the official name Ordnance Datum Newlyn that represents vertical datum or base level used in Great Britain for deriving altitudes and depths on maps. See also: A Beginner's Guide to Using Grid References | OS GetOutside

Ordnance Survey (OS): the national mapping agency for Great Britain. See also: Ordnance Survey | Great Britain's national mapping service

Outbye: in the direction of the pit bottom.

Outcrop: a visible exposure of bedrock at the surface.

Panel: a specific, planned area within a mine, bordered by pillars of coal left intact for structural support, with access restricted to necessary roadways.

Panel number: reference code assigned by a mine operator to a panel.

Pillar: a solid block of coal left undisturbed varying in area from a few metres square to several acres designed to support the roof of a mine.

Pillar and stall: a traditional system of working coal, and other minerals, where coal is partially excavated in a grid-like pattern, creating stalls (rooms or bords) whilst leaving solid blocks of coal (pillars or stoops) to support the roof.

Pit: a colliery, pit shaft, shallow hole, or the workings, inclusive of all roads, situated underground. See Colliery.

Pit tip: See Spoil tip.

Pump: a heavy-duty mechanical device designed to remove water (dewatering) or transport mixtures of water and solids from underground workings.

Roadway: a sloped, underground passage used for access, ventilation, or transportation between workings in different seams or with the surface.

Rob: to cut away or reduce the size of pillars of coal wholly or partially.

Robbed out: particularly in pillar and stall workings where the coal pillars are systematically removed.

Roof: the rock strata directly overlying the coal seam being worked.

Room and pillar: See Pillar and stall.

Seam: a distinct layer of coal.

Seam section: a vertical slice of a coal seam illustrating the geology above and below.

Shaft: a vertical or near-vertical tunnel sunk from the surface that gives access to underground coal seams for ingress and egress of people, machinery, coal, and air. Shafts are usually constructed in a circular form, though oval and rectangular ones are not uncommon. They vary in diameter and depth. After the Hartley Disaster in 1862, it became law that every mine had at least two means of egress after 204 men and boys were killed when the only means of egress was blocked. Therefore, any plans after this date should have at least two mine entries, plans before may only have a single shaft / adit. See also: Upcast and Downcast.

Shaft pillar: a large, solid block of coal left unworked around the base of the mine shaft to protect the shaft and the surface buildings from damage by subsidence.

Sough: a drainage tunnel to remove water from mines without the need for pumping. See Level[2].

Spine Roadways: See Roadways.

Spoil tip or **heap**: a bank or heap on the surface where the spoil (waste material) is deposited.

Staple pit / shaft: an underground shaft between seams that does not reach the surface. However, in the Northeast, the term 'staple' is often used to describe a shallow shaft / pit from surface.

Stopping: a solid stone, brick or clay barrier or wall built across an underground airway to control the ventilation of air.

Stoop and room: See Pillar and stall.

Strata: distinct, parallel layers of sediment or rock that have been built up over millions of years.

Sump: the bottom of a shaft, typically the lowest point of the shaft or workings, below the lowest inset forming a dish into which the water collects.

Surveyor: an individual responsible for the precise measurement, mapping, and monitoring of underground and / or surface coal mining operations.

Swilley: a geological irregularity where a coal seam thickens or dips over a limited area, creating a localised hollow or depression. Spelling variations include swilly, swelly, or swally.

Tailgate: in longwall mining the roadways that serves as the return airway and secondary access point.

Tip: see Spoil Tip.

Total extraction: an underground mining method designed to remove the maximum amount of coal from a specific seam or area resulting in the deliberate collapse of the roof strata behind the working face.

Treated: the process taking remedial action to secure, cap, or fill disused mine entries to prevent or remediate subsidence, ground collapse, or safety hazards.

Upcast shaft: the shaft through which spent air leaves the mine.

Ventilation: the essential, engineered process of supplying continuous, controlled flow of fresh air to underground workings. The aim is to remove hazardous contaminants such as noxious gases (e.g. methane, carbon monoxide etc) and coal dust, and to regulate temperatures for worker safety and preventing explosion. Also, generally, the air circulating in a mine.

Upthrow: the upward displacement of strata that is typically caused by faulting causing a coal seam to be partially or entirely cut off and brought above the original level.

Washout: a geological feature where a river or stream channel active at the time of coal formation eroded the peat material, resulting in a coal seam that is not fully formed, is thinned, or is replaced by sandstone or shale, creating challenges for mining operations.

Winding engine: the steam- or electricity-powered apparatus fixed within close proximity of a shaft for raising the people, equipment, and coal.

Worked: the process of extracting coal from a seam, or to an area where mining operations have already taken place.

Workings: see Mine workings.