

Technical Note

Ref. ST20879-0002

CLIENT:	TATA Steel UK
PROJECT:	Project EAF
SUBJECT:	Scheme of Mitigation for Coal Mining Risk: National Grid Substation Area
JOB NO.:	ST20879
DATE:	05 March 2026
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Introduction

As part of the overall Project EAF, it is necessary to construct a new National Grid (NG) substation in the south of the site. This Technical Note specifically relates to the NG substation, although the principles and background apply to the whole site. The boundary of the NG Substation is shown in blue on the appended drawing ST20879-003.

The British Geological Survey (BGS) data indicates that the land beneath the Port Talbot Steel Works Site is located on Coal Measures geological formation. A part of the Site proposed for redevelopment is described by the Mining Remediation Authority (The statutory planning consultee for land containing coal, formerly known as The Coal Authority) as being a Development High Risk Area. This designation highlights a potential for ground instability, resulting from legacy coal mining operations. A Coal Mining Risk Assessment (CMRA) is a requirement for any planning consultation with such a designation. A desk-based CMRA has been prepared by Wardell Armstrong (now SLR Consulting) for the whole Project EAF site which provides a deeper understanding of the below ground hazards and to allow any proposed redevelopment of the Site to be designed in such a way to mitigate against any risk that might be identified.

This Technical Note has been prepared for the partial discharge of Condition 57 of planning permission ref: P2024/0711, which states:

“No commencement of construction of the superstructure of any hereby approved buildings or structures for each phase of development as defined by Condition 39 shall

commence until a scheme is submitted to and approved in writing for proposals to mitigate the potential risk of coal mining subsidence. The scheme shall include:

- 1. The undertaking of an appropriate scheme of intrusive site investigations for the mine entries and any potential shallow coal workings;*
- 2. The submission of a report of findings arising from the intrusive site investigations, including the results of any gas monitoring;*
- 3. The submission of a layout plan which identifies suitable 'no-build' zones, for the mine entries.*

Based on the results of the intrusive site investigation referred to in (i) and any identified mitigation and remediation measures to address land instability arising from coal mining legacy, the approved scheme shall be fully implemented in accordance with a schedule of works which will form part of the submitted scheme."

Background

The Site is underlain by Lower and Middle Coal Measures deposits, which consist primarily of mudstones, siltstones and sandstones, interspersed with bands of coal dipping in a north-east direction. The thickest and most valuable of these coal seams have been given names to help reference and map their mineral value. There are 15 named coal seams which are indicated to subcrop (outcrop beneath soil deposits) within the main Project EAF planning boundary. These named seams are likely to be of mineable thickness, and at least four of these seams are known to have been mined beneath the Site. Additional unnamed coal seams are present but are less likely to be of sufficient thickness or mineral value to have been mined.

Several geological faults subdivide the stratigraphy at the Site. The Kenfig-Tytlwyn Thrust Fault crosses through the Site in an approximate east-west direction and offsets (throws) the geological sequence. The offset is such that several named coal seams are thought to subcrop within the Site on both sides of the fault. BGS records also describe additional faulting (Giant's Grave fault and Morfa fault) at the Site; but without detailed investigation, the conjectured position, and throw of these faults cannot be accurately determined.

Coal mining is known to have historically occurred at the Site, most notably associated with the former Morfa Colliery, formerly located at the Site. Wardell Armstrong (now SLR Consulting) has previously carried out a CMRA on part of the Site, identifying low to moderate risk to any future development.

Three mine entries are recorded by the Mining Remediation Authority within the provided Planning Boundary. Wardell Armstrong (now SLR Consulting) has previously carried out physical searches for the three mine entries, proving the position of one shaft and providing search records for the other two.

Evidence of possible coal mine workings exists for up to ten of the coal seams beneath the Site, and is summarised by each source of the information below:

1. The Coal Authority Consultant Mining Report records workings in the Five Foot, Gellideg, Lower Nine Foot Top Leaf and Garw Vein coal seams.
2. Available Morfa Colliery abandoned mine plans describe workings in the Four Feet (L 4 FT) and Nine Feet (U 9 FT and/or L 9 FT).
3. British Geological Survey held plans and borehole logs indicates workings of the North Fawr, South Fawr, Six-Feet, Four-Feet, Nine-Feet, Five Quarters, and Cribbwr Fawr seams.
4. The North of England Institute of Mining and Mechanical Engineers - Forster Collection, records workings in the Nine Feet (U 9 FT and/or L 9 FT) and Garw Vein.
5. The Northern Mining Research Society website reports the “Morfa colliery worked the North Fawr, South Fawr, Six-Feet, Three-Feet, Nine-Feet, Five-Quarter and Cribbwr seams; and worked the Clay seam between 1854 and 1865”.

Several of the worked seam names can be corroborated by multiple sources, with evidence for the Five Feet (Nine Feet) and Gawr Vein seams reported as worked in three of the above searches. These two seams are the principal worked seams, with record of workings extending across most of the area where the seam is present. The Five Feet (Nine Feet) workings being the largest, with an extraction thickness of 3.3m. The other seams above are recorded as worked across a smaller area and with a lesser extraction thickness.

There is difficulty correlating old records to the modern seam names, particularly where two records provide conflicting names for an individual seam. The Yard seam for example is thought to have been worked beneath the Site, with evidence under its modern name beyond the Site boundary, and possibly via historical names (Four Feet, Six Feet and Clay) beneath the Site. The most recent date of recorded mine workings at the Site is 1913, in the Gawr Vein seam, from the Consultant Mining Report.

Following the assessment made in the CMRA, the likelihood of subsidence or significant ground collapse resulting from deep recorded mine workings of this age and at these depths is very low. This very low risk persists across much of the Site where the coal seams are not at shallow depth. In small and isolated parts of the Site the possibility for historical unrecorded workings at a shallower depth cannot be discounted, and a moderate risk was assessed (with lesser coal seams posing a lower risk). This Scheme of Mitigation is to target areas of low/moderate and moderate risk to better assess the level of risk.

Typical Remediation Programme – Industry Guidance

The industry standard guidance document is the Abandoned Mine Workings Manual, (CIRIA C758D, 2019) which contains general advice, industry knowledge and outline methods for investigation and remediation of coal mine workings. Remediation of coal mine workings hazards typically involves the injection of a cementitious grout into the mine workings, to fill any voids. This is carried out via a number of boreholes, drilled across the area of risk in a grid pattern. Where evidence for mine workings at shallow depth is identified, the grid spacing may be tightened. Where mine workings are identified and grout takes are high (typically a 5-tonne threshold in a single hole), additional boreholes on secondary grids may be drilled at spacing tighter than the primary grid.

Drilling and grouting on a tightly spaced grid system infills a large majority of the mine workings void, which largely inhibits collapse void migration; but it does not provide strength to prevent the actual collapse of overlying roof strata. Where piled foundations are to be used, grout infilled mining voids without significant rock cover are considered unable to provide the support for a pile. It is more appropriate to remediate the area immediately beneath the pile; either confirming the absence of mine workings, where moderate rock cover is available; or advocating for grout injection below the base of the pile and/or the installation of the pile below the seam horizon with lesser rock cover and/or evidence of workings. In advance of remediation, where piled foundations are to be used, the designer of the pile group should be notified, and become an active participant in the remediation design process.

Preliminary Opinion on Mining Risk – National Grid Substation

This opinion is based on existing information about the Site, and the local area, and formulated in line with past experience and industry guidance.

There are recorded workings beneath the NG Substation, associated with the Morfa Colliery. The colliery worked two of the thickest coal seams in the local area: the Gellideg, and the Five-Foot seams. Additionally, up to eight other seams have been worked beneath the Site, albeit to a lesser extent than the largest seams. The thick Superficial Deposits and shallow tidal groundwater would present a significant challenge to any mining operation, and as such go some way to precluding the presence of ancient and artisanal unrecorded mine workings.

There would appear to be three coal seams at shallow depth beneath the NG Substation; where shallow depth is taken as the depth below rockhead (bedrock) equivalent to 10 times the worked thickness of the coal seam. The coal identified is considered to be the Yard seam in the southern portion of the Site, the Amman Rider and the Upper Five Foot seam in the northern portion of the Site.

The three mine entries recorded at the Site by the Mining Remediation Authority are outside the influencing distance of the NG Substation and are not considered further in this scheme. A Scheme of Mitigation to understand and remediate mining related issues beyond the boundary of the NG substation, including of the recorded shafts will be presented in a separate document.

The Mining Remediation Authority records cannot be considered the ultimate source on the history of coal mining in the area, and particularly prior to the Coal Mines Regulations Act 1887, records of mining were not required to be kept. Indeed, several records of mining activity beneath the Site, previously unknown to the Mining Remediation Authority, have been brought to light in producing this opinion.

The level of risk associated with each seam thought present at the NG Substation is discussed below.

Amman Rider seam

The Amman Rider is recorded to be a thin coal seam immediately below the Amman (Vanderbeckei) Marine Band, which marks the boundary between the Lower and the Middle Coal Measures. The Mining Remediation Authority do not record the presence of the Amman

Rider, but the seam is shown in vertical section on BGS 1:50,000 scale Sheet 247, and positioned subcropping within the Site area on BGS 1:10,000 scale SS78NE. There are no boreholes investigating the seam to the south of the Kenfig-Tytlwyn Thrust fault, but the seam is described in the BGS memoir as a “dirty, sulphurous coal” with a thickness of 0.19m. Mine workings in a such a thin seam are unlikely, with a limited commercial viability, and the close proximity to thicker, more viable seams, is a strong indicator that the Amman Rider has not been worked. Elsewhere in the South Wales Coal Measures, the Amman Rider is thought to have been worked only rarely, where it is reported to increase in thickness, up to 0.61m; and where it may also coalesce with the underlying Yard seam where both have been worked together. The 'outcrop' position of the Amman Rider seam falls within the boundary of the NG Substation, but this should only be considered approximate, given the conjectured nature of the outcrop data and lack of borehole information confirming its presence to the south of the fault. There are no specific records to suggest that the Amman Rider seam has been worked beneath the steelworks, and the seam thickness is of low commercial value. Risk associated with this seam is considered to be very low, but it is recommended to validate the possible presence of the seam by borehole investigation within the area of risk. The area of mining risk is shown on drawing ST20879-0003.

At the NG Substation the initial risk posed by this mining hazard is considered to be of a low category, based upon:

Reduced risk:

- No recorded workings at shallow depth
- Limited extent of seam (truncated by fault)
- Thin seam (low commercial value)
- Challenging mining conditions (thick Superficial Deposits)
- Challenging mining conditions (shallow tidal influenced groundwater)
- Challenging mining conditions (faulting)

Increased risk:

- Seam known to be worked elsewhere.
- Seam subcrops within the Site (no rock cover mitigation)
- Limited and inconclusive site investigation data
- High collapse migration (steep seam angle)
- High collapse migration (weak, faulted and broken roof strata)

Yard Seam

RSK borehole BH320 identified a coal seam of up to 2.2m vertical thickness. This measurement is made up of 0.7m weathered coal and 1.5m of "No recovery (coal washaway)". The seam depth in this borehole approximately coincides with the Mining Remediation Authority inferred/conjectured SW025I 'outcrop' position, and the general dip angle of strata, recorded in coal mine workings beneath the Site. The 'outcrop' position of the Yard seam falls within the boundary of the NG Substation, but this should only be considered approximate, given the conjectured nature of the outcrop data. There are no specific records to suggest that the Yard seam has been worked beneath the steelworks, but historical records suggest the Yard seam may have been worked, in part, under a different name; and the Yard seam is known to have been worked elsewhere in the Neath/Port Talbot area. The coal seam is of workable thickness, whether using the full 2.2m thickness or simply the 0.7m thick positively identified coal, and so is considered to be a mining hazard. The area of mining risk is shown on drawing ST20879-0003.

At the NG Substation the initial risk posed by this mining hazard is considered to be of a low/moderate category, based upon:

Reduced risk:

- No recorded workings at shallow depth
- Challenging mining conditions (thick Superficial Deposits)
- Challenging mining conditions (shallow tidal influenced groundwater)
- Challenging mining conditions (faulting).

Increased risk:

- Seam of workable thickness
- Seam known to be worked elsewhere
- Seam subcrops within the Site (no rock cover mitigation)
- Limited and inconclusive site investigation data
- High collapse migration (steep seam angle)
- High collapse migration (weak, faulted and broken roof strata).

Upper Five Foot Seam

RSK borehole BH322 identifies a coal seam at an approximate depth of 21.0m (BGL); and due to poor core recovery, the seam is logged with a thickness of 5.0m. This is thought to be an over-estimate of the seam thickness due to poor quality drilling; as in contrast the Mining Remediation Authority data indicates an extraction thickness of 3.3m. Additionally, the BGS shaft record for the Morfa Colliery Abbot Pit, (SS78NE58, p.26) reports the Upper Five Foot with a 2.75m vertical thickness. A 0.45m thick siltstone separates the upper seam from a 0.41m thick coal seam lying beneath, named the Danllyd. Both seams, along with the siltstone parting, form a total vertical sequence of 3.61m – approximately concordant with the reported extraction thickness.

This seam is extensively worked beneath the Site, on both sides of the Kenfig-Tytlwyn Thrust Fault. The majority of the recorded mine working is at sufficient depth and of sufficient age to not pose a tangible risk. In the area to the north of the fault, by projecting the coal seam in an up-dip direction from its recorded position, it can be shown that the coal seam would be truncated by the thrust fault before reaching the surface. While it does not reach subcrop to the north of the fault, the coal seam will be present at shallow depth (<10T rock cover) due to the large extraction thickness.

The seam is not reported to be worked beneath the northern corner of the Site on the northern side of the fault; and in such proximity to the fault and to rockhead, challenging mining conditions would be expected. In a steeply dipping seam such as this, up dip collapse migration of the final working face must be expected (i.e. unmined “solid” coal will collapse into the mine void in the down dip direction). As such, and alongside the likely inaccuracy of historical records, the possibility of unrecorded working in this seam, cannot be ruled out beneath the Site, and an area of mining risk is labelled. The area of mining risk is shown on drawing ST20879-0003.

At the NG Substation the initial risk posed by this mining hazard is considered to be of a moderate category, based upon:

Reduced risk:

- No recorded workings at shallow depth
- Challenging mining conditions (thick Superficial Deposits)

- Challenging mining conditions (shallow tidal influenced groundwater)
- Challenging mining conditions (faulting)
- Seam does not subcrop (partial rock cover throughout).

Increased risk:

- Seam extensively worked beneath the Site
- Seam of very high extraction thickness (3.3m)
- Limited and inconclusive site investigation data
- High collapse migration (steep seam angle)
- High collapse migration (weak, faulted and broken roof strata).

Summary Risk

In light of the above, it is considered there is a moderate category of mining risk at the NG Substation, which is limited to the zone of influence of the Upper Five Foot seam at a shallow influencing depth; a low/moderate category of mining risk limited to the zone of influence of the Yard seam at a shallow influencing depth; and a low category of mining risk limited to the zone of influence of the Amman Rider seam at a shallow influencing depth.

While there is no recorded mining at shallow depth immediately beneath this area of the Site, there is a seam of high extraction thickness (heavily worked in the down dip direction), and a second seam of workable thickness; potential for unrecorded workings; and a potential for mining collapse to migrate to surface. There is a lack of high-quality ground investigation data nearby and assessment of competent rock cover and worked nature of the seams as a result is difficult.

Scheme of Mitigation

Two parts of the NG Substation are designated as a Development High Risk Area, which are areas where the Mining Remediation Authority considered that coal mining hazards beneath the Site are considered somewhat likely to pose a risk to the built environment. Wardell Armstrong (now SLR Consulting) prepared a Coal Mining Risk Assessment (Report: ST20879-001) which identified the main hazards, areas of additional risk and recommended further works. This further works is now termed a Scheme of Mitigation, and the outline of which is presented below:

The Scheme of Mitigation will include three elements:

1. Ground investigation consisting of a spread of boreholes drilled to investigate the mining hazards.
2. Detailed Coal Mining Risk Assessment and production of 'live' 3D mining risk model, which shall analyse the ground investigation, assess the risk level, and demonstrate areas of risk.
3. Further investigation and remediation of coal mining hazards, to reduce risk to as low as is practicable. Where a mining hazard exists, the risk can never fully be reduced to zero. The design of the risk reduction will vary depending on the type of hazard (mine entry or mine workings), the revised risk level; the proposed foundation type; and the end use for the structure.

The possibility of mine workings in shallow coal seams, and collapse voids in the strata above those coal seams cannot be ruled out. Based on the maximum level of risk assessed, it is recommended that further investigation is carried out in the NG Substation area, to clarify the potential risk areas shown on drawing ST20879-003. This further investigation has been designed to provide coverage focussing on the footprint of buildings and plant forming part of the NG Substation and shall investigate the thickness of roof strata above the coal seams, and the worked nature of the coal seams.

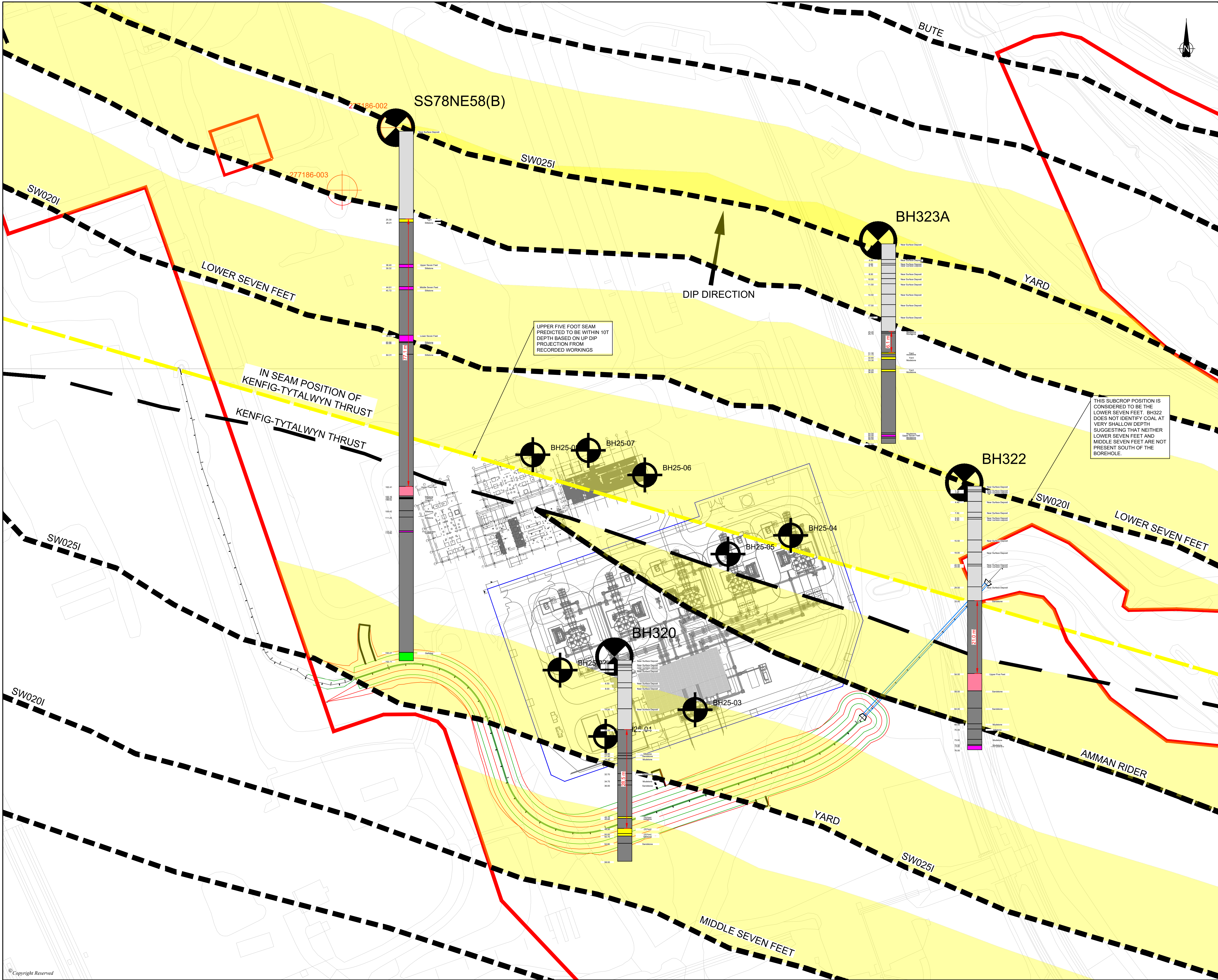
The evidence for mining voids will be soft drilling, open voids and loss of drilling flush at or above the coal seam horizon; and broken rock suggesting collapse migration. Should mining voids, or evidence to suggest mining void may be present, a more detailed remediation programme should take place, following the typical outline described in the Background. Where the roof rock is found to be of sufficient thickness, and no evidence of mine workings are identified, the risk category will be reduced, and no further work will be required.

Where the risk remains elevated by the identification of evidence for shallow mine workings, the remediation will take the form of injection of a cementitious grout mix into the coal horizon. The grout will be injected via a series of boreholes spaced in a pattern with specific consideration of the proposed foundation solution for each structure. Where raft or other shallow foundations are proposed, treatment on an initial 12m x 12m grid, with centres across an area beneath and immediately adjacent to the footprint of any buildings should be carried out with the grid spacing tightening where grout takes are high. Where pile foundations are

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proposed, the pile designer should consider whether piling to beneath the coal seam horizon is a more practicable option, or grout infilling of any mining void beneath the rock. The location of the treatment works, should be undertaken directly below the base of each pile.



DO NOT SCALE FROM THIS DRAWING

KEY PLAN @ 1:25,000

KEY

PLANNING BOUNDARY

NATIONAL GRID SUBSTATION BOUNDARY

COAL SEAM SUBCROP

COAL SEAM INSTABILITY ZONE

PREVIOUS RSK INVESTIGATION OR SHAFT RECORD

PROPOSED GEOTECHNOLOGY INVESTIGATION LOCATION

MINING REMEDIATION AUTHORITY RECORDED MINE ENTRY

NOTES

THIS DRAWING SHOULD BE VIEWED IN CONJUNCTION WITH TECHNICAL NOTE ST20879-0002 "Scheme of Mitigation for Coal Mining Risk"

THE COAL SEAMS SHOWN ON THIS DRAWING ARE NOT EXHAUSTIVE AND FURTHER COAL SEAMS ARE ANTICIPATED TO BE PRESENT AT SUBCROP BENEATH THE SITE. REFER TO FIGURE 2.1 OF REPORT ST20879-001.

COAL DATA USED UNDER LICENCE: THE MINING REMEDIATION AUTHORITY IS THE TRADING NAME OF THE COAL AUTHORITY © THE MINING REMEDIATION AUTHORITY LICENCE NUMBER CA36/IFTS LICENCING/WA/MM/3. ALL RIGHTS RESERVED.

TATA STEEL UK AND NG SUBSTATION PROPOSED DEVELOPMENT LAYOUT BASED ON DRAWING(S):
1. 3701.00025.TSL.200100.CI.DRG.LA.000022
2. EAF-LAW-X-X-DR-A-900001-Site Location Plan_P05

B	REVISED MRA NAME	24-02-26	AJC	RB	RB
A	FIRST ISSUE	24-10-25	AJC	RB	RB

REVISION	DETAILS	DATE	ISSUED	CHECKED	APPROVED
CLIENT	TATA STEEL UK LTD				
PROJECT	PROJECT EAF				
DRAWING TITLE	NATIONAL GRID SUBSTATION - MINING RISK				
DRG No.	ST20879-003	REV	B	SUIT. CODE	--
DRG SIZE	A1	SCALE	1:1000	DATE	24 FEB 2026
DRAWN BY	AJC	CHECKED BY	RB	APPROVED BY	RB

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