Coal Mining Risk Assessment
For

Shaw Lane Aquaforce FC
Shaw Lane,
Barnsley

Client:-
Shaw Lane Aquaforce FC
Shaw Lane
Barnsley
S70 6HZ

Design - it
Structural Solutions Ltd

37 Hall Bank, Barnsley, S75 1EX
Tel: 01226 291367
Mob: 07794 510438
Email: designit.struct@gmail.com

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Executive Summary

Proposal	Erection of a grandstand.
Current land use	Sports pitch surround at approximately 137m AOD.
Mining related site history	No historic mining features recorded on the site. Numerous old coal pits, adits and several collieries present locally.
Geology	Directly underlain by Middle Coal Measures strata. The Barnsley and Dunsil coal seams underlie the site at shallow depth.
Mining history and context	6 seams of worked coal are recorded as potentially influencing the site at depths of between shallow and 330m, last worked in 1961. Numerous former mine entries are recorded south, east and northwest of the site. Unrecorded mine entries could be present on the site. The site lies within an area of past shallow coal mining as defined by the Coal Authority.
Mining related risks	There is a potential for shallow mining beneath the site potentially leading to surface instability **– Moderate to High**. Unrecorded former mine entries may be present on the site **– Low to Moderate**. Mine gases may be present on the site – **Low**.
Mitigation of risks	Proof drilling is recommended to confirm depth to rockhead and depth and thickness of underlying coal seams. If shallow mining is confirmed, drill and grout will be required or possibly the incorporation of a raft foundation, subject to local authority building control approval. Vigilance during site enabling works to check for former mine entries. Mine gases present negligible risk to the proposed development.

1. Introduction

1.1 Design it Structural Solutions Ltd were appointed by Mr Peter Thompson, on behalf of Shaw Lane Aquaforce FC, to undertake a Coal Mining Risk Assessment (CMRA) for their site at Shaw Lane, Barnsley where it is proposed to construct a demountable grandstand to one of the pitch.

A planning application (Ref. 2014/1354) has been submitted to Barnsley Metropolitan Borough Council (BMBC) and the site is identified as lying within a Coal Authority (CA) Coal Mining Development Referral Area, thus necessitating the requirement for a CMRA in order to provide BMBC with information on historic coal mining and an assessment of its potential impact on land stability.

1.2 The purpose of this CMRA is to:

- Present a desk-based review of all available information on the coal mining issues which are relevant to the application site
- Use that information to identify and assess the risks to the proposed development from coal mining legacy, including the cumulative impact of issues
- Set out appropriate mitigation measures to address the coal mining legacy issues affecting the site, including any necessary remedial works and/or demonstrate how coal mining issues have influenced the proposed development, and
- Demonstrate to the Local Planning Authority that the application site is, or can be made, safe and stable to meet the requirements of national planning policy with regard to development on unstable land

1.3 To this end the study has included an inspection of published historical maps, published geological data, publicly available planning information and a review of a CA mining report, together with other sources as indicated within the report.

1.4 This report presents the factual information available during this appraisal, interpretation of the data obtained and recommendations relevant to the scope of works outlined above.

1.5 The comments and opinions presented in this report are based on the findings of the available desk study assessment carried out by Design it Ltd. Responsibility cannot be accepted for any conditions not revealed by this desk study and which have not been taken into account by this assessment.

1.6 This report has been prepared for the sole use of Mr Peter Thompson and his client Shaw Lane Aquaforce FC. No other third party may rely upon or reproduce the contents of this report without written approval of Design it Structural Solutions Ltd. If any unauthorised third party comes into possession of this report, they rely on it entirely at their own risk and we do not owe them any Duty of Care or Skill.

2. Site location and description

2.1 The site is centred on National Grid Reference 433430mE 405750mN with the proposed grandstand measuring approximately 3m by 27m (81m^2) in plan. The site is located at the western end of the Shaw Lane sports complex between Shaw Lane and Broadway (A6133), southwest of the town centre. A site location plan is included as **Appendix A**.

2.2 It comprises a grassed rugby and football pitch with the proposal sited at the southeastern end of the pitch. An existing formal footpath is present behind the southeastern end of the pitch orientated southwest to northeast, which is proposed for diversion behind the new grandstand. Approximately 6m behind the footpath there is a pronounced break of slope where levels fall away steeply by approximately 4m in the form of a tree covered embankment. The site is at a level of approximately 137m AOD. Multi-use sports facilities bound the site to the southwest, northwest and northeast with a hospital to the southeast.

Proposed development

2.3 It is proposed to construct a 200 seat modular and covered tiered grandstand on the site. Details of the proposal are included as **Appendix A**.

Site history

2.4 Historical maps for the site and its surroundings, available from internet based sources, have been reviewed and a summary of this information, specifically relating to mining related features, is provided below.

Date	On site features	Off site features (coal mining related)
1855 - 1894	Open fields	Shaft approximately 500m northeast and Victoria colliery 1km southeast. Brickfield approximately 350m southeast. Sandstone quarry approximately 350m southwest.
1894 - 1932	Open fields	Colliery 1km east.
1932 - 1950	Allotments	Extensive clay pit approximately 500m

		northwest. Unidentified pit or quarry approximately 400m southwest. Air shaft approximately 500m south. Houndhill colliery (disused) >1km southeast and Needlewood drift colliery >1km southwest.

3. Geological setting and historical mining context

3.1 Information obtained from various sources pertaining to the site's geology and historical mining perspective is summarised in the table below with information sources identified as appropriate.

Information sources	British Geological Survey (BGS) 1:10 000 scale, sheet SE30NW. BGS online Borehole Database. BGS Internal Report IR/06/135 'The Pennine Lower and Middle Coal Measures formations of the Barnsley district', 2006. BMBC online Planning Applications Search. CA online Interactive Viewer. CA mining report, Ref. 51000722443001, 12 December 2014 (included as **Appendix B**).
Made ground	None shown, however, likely to be present due to site being upon a raised embankment. Made ground (possible colliery spoil) is indicated as present adjacent to northwestern boundary of pitch.
Drift	None present.
Solid	Undifferentiated strata of the Middle Coal Measures.
Dip of strata	5^0 to the northeast.
Faults	Faults indicated to the southeast downthrowing to the southeast and to the northeast downthrowing to the northeast, however, none on or within close proximity to the site.
Coal seams	The Barnsley coal seam is conjectured as outcropping to the southwest of the site and is considered to underlie the site at shallow depth. Beneath the Barnsley seam within the succession (approximately 16m below), the Dunsil coal seam dips beneath the site and is potentially present at shallow depth. Although not indicated as present on the geological map, the Barnsley Rider coal seam may potentially outcrop within or close to the site. Regional thicknesses for these seams are; Barnsley (1.7 to 3.1m) and Dunsil (0.5 to 2.9m), both seams containing significant dirt partings. Locally, BGS stratigraphic section thicknesses for these seams are; Barnsley Rider (0.15 to 0.6m), Barnsley (2.3 to 3.1m) and Dunsil (0.5 to 0.8m).
Shafts and collieries	BGS mapping indicates abandoned shafts and adits to the northwest along the outcrop of the Barnsley seam and within the same fault block as the site. The CA Interactive Viewer records numerous former mine entries south, east and northwest of the site.

Nearby intrusive information	Retrospective investigation for the existing grandstand along the southwestern edge of the pitch proved between 4.5 and 5m of made ground with intact coal (0.1 to 0.8m thick) present at between 20 and 21m depth. This is interpreted as the Dunsil seam with the Barnsley seam absent and possibly removed by surface mining methods. A borehole located just west of the site proved coal (0.51m thick) at 8.35m, coal (0.25m thick) at 26.1m, coal (0.15m thick) at 26.5m, coal (0.33m thick) at 27.9m, coal (0.15m thick) at 29.8m and coal (0.18m thick) at 35.65m depth, all seams intact. The upper seam is interpreted as the Barnsley seam with the next 2 lower seams interpreted as the Dunsil seam including dirt parting. Ground investigation records at a site approximately 300m to the northeast proved intact coal at thicknesses of between 2.15 and 2.75m at depths of between 9 and 15m. The coal is interpreted as the Barnsley seam. Ground investigation records for another site approximately 400m to the north proved workings at thicknesses of between 1.25 and 3.35m at depths of between 6.25 and 8.4m. Intact coal at between 1.53 and 3.25m thick was also proved, interpreted as the Barnsley seam.
Coal Authority mining report	6 seams of worked coal are recorded as potentially influencing the site at depths of between shallow and 330m, last worked in 1961. There are no known mine entries at, or within 20m, of the site, however, records may be incomplete and other such entries could be present locally. There are no records of any mine gas emissions requiring action within the site boundary.
Shallow mining	The CA Interactive Viewer indicates the site to lie within an area of recorded past shallow coal mining and an area of probable past shallow coal mining.

4. Risk assessment

4.1 The potential risks to the redevelopment of the site associated with the coal mining legacy of the locality are summarised in the following table.

Coal mining issue	Risk		Risk assessment (Risk rating)
	Yes	No	
Underground coal mining (recorded at shallow depths)	**Yes**	**-**	CA information definitively states past shallow coal mining beneath the site **- Moderate to High**
Underground coal mining (probable at shallow depths)	**Yes**	**-**	Shallow depth to both the Barnsley seam and to the underlying Dunsil seam. Nearby intrusive investigations have proved evidence of workings within the Barnsley seam. Evidence of widespread historical mining in the locality would suggest potential shallow mining of these coal seams **- Moderate to High**
Mine entries (shafts and adits)	**Yes**	**-**	No mine entries recorded on site, however unrecorded mine entries are a possibility. Numerous recorded former mine entries including adits) within the locality associated with the Barnsley seam **- Low to Moderate**
Coal mining geology (fissures)	**-**	**No**	CA information and published geology does not indicate any geological weaknesses on site as a consequence of mining related activities **– Low**
Record of past mine gas emissions	**Yes**	**-**	CA information states no mine gas related issues in the locality. However, potential for mine gas as shallow and deep mining is present beneath the site **- Low**
Recorded coal mining surface hazard	**-**	**No**	CA information does not record the presence of any mining surface hazards on or close to the site **- Low**
Surface mining (opencast workings including clay pits and sandstone quarries)	**-**	**No**	CA information state the site to be unaffected by any past, current or future open cast workings. Historical mapping records a significant clay pit and a sandstone quarry within the vicinity, but none on the site itself **- Low**

5. Discussion

5.1 The risk assessment above highlights several potential risks posed to the site during redevelopment, namely potential for shallow coal workings, potential for unrecorded mine entries and associated mine gas emissions, cumulatively assessed as **low to high**. These risks are discussed in turn more fully below.

Shallow mineworkings

5.2 The Barnsley and the underlying Dunsil coal seams are recorded as underlying the site at shallow depth and potentially having been historically exploited. It is estimated that the Barnsley coal seam is likely to be present beneath the site within approximately 10m of the surface and the Dunsil coal seam between approximately 20 and 25m depth. Local intrusive information indicates a thickness of 3m for the Barnsley seam (including dirt partings) and 0.8m for the Dunsil seam (including dirt partings). There is considered to be *insufficient* competent rock cover above the Barnsley seam and *sufficient* competent rock cover above the Dunsil seam to maintain surface stability in the event of these seams having been worked beneath the site. This assumption is based upon having a minimum of 10 times intact coal seam thickness of competent rock strata present above the coal seam. However, the above seam thicknesses and depths to the coal seams underlying the site are only estimates, and as the depth to rockhead is not known at this stage, the surface stability at the site cannot be guaranteed in the absence of intrusive works. In addition, the deep made ground proved during intrusive investigation of the existing grandstand maybe evidence that the Barnsley seam has been removed through historic surface workings due to it outcropping close to the site and present at relatively shallow depth beneath the site.

Mine entries

5.3 Due to the proximity of the outcrop of the Barnsley coal seam and recorded abandoned mine entries to the northwest, the presence of on-site unrecorded former mine entries associated with the exploitation of this seam cannot be discounted. Pre 1849, it was not a statutory requirement to record mine entries and mining plans. Furthermore, CA information records the site as within an area of past shallow coal mining. Such features are considered as presenting a potential risk to development by way of instability and potential collapse.

Mine gas

5.4 The potential for upward migration of mine gases beneath the site cannot be discounted. However, given that the proposal is for an open grandstand to be used infrequently, the risk presented to future end users is considered to be negligible.

6. Proposed mitigation strategy

6.1 A review of geological and historical mining information at the site has shown that there is a potential risk to surface stability from shallow mineworkings that may be present within the Barnsley coal seam.

Shallow mineworkings

6.2 In the absence of site specific data on the depth to rockhead beneath the site, seam thicknesses and thickness of competent rock cover above the Barnsley seam, there is considered to be a definite risk presented by potential shallow mineworkings within this coal seam beneath the site. It would be prudent, therefore, to undertake proof drilling across the site to confirm the depth to rockhead and depth to/nature of the underlying coal seam. Boreholes should be put down to 30m below existing ground levels with appropriate permission and licences obtained from the Coal Authority prior to commencing any such works. If shallow mining is proved then drilling and grouting works would be required to consolidate the workings. Alternatively, subject to loadings, a raft foundation may be feasible to spread imposed loadings of the new grandstand, subject to local authority building control approval.

Mine entries

6.3 The presence of unrecorded mine entries should be confirmed. During site enabling works and a site strip the exposed sub soils should be checked for the presence of disturbed and potentially unstable ground associated with backfilling of such features. However, the likely presence of deep made ground may make the identification of any such features difficult. Drilling may be the only feasible way of identification and vigilance should be taken during these works with respect to any anomalous findings. If mine entries are identified on the site, then these will require treatment by grouting and capping at the surface.

7. Conclusions

7.1 There is a potential risk posed to the redevelopment of the site from shallow mineworkings that may be present in the underlying Barnsley coal seam. Such risks comprise surface instability from collapse of workings and former mine entries. Proof drilling is recommended to better understand these risks.

7.2 In addition, as there can never be total certainty with regard to unrecorded mine entries, the developer should be made aware of this possibility during site stripping and excavation for foundations. Any evidence of the suspected presence of mine entries should be investigated further.

Appendix A

Site location plan and proposed development

Appendix B

Coal Authority mining report