

Supplementary Site Investigation & Coal Mining Risk Assessment Report for New Carriage Shed, East Lancashire Light Railway depot, Buckley Wells Locomotive Works, Baron Street, Bury.

Project No: NX397



Client

EAST LANCASHIRE RAILWAY

DOCUMENT VERIFICATION

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Revision History

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EXECUTIVE SUMMARY

Site Location & Access	East Lancashire Light Railway (ELLR) depot at Buckley Wells Locomotive Works, Baron Street, Bury.
Development Proposals	It is understood that development proposals comprise the provision of a new carriage and restoration shed with ancillary paint store, kitchens and washrooms. This supplementary mining risk assessment relates to the construction of the above building only and not any wider development proposals.
Grid Reference	379818, 410010.
Site Area	Approximately 7.5Ha.
Site description	The larger property is generally level and comprises railway workshops, track and sidings and an abandoned allotment in the northwest corner of the site. The site is bound to the northeast by residential development and Metrolink lines, to the north by Baron Street and further ELLR Locomotive Sidings and school playing fields to the west. Surface cover comprises a mix of tarmacadam car parking, railway building workshops, track, ash, gravel and localised areas of concrete, grass and soil landscaping.
Geology, Hydrogeology & hydrology	A previous site wide Interim Ground Investigation & Risk Assessment Report has been carried out by Leyden Kirby (LK) in 2006. The LK report indicates that the site was underlain by up to 11 metres of made ground comprising ash, reworked material containing demolition type rubble or reworked sands and clays. The deepest areas of made ground were recorded in the eastern part of the site. British Geological Survey (BGS) data and site investigation information indicates that the drift deposits beneath the larger site comprise Cohesive Glacial Drift (Boulder Clay), River Terrace Deposits (sands and gravels) and occasional horizons of Alluvium (silts and clays). Solid strata beneath the site comprise Lower Coal Measures Formation (which comprises inter-bedded series of sandstones, mudstone and siltstones) with the Trencherbone Sandstone present beneath the northern third of the site. The Trencherbone and Hell Hole coal seams are indicated to sub-crop beneath the site and the coal measures strata are thought to dip approximately 5 degrees to the south.

	The Cohesive Glacial Drift is classified as a non-aquifer whereas the River Terrace Deposits (sands and gravels) are classified as a minor aquifer. The nearest surface water feature is the River Irwell located approximately 220m west of the study site. It is assumed that site drainage and surface run-off dip westwards towards the River Irwell.
Mining & Ground Stability	Information provided in the site wide Interim Ground Investigation & Risk Assessment Report, carried out by Leyden Kirby (LK), includes a Coal Authority Mining Report, which states that the property is not within the zone of likely physical influence on the surface from past underground coal workings. However, the property is in an area where coal is believed to exist at or close to the surface that may have been worked at some time in the past. The property is not within the zone of likely physical influence on the surface from any present underground coal workings. The report has no record of any notice of the risk of the land being affected by subsidence being given under S.46 of the Coal Mining Subsidence Act 1991. There are 2no. mine entries located within or within 20 metres of the property boundary. The approximate positions are to the north of the proposed carriage shed development and outside of any likely zone of influence. However, the records held by the Coal Authority may be incomplete and consequently, unrecorded mine entries may exist elsewhere upon the site. The report also states that the site is situated in an area where coal is believed to exist at or close to the surface, which may have been worked at some time in the past. During the LK assessment, two open rotary boreholes (R1 & R2) were formed beneath the site. LK report that the Trencherbone Seam was not encountered in R1. However black siltstone was recorded between 19.5 and 20.0mbgl which may constitute a pinching out of the coal or a lens of organic-rich material associated with the coal seam. No voids or specifically saturated rock strata were encountered. A coal seam (thought to represent the Hell Hole Seam) was encountered from 26.0m to 27.5m below ground level (mbgl) in R2 (which was formed beneath the current proposed building). As no voids were encountered and the seam was not unduly waterlogged in comparison to surrounding rock strata, LK concluded that there is no strong evidence that this seam has been worked below the proposed building and recommended that a further 2no rotary

boreholes were formed beneath the building to establish whether the Hell Hole Seam had been worked beneath the building footprint.

In order to further investigate the risks from shallow coal mining, 3no. rotary open hole boreholes (RBH01 was moved and re-drilled due to poor flush return within the Glacial Sand) were formed, by NX Consulting, beneath the proposed building area between 30th March & 1st April 2020. This approach was verbally agreed with the Coal Authority representatives prior to formation and carried out under Coal Authority permit No 19671.

The boreholes did not encounter the anticipated Hell Hole Coal Seam at the anticipated depth of circa 26.00m bgl. A black soft coal seam was recorded at 32.00 – 32.25 (0.25m thick).

With the exception of some loss of flush through the Glacial sand deposits, no evidence of mineworkings was encountered during the drilling work.

Based upon the information obtained to date, it is evident that the Trencherbone coal seam is not present within the upper 40m depth, beneath the proposed building and the Hell Hole Mine seam sub crops beneath the proposed building, between the NX boreholes and LK RBH02. We consider there to be a low to moderate risk of shallow abandoned mineworkings (and unrecorded mine entries), being present that could affect the proposed carriage shed and associated infrastructure. Drilling and grouting would be required, to mitigate the risk of void collapse if the Hell Hole Seam has been worked to sub crop. Note however, that we consider the likelihood of this seam being worked (to subcrop and therefore beneath the proposed building) to be very unlikely, due to the potential risks of groundwater inundation from the overlying Glacial Sand deposits.

In terms of further mitigation measures, it may be possible to lessen the perceived degree of risk from impacts within the potential workings, within the Hell Hole Mine seam. The Coal Authority may consider that the adoption of foundation reinforcement in line with CIRIA report C758 - Abandoned mine workings manual, as a suitable alternative to further rotary site investigation and subsequent expensive drilling & treatment works.

Concerning the potential for unrecorded shafts, given the depth of made ground, it would not be possible or practical to undertake a site strip. However, care would be required to inspect excavations for foundations/services, to check for suspected mine entries during construction works. All site operatives should be made aware of this potential risk and a watching brief should be maintained during site works.

LK have assessed the risk of mining related ground gas on site. Gas monitoring indicated slightly elevated levels of carbon dioxide present across the site. Given the nature of the proposed structures, precautionary gas protection measures may be required in small areas such as offices, toilets and cupboards. Any protection measures should be agreed with Bury Metropolitan Borough Council representatives.

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1.0 INTRODUCTION

1.1 Instruction

NX Consulting Limited has been commissioned by East Lancashire Railway (The Client) to conduct a supplementary Coal Mining Risk Assessment for a new proposed Carriage Shed at their depot at Buckley Wells Locomotive Works, Baron Street, Bury.

It is understood that development proposals comprise the provision of a new carriage and restoration shed with ancillary paint store with kitchens and washrooms.

This supplementary mining risk assessment relates to the construction of the above building only and not to any of the wider development proposals.

1.2 Previous Works

A previous site wide Interim Ground Investigation & Risk Assessment Report (Report Ref: CL-602-JB578-02 INTERIM) has been carried out by Leyden Kirby Associates (LK) in 2006.

Intrusive investigations were undertaken between 9th and 19th December 2005 and comprised the formation of up to 15no trial pits, 5no cable tool percussion boreholes and 2no rotary open hole boreholes to 30m depth. The rotary boreholes were undertaken on 26th April 2006 as part of the coal mining assessment.

The report indicates that the site was underlain by up to 11 metres of made ground comprising ash, reworked material containing demolition type rubble or reworked sands and clays. The deepest areas of made ground was recorded in the eastern part of the site.

British Geological Survey (BGS) data and site investigation information indicates that the drift deposits beneath the wider site comprise Cohesive Glacial Drift (Boulder Clay), River Terrace Deposits (sands and gravels) and occasional horizons of Alluvium (silts and clays).

Solid strata beneath the site comprises Lower Coal Measures Formation (which comprises inter-bedded series of sandstones, mudstone and siltstones) with the Trencherbone Sandstone present beneath the northern third of the site. The Trencherbone and Hell Hole coal seams are indicated to sub-crop beneath the site and the coal measures strata are thought to dip approximately 5 degrees to the south.

Information provided in the report carried out by LK includes a Coal Authority Mining Report, which states that the property is not within the zone of likely physical influence on the surface from past underground coal workings. However, the property is in an area where coal is believed to exist, at or close, to the surface that may have been worked at some time in the past.

The property is not within the zone of likely physical influence on the surface from any present underground coal workings.

The report has no record of any notice of the risk of the land being affected by subsidence being given under S.46 of the Coal Mining Subsidence Act 1991.

Within or within 20 metres of the property there are 2 mine entries. The approximate positions are to the north of the proposed carriage shed development and outside of any likely zone of influence. However, the records held by the Coal Authority may be incomplete and consequently, unrecorded mine entries may exist elsewhere upon site.

The report also states that the site is in an area where coal is believed to exist at or close to the surface, which may have been worked at some time in the past.

During the LK assessment, two open rotary boreholes (R1 & R2) were formed beneath the site. LK report that the Trencherbone Seam was not encountered in R1. However black siltstone was recorded between 19.5 and 20.0mbgl which may constitute a pinching out of the coal or a lens of organic-rich material associated with the coal seam. No voids or specifically saturated rock strata were encountered.

A coal seam (considered to represent the Hell Hole Seam) was encountered from 26.0m to 27.5m below ground level (mbgl) in R2 (which was formed beneath the current proposed carriage shed footprint). As no voids were encountered and the seam was not unduly waterlogged, in comparison to surrounding rock strata, LK concluded that there is no strong evidence that this seam has been worked below the proposed building and recommended that a further 2no rotary boreholes were formed beneath the building to establish whether the Hell Hole Seal had been worked beneath the building footprint.

1.3 Scope of Work

The site lies within the Coal Mining Development Referral Area and a Coal Mining Risk Assessment is required in line with Planning Policy Guidance 14 (PPG14) 'Development on Unstable Land' (1990).

The LK CMRA highlighted a potential risk to the proposed development from possible workings in shallow coal seams beneath the site.

The objectives of the NX Consulting additional ground investigation works were to appraise/summarise the LK CMRA and to check for the presence of shallow coal seams beneath the site and assess the potential for mineworkings to be present in any seams identified.

The overall scope of the current work comprised the formation of 3no rotary open hole boreholes to depths ranging from 31.50m bgl to 40.50m bgl.

This assessment has been carried out for the new shed only and not developed to

assess the existing and ongoing ground stability risk to the remainder of the site.

1.4 Report Layout

- Section 2 of this report presents a summary of desk based information relating to possible shallow mineworkings beneath the site. This includes the CMRA undertaken by LK, as well as any additional geological and mining related information obtained by NX Consulting.
- Section 3, 4 and 5 details the intrusive investigation carried out, ground conditions identified by the investigation and makes recommendations in respect of shallow mineworkings.

1.5 Limitations

The accuracy of the data supplied by third parties should be considered in the context of any known site conditions for which NX Consulting Limited cannot be held liable.

The comments made in this report are based on the data available at the time of its completion. Any unusual or conflicting evidence discovered during any future site works must be presented to NX Consulting as soon as possible so that any implications may be considered.

This report is provided for the benefit only of the party to whom it is addressed. NX Consulting does not extend responsibility to any third party for the whole or any part of the contents. Nx Consulting owes no duty of care in relation to this report to any third party. The investigation and reportage has been undertaken with all reasonable skill, care and due diligence. NX Consulting disclaims any responsibility to the client or others in respect of any matter(s) outside this agreed scope of the above works.

In addition to the above it should be noted that when investigating or developing land, sub-surface conditions might vary both spatially and over time. Whilst this investigation and subsequent interpretation has been undertaken to reasonably characterise current sub-surface conditions at the site within the scope of works and agreed budget, the absence of certain ground, contamination or groundwater conditions at the individual locations is not a guarantee that these conditions do not exist elsewhere on the site. Additional information, changes in legislation or revised practices may necessitate re-interpretation of part or all of this report.

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2.0 PHASE 1 ASSESSMENT SUMMARY

This section summarises pertinent information gained from reviewing the LK report and other relevant data sources.

2.1 Site Location and Setting

Table 2.1 – Site location and Setting	
Site Location	East Lancashire Light Railway (ELLR) depot at Buckley Wells Locomotive Works, Baron Street, Bury.
Site Description	The larger property is generally level and comprises railway workshops, track and sidings and an abandoned allotment in the northwest corner of the site. The site is bound to the northeast by residential development and Metrolink lines, to the north by Baron Street and further ELLR Locomotive Sidings and school playing fields to the west. Surface cover comprises a mix of tarmacadam car parking, railway building workshops, track, ash, gravel and localised areas of concrete, grass and soil landscaping.
Grid Reference	379818, 410010.
Larger Site Area	Approximately 7.5 Hectares.

2.2 Published Geology and Statigraphy Data

Table 2.2 – Summary of Published Geology	
Made Ground	The site lies within an extensive area of Made Ground. The report indicates the site was underlain by up to 11 metres of made ground comprising ash, reworked material containing demolition type rubble or reworked sands and clays. The deepest areas of made ground was recorded in the eastern part of the site.
Drift Geology	British Geological Survey (BGS) data and site investigation information indicates that the drift deposits beneath the larger site comprise Cohesive Glacial Drift (Boulder Clay), River Terrace Deposits (sands and gravels) and occasional horizons of Alluvium (silts and clays).

Table 2.2 – Summary of Published Geology

Solid Geology	Solid strata beneath the site consist as Lower Coal Measures Formation (which comprises inter-bedded series of sandstones, mudstone and siltstones) with the Trencherbone Sandstone present beneath the northern third of the site.
Stratigraphy	Geological mapping shows that the site is located between the conjectured positions of two faults. The conjectured locations of the outcrop at rockhead of the Trencherbone, Hell Hole Mine, Five Quarters and Doe coal seams are indicated to be in the vicinity of the site. No details of mining is indicated within the immediate vicinity of the site. A level tunnel from a shaft at Fletcher Fold some 1.2km south east of Buckley Wells records strata dipping in a south westerly direction, at gradients from 1 in 5 to 1 in 6. BGS Mapping indicates that that both the Trencherbone and Hell Hole Mine coal seams dip in a southerly to south westerly direction from their conjectured subcrops below the drift geology and are thought to dip at approximately 5 degrees. The Hell Hole mine is shown to subcrop within the vicinity of the proposed carriage shed. No faults have been identified in the vicinity of the site. Based on the information above, the Trencherbone and Hell Hole Mine coal seams potentially lie beneath the site within depths of 20 to 35m bgl.

2.3 Coal mining Information

Coal Authority Mining Report

Information provided in the report carried out by LK includes a Coal Authority Mining Report, which states that the property is not within the zone of likely physical influence on the surface from past underground coal workings. However, the property is in an area where coal is believed to exist, at or close, to the surface that may have been worked at some time in the past.

The property is not within the zone of likely physical influence on the surface from any present underground coal workings.

The report has no record of any notice of the risk of the land being affected by subsidence being given under S.46 of the Coal Mining Subsidence Act 1991.

Within or within 20 metres of the property there are 2 mine entries. The approximate positions are to the north of the proposed carriage shed development and outside of any likely zone of influence. However, the records held by the Coal Authority may be incomplete and consequently, unrecorded mine entries may exist elsewhere upon site.

The report also states that the site is in an area where coal is believed to exist at or close to the surface, which may have been worked at some time in the past.

Additional Information

Further information relating to potential coal mining activity at the site obtained from internet resources and the LK report is summarised as follows:

- The Coal Authority Interactive Map Viewer shows the site as lying within a development high risk area.
- During the LK assessment, two open rotary boreholes (R1 & R2) were formed beneath the site. LK reported that the Trencherbone Seam was not encountered in R1. However black siltstone was recorded between 19.5 and 20.0mbgl which may constitute a pinching out of the coal or a lens of organic-rich material associated with the coal seam. No voids or specifically saturated rock strata were encountered.
- A coal seam (considered to be the Hell Hole Seam) was encountered from 26.0m to 27.5m below ground level (mbgl) in R2 (which was formed beneath the current proposed carriage shed footprint). As no voids were encountered and the seam was not unduly waterlogged, in comparison to surrounding rock strata, LK concluded that there is no strong evidence that this seam has been worked below the proposed building and recommended that a further two rotary boreholes were formed beneath the building to establish whether the Hell Hole Seam had been worked beneath the building footprint.

2.4 Summary of Potential Coal Issues from Phase 1 Study

Based on the information from 2.2 and 2.3, there is a potential for shallow coal seams to be present beneath the site, namely the Hell Hole Mine seam and possibly also the Trencherbone seam.

Possible workings in either or both of these seams could potentially affect the proposed development and the risk is therefore considered to be low to moderate.

4.0 FIELDWORKS

4.1 General

The supplementary phase of intrusive investigation was carried out by Taylor Drilling Services and monitored by an engineer from NX Consulting and Atlantic Consulting (on behalf of the client) between the 30th March & 1st April 2020. A plan showing all the exploratory hole locations is presented in Appendix A.

All locations were checked for services against available service plans, scanned with a cable avoidance tool (CAT), and hand dug trial pits formed to a depth of 1.20metres below ground level (bgl) prior to the intrusive investigation; in line with NX Consulting health and safety methodology.

4.2 Rotary Open Hole Boreholes

In order to further investigate the risks from shallow coal mining, 3no. rotary open hole boreholes were formed to depths ranging from 31.50m bgl to 40.00m bgl, by Taylor Drilling Services; utilising a track mounted rotary drill rig, employing conventional water flush with a 65mm rock bit. RBH01 was moved and re-drilled due to poor flush return within the Glacial Sand deposits, beneath the proposed building area. The works were carried out under Coal Authority permit No 19671.

The arisings were described by an experienced drilling foreman and monitoring engineer from Atlantic Consultants. Borehole log sheets provided by Atlantic Consultants are included in Appendix C.

Gas monitoring was undertaken during the drilling works for the presence of CH₄, CO and CO₂. Concentrations remained below the detection limits of the instrument used throughout the works.

5.0 GROUND CONDITIONS

5.1 Ground Conditions

Made Ground

Made Ground was encountered in all four (LK & NX intrusive works) rotary open hole boreholes to depths ranging from 7.50m bgl to a maximum potential depth of 9.50m bgl. The LK CMRA referred to Made Ground depths of 8.50m bgl within RBH02.

Coal Measures Bedrock

Directly underlying the Made Ground, Glacial sand and clay over Coal Measures bedrock was encountered.

RBH01

RBH01 was drilled to a total depth of 31.5 metres. The returns from the rotary flush were poor and non-existent from approximately 10.0m to 22.5 and 25.0 – 31.5. Drilling rates were used to approximate rock changes. Entering the underlying Glacial sand formation circulation was lost and never properly regained.

RBH01B

Ground Level (GL) to 3.00m - Made ground of Sandy Ash and Railway Ballast
3.0m to 7.50m - Possible made ground of Grey Green Fine Sands
7.5m to 27.0m - Brown Glacial Sands medium lithic poorly cemented with pink or grey thin clays bands.
27.0m to 40.5m - Carboniferous inter-bedded red & grey sandstones mudstones & shales.
No coal bands penetrated

RBH02

GL to 13.0m - Made ground of Grey Green Fine Sands
13.0m to 25.0m - Glacial Sands medium lithic & poorly cemented
25.0m to 40.5m - Carboniferous inter-bedded sandstones mudstones & shales
32.00 – 32.25 - Black Soft Coal Band (0.25m thick)

With the exception of the localised flush loss through the Glacial Sand in RBH01 described above, no other flush loss, voids, loose drilling or other possible evidence of shallow mineworkings was recorded in the boreholes.

5.2 Groundwater

No groundwater was recorded during drilling. Although this may have been masked by the use of water flush medium throughout drilling.

6.0 ASSESSMENT OF POTENTIAL SHALLOW MINING ISSUES

6.1 General

It is understood that development proposals comprise the provision of a new carriage and restoration shed with ancillary paint store with kitchens and washrooms.

No building loads or finished site/building levels have been provided to NX Consulting at the time of drafting this document. It is understood that conventional strip and pad foundations formed onto vibro-treated granular made ground and glacial sands is the proposed foundation solution.

The Phase 1 Coal Mining Risk Assessment (CMRA) identified a potential low to moderate risk to the proposed development from shallow mineworkings and potentially hazardous ground gas. This was on the basis of two potential coal seams being present at shallow depth beneath the site. The two seams were the Hell Hole Mine and the Trencherbone coal seam. The latter being recorded as a coal seam with a history of spontaneous combustion by the Coal Authority.

3no. rotary open hole boreholes were formed to depths ranging from 31.50m bgl to 40.00m bgl, to check for the possible presence of coal seams/shallow workings beneath the property.

6.2 Ground Conditions Summary and Assessment

Made Ground was encountered in all four (LK & NX intrusive works) rotary open hole boreholes to depths ranging from 7.50m bgl to a maximum potential depth of 9.50m bgl. The LK CMRA referred to Made Ground depths of 8.50m bgl within RBH02.

Underlying the Made Ground, Glacial sand with clay bands was recorded to depths of 7.50m bgl to 25.00m bgl (RBH02) and 27.0m (RBH01B). Coal Measures strata comprised an initial layer of red mudstone (Marl) and sandstone between 25.00m bgl and 32.50m bgl (RBH02) and 35.80m gbl (RBH01B). Solid drilling was recorded to 31.50m bgl in RBH01.

A thin band of Coal (0.25m thick) was recorded in RBH02 only between 32.0 and 32.50m depth. Coal thought to represent the Hell Hole Mine seam was recorded within LKRBH02 between 26.00m bgl to 27.50m bgl. No loss of flush or any other indication of mine workings were recorded. LK reported that as no voids were encountered and the seam was not unduly waterlogged, in comparison to surrounding rock strata, there is no strong evidence that this seam has been worked below the proposed building.

The Coal Authority do not have records of mine shafts beneath the site, although they do say that shafts may be present that they are not aware of.

Additionally, no potentially hazardous ground gas was recorded during drilling at the drill head.

Based upon the information obtained to date, it is evident that the Trencherbone coal seam is not present within the upper 40m depth, beneath the proposed building and the Hell Hole Mine seam sub crops beneath the proposed building between the NX boreholes and LK RBH02. We consider there to be a low to moderate risk of shallow abandoned mineworkings (and unrecorded mine entries), being present that could affect the proposed carriage shed and associated infrastructure. Drilling and grouting would be required, to mitigate the risk of void collapse if the Hell Hole Seam has been worked to sub crop. Note however, that we consider the likelihood of this seam being worked (to subcrop and therefore beneath the proposed building) to be very unlikely, due to the potential risks of groundwater inundation from the overlying Glacial Sand deposits.

In terms of further mitigation measures, it may be possible to lessen the perceived degree of risk from impacts within the potential workings within the Hell Hole Mine seam, the Coal Authority may consider that the adoption of foundation reinforcement in line with CIRIA report C758 - Abandoned mine workings manual, as a suitable alternative to further rotary site investigation and subsequent expensive treatment works.

Concerning the potential for unrecorded shafts, given the depth of made ground, it would not be possible or practical to undertake a site strip. However, care would be required to inspect excavations for foundations/services, to check for suspected mine entries during construction works. All site operatives should be made aware of this potential risk and a watching brief should be maintained during site works.

LK have assessed the risk of mining related ground gas on site. Gas monitoring indicated slightly elevated levels of carbon dioxide present across the site. Given the nature of the proposed structures, precautionary gas protection measures may be required in small areas such as offices, toilets and cupboards. Any protection measures should be agreed with Bury Metropolitan Borough Council representatives.

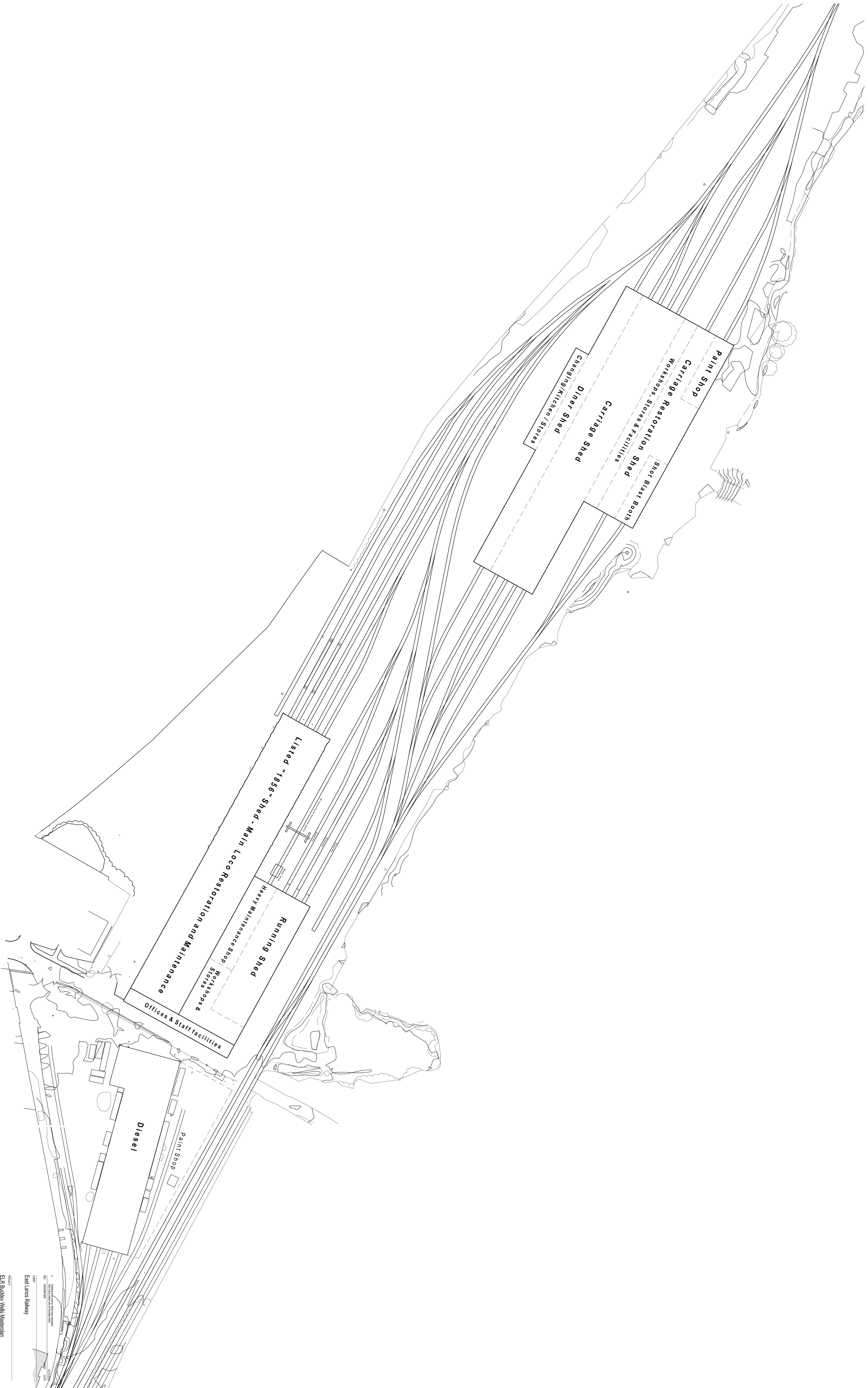
APPENDICES

Appendix A – Drawings & Coal Authority Permit

Appendix B – Atlantic Consultants Report & Exploratory Hole Logs

Appendix A – Drawings & Coal Authority Permit

Proposed Site Layout - Option D



A. Existing track used to 1950s shed indicated.
How your subject used to Manning Street.

FEV DISPOSITION

19.12.2016 DATE

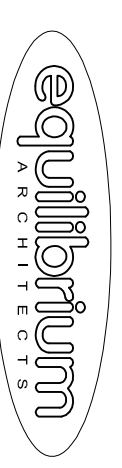
CLERK

East Lanes Railway

ELR Buckley Wells Masterplan

Proposed Site Layout - Option D

SCALE	DATE	DRAWN	CHECKED
1:500 A0	18.12.18	MH	
DRAWING NO.	CAD REFERENCE NO.	REVISION	
C-0340-08		A	



435-437 Woodmerry Road Bury Lancashire BL9 9EU T: 0161 797 2077 F: 0161 797 2068
 info@equib@arrstedtscheck.co.uk www.equib@arrstedtscheck.co.uk

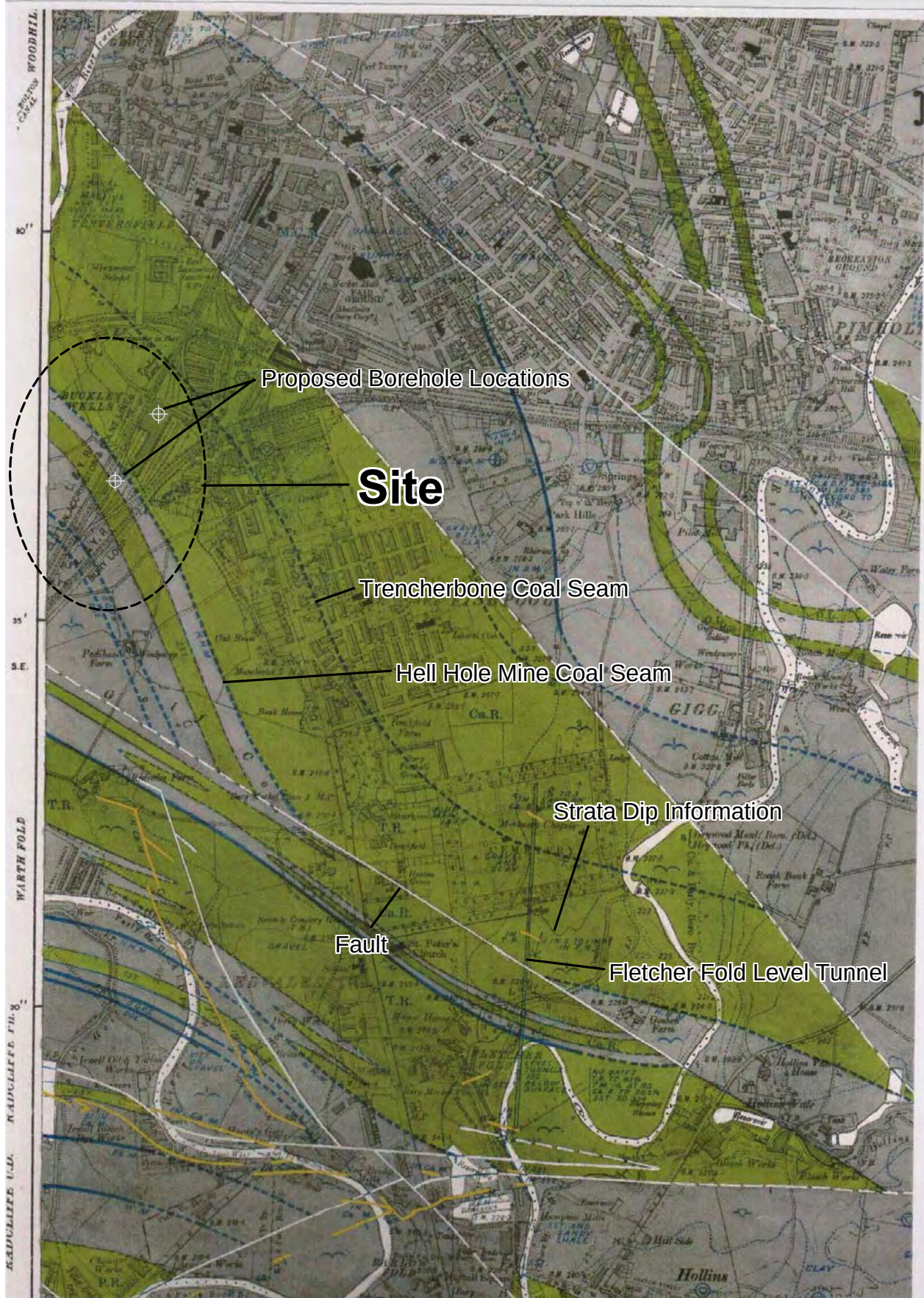


Figure 2: Lancs Sheet 88SW 1910 Geological Map

Drawn: March 2006



Figure 1: Lancs Sheet 87 and 88 1st Edition Geological Map

Drawn: March 2006

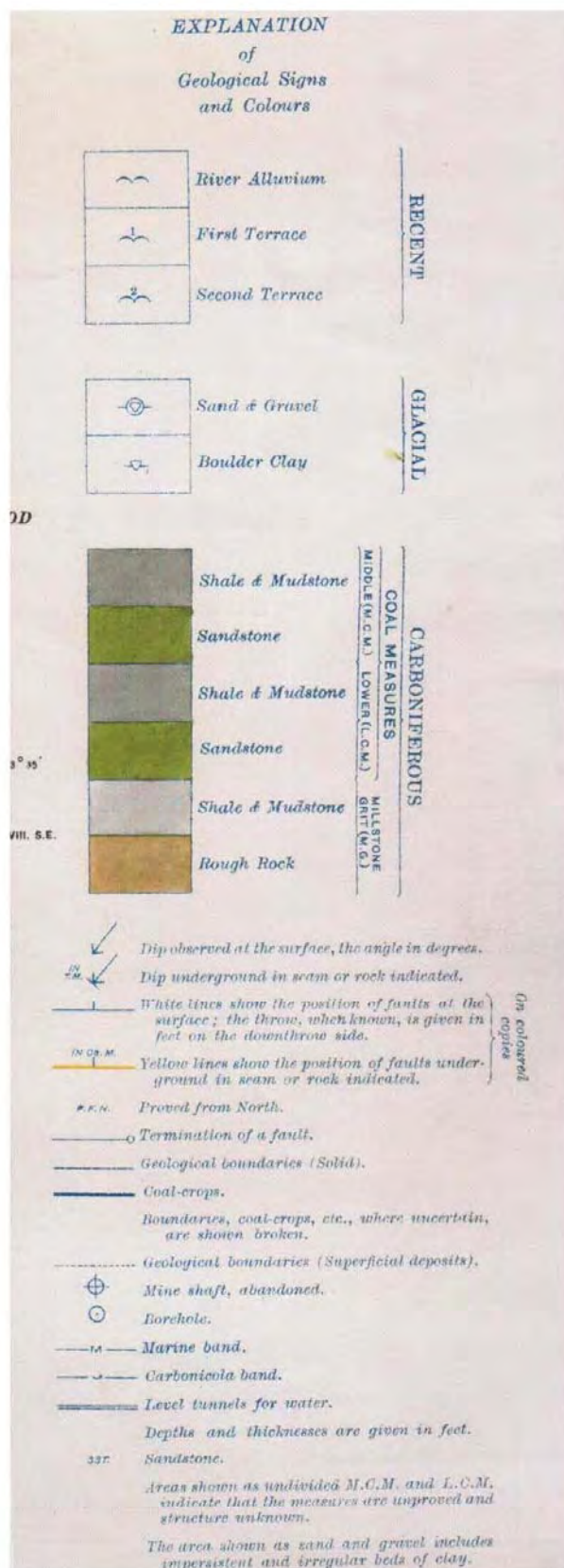
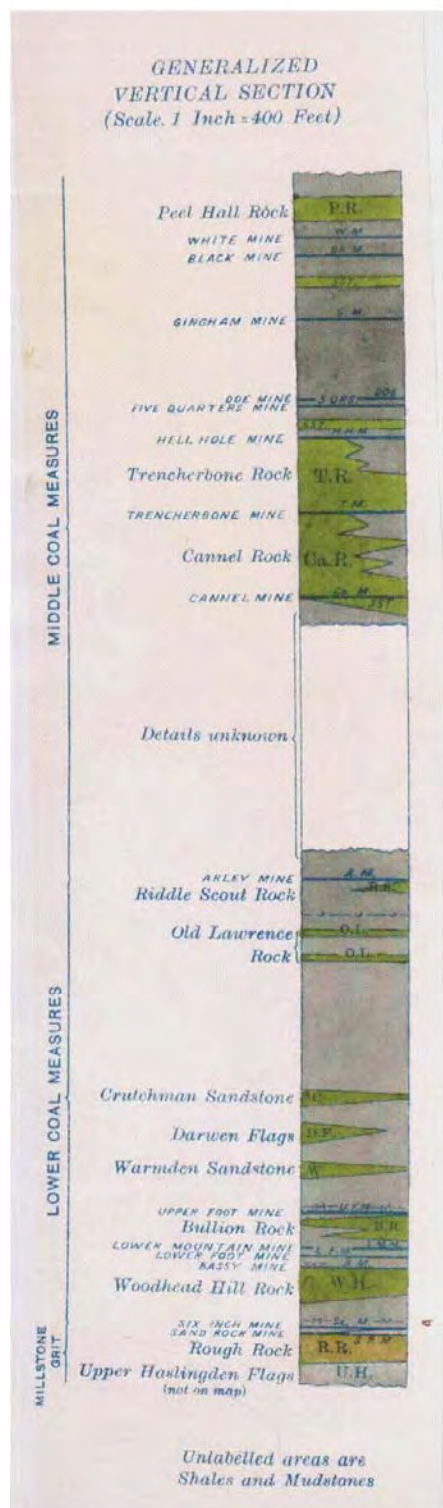


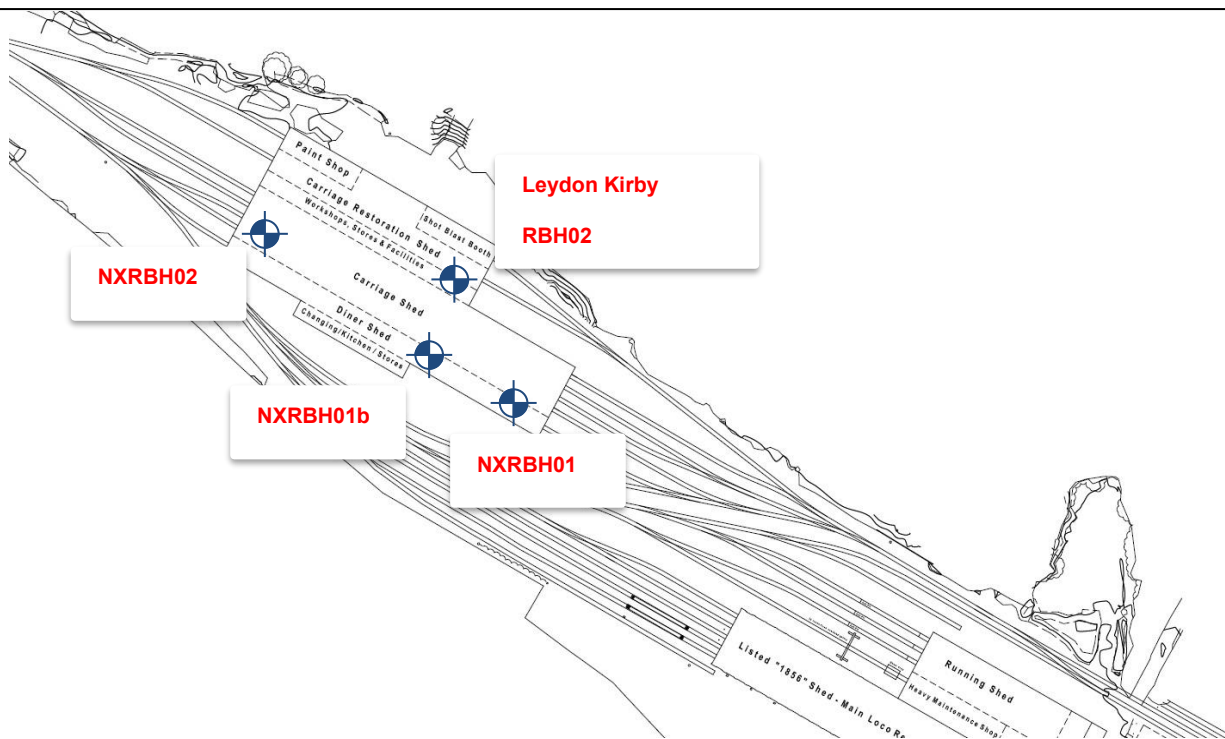
Figure 3: Legend for Lancs Sheet 88SW 1910 Geological Map

Drawn: March 2006



Figure 4: Lancs Sheet 87SE 1931 Geological Map

Drawn: March 2006



Not to scale

Key



Approximate NX & Existing LK
Rotary Open Hole Locations



Next Generation Engineering Consultancy Services

Tel: 0161 904 0187
E-mail: admin@nxconsulting.org.uk
Web: www.nxconsulting.org.uk

Ref: NX397 Figure 1

Project:

Buckley Wells Carriage Shed

Title:

NX & Existing LK Exploratory Hole Location Plan

MICHELLE WADDICOR,
LEYDEN KIRBY ASSOCIATES LTD,
BURY BUSINESS CENTRE,
KAY STREET,
BURY,
BURY,
LANCS,
BL9 6BU

This matter is being dealt with by Ken Rowe

Our Ref: **10027088-06**

Your Ref: JB 578

Electronic Ref: EME_00003989430001_005

RRUID: 005.00003989430001

Date: 24 January 2006

Dear Sir,

Coal Mining Report

LAND AT BUCKLEY WELLS LOCOMOTIVE WORKS, BARON STREET, BURY, LANCASHIRE

I refer to the enquiry dated 23rd January 2006, received 23rd January 2006, in connection with the above.

This report is based on and limited to the records in the possession of The Coal Authority at the time the search is answered.

Past Underground Mining

According to the records in our possession, the property is not within the zone of likely physical influence on the surface from past underground coal workings.

However you may wish to know that the property is in an area where coal is believed to exist at or close to the surface that may have been worked at some time in the past.

Present Underground Mining

The property is not within the zone of likely physical influence on the surface from any present underground coal workings.

Future Underground Mining

The property is not within a geographical area for which a licence to extract coal by underground methods is awaiting determination by the Coal Authority.

The property is not within a geographical area for which a licence to extract coal by underground methods has been granted.

The property is not within the zone of likely physical influence at the surface from plans of future workings in our possession.

However reserves of coal exist in the locality which could be worked at some time in the future subject to feasibility, licences, and planning consents.

We have no record of any notice of the risk of the land being affected by subsidence being given under S.46 of the Coal Mining Subsidence Act 1991.

Shafts and Adits

Within or within 20 metres of the property there are 2 mine entries, the approximate positions of which are shown on the attached plan. Your attention is drawn to the statements made on that plan.

We have no record of what steps, if any, have been taken to treat the mine entries.

The records held by the Coal Authority may be incomplete. Consequently, there may exist in this locality mine entries of which we have no knowledge.

Surface Geology

Records in our possession do not disclose any fault or other line of weakness at the surface as having affected the stability of the property.

Past Opencast Mining

The property is not located within the geographical boundary of an opencast site from which coal has been extracted by opencast methods.

Present Opencast Mining

The property does not lie within 200 metres of the geographical boundary of an opencast site within which coal is being extracted by opencast methods.

Future Opencast Mining

The property is not within 800 metres of the geographical boundary of an opencast site for which a licence to extract coal by opencast methods is awaiting determination.

The property is not within 800 metres of the geographical site boundary of an opencast site for which a licence to extract coal by opencast methods has been granted.

Subsidence

The records in our possession do not disclose any damage notice or claim having been given, made or pursued in respect of the property since 1 January 1984.

The records in our possession do not disclose any current "Stop Notice" affecting the property.

The records in our possession do not show any request having been made to execute preventative works under S.33 of the Coal Mining Subsidence Act 1991.

Withdrawal of Support

The property does not lie within a geographical area in respect of which a notice of entitlement to withdraw support has been published.

The property does not lie within a geographical area in respect of which a notice has been given under S.41 of the Coal Industry Act 1994, revoking the entitlement to withdraw support.

Working Facilities Orders

The property is not within a geographical area that is the subject of an Order made under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

Payments to Owners of Former Copyhold Land

The property is not within an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Additional Remarks

In view of the mining circumstances a prudent developer would seek appropriate technical advice before works are undertaken on site. All proposals should have regard to good engineering practice in mining areas as identified in authoritative publications on mining stability problems. In any event, no activities should be undertaken that intersect, disturb, or interfere with any coal or mines of coal without permission of the Coal Authority.

These replies are prepared in accordance with the 2003 editions of the Coal Authority's Terms and Conditions, User Guide and the Law Society's Guidance Notes.

Copyright in coal mining reports and certificates belongs to the Coal Authority. Information used to compile this report is protected by the Coal Authority's database right. All rights are reserved and unauthorised use is prohibited. Copyright and other intellectual property is not transferred to external parties by possession of a mining report or certificate, however those for whom the report is supplied have the right to use it.

We acknowledge the receipt of your remittance in payment of our fee.

Yours faithfully

A handwritten signature in black ink, appearing to read 'Pennell', with a stylized flourish at the end.

Stephen Pennell

Director of Mining Information and Services



Crown Copyright.

PLAN NOT TO SCALE

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This is a plan of the boundaries of the property in respect of which this report has been prepared. It is the responsibility of the user to ensure that the boundaries shown correspond with those of the property.

APPROXIMATE POSITION OF ENQUIRY BOUNDARY SHOWN



APPROXIMATE POSITION OF DISUSED MINE SHAFTS SHOWN



This plan shows the approximate location of the disused mine entry/entries referred to in the attached mining report. For reasons of clarity, mine entry symbols may not be drawn to the same scale as the plan.

Property owners have the benefit of statutory protection (under the Coal Mining Subsidence Act 1991). This contains provision for the making good, to the reasonable satisfaction of the owner, of physical damage from disused coal mine workings including disused coal mine entries. A DTL leaflet setting out the rights and the obligations of either the Coal Authority or other responsible persons under the 1991 Act can be obtained by telephoning 0845 762 6848.

If you wish to discuss the relevance of any of the information contained in the attached report you should seek the advice of a qualified mining engineer or surveyor. If you or your adviser wish to examine the source plans from which the information has been taken these are available at our Mansfield office, free of charge, by prior appointment, telephone 01623 638233. Should you or your adviser wish to carry out any physical investigations that may enter, disturb or interfere with any disused mine entry the prior permission of the owner must be sought. For coal mine entries the owner will normally be the Coal Authority.

The Coal Authority, regardless of responsibility and in conjunction with other public bodies, provide an emergency call out facility in coalfield areas to assess the public safety implications of mining features (including disused mine entries). Our emergency telephone number at all times is 01623 646333.

Appendix B – Atlantic Consultants Report & Exploratory Hole Logs

Tracey Parkinson
General Manager
East Lancashire Railway
Baron Street Office
Bury BL9 0EL

4th April 2020

Bore Hole Drilling and Geology of Baron Street Site

On Monday 30th April 2020 commenced 3 days of intrusive investigation on the railway sidings at Baron Street Bury (Steam Sheds), into the geology of the formations below the footprint of the proposed new Carriage Sheds on this site. Atlantic Environmental Consultants acted as an onsite/rig geologist analysing and interpreting the drill samples and formulating borehole logs for the 3 holes drilled.

Methodology

Taylor Drilling Services utilised a track mounted rotary drill, in order to develop 2 x @ 35.0 metre drill holes into the underlying Carboniferous formations. The intention of the exploration was to increase the knowledge of the potential for coal workings beneath the site, in the Hell Hole Mine coal seam. The rig employed conventional water flush with a 65mm rock bit, I examined rock cutting every 3 meters and later constructed borehole logs accordingly.

The investigation is undertaken to British Standard BS 5930:2015 Code of Practice for Ground Investigations.

Investigation

The site has previously had deeper boreholes constructed upon it to 30 metres. I named these LKBH1 and LKBH2. (drillers logs included in appendix) The first was drilled close the Baron Street works in the north of the site, and the second in amidst the sidings half way down to the Metrolink on the west side. Leyden Kirby produced a report after a contaminated land investigation for Bury Council in 2006. (Buckley Wells Locomotive Works Baron Street Bury, Interim Ground Investigation and Risk Assessment Report dated 25/10/2006 by Leyden Kirby Associates.)

Drilling Observations and Results.

Primarily the rig was employed to drill 2 boreholes, this was superseded due to the first days work.

30th March 2020 BH TDS1A

This hole was drilled half way between LKBH1 and the neck in the yards. It is roughly east and south of LKBH2. This hole was drilled to a total depth of 31.5 metres. It was cased to 9 metres. The returns from the rotary flush were poor at best and none existent from @10m to 22.5 and 25.0 – 31.5. Only drilling rates could potentially guess at the rock changes. The Glacial Till in the zone 4.0m – 9.0m were identifiable and compared to the later bore in colour and lithology. Entering the underlying Glacial sand formation circulation was lost and never properly regained. Descriptions of the lithology is therefore limited and is shown on borehole log TDS 1A in the appendix to this report.

31st March 2020

BH TDS 2 is located as close to the 'V' neck to the south of the site as possible. It is marked on the enclosed map, and can be described as between the sidings No 6 and the Coal Road. This hole progressed to 40.5 metres, and retained good circulation and cuttings to the bottom of the hole. See enclosed appendix for borehole lithology logs.

The main horizons penetrated are as follows:-

0.00 – 13.00	Made ground of Grey Green Fine Sands
13.00 – 25.00	Glacial Sands medium lithic & poorly cemented
25.00 – 40.50	Carboniferous inter-bedded sandstones mudstones & shales
32.00 – 32.25	Black Soft Coal Band (@ 1ft thick)

On completion of this hole (@ 15:00) the rig was moved back to the first location (@ 6m south) and the first hole was re-drilled. 2nd hole named TDS 1B Drilled to 9m and cased on 31st March 2020.

1st April 2020

BH TDS -1B progressed to 40.5 m and retained good circulation for the depth of the hole, and so good returns were able to be analysed and the borehole lithology log is given in the appendix to this report.

The main horizons penetrated are as follows:-

0.0 – 3.00	Made ground of Sandy Ash and Railway Ballast
3.00– 7.50	Made ground (?) of Grey Green Fine Sands
7.50 – 27.00	Brown Glacial Sands medium lithic poorly cemented with pink or grey thin clays bands.
27.00 – 40.50	Carboniferous inter-bedded red & grey sandstones mudstones & shales. No coal bands penetrated

In respect of ground elevation, BH TDS2 was about 1 metre lower than BH TDS 1B (&A).

A formal surveying of the ground elevation of these locations should be undertaken in order to interpret the geology with previously drilled boreholes. A schematic interpretation of the deeper boreholes is given in the appendix. Samples have been retained for further examination if necessary.

Best Regards

Stuart McDonald B.Sc. C.Geol.F.G.S.
Atlantic Environmental Consultants UK
atlanticstu@msn.com
07969 122 985

Photographs of boreholes

Borehole No TDS 1A
View looking north east



Borehole TDS 1A
View south west

Borehole TDS 2
View west



Borehole TDS 2
View south west

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Borehole TDS 1B
View south-south west



Borehole TDS 1B
View south west

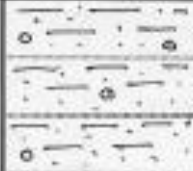
Lithology Borehole Log TDS 1A

Atlantic Environmental Consultants		Client : East Lancashire Railway Co Ltd.	B/H No = TDS 1A Sheet No 1 of 2		
Ground Elevation : Drilled By : Taylor Drilling Services Drillers Name: Decklan Taylor Hard Drilling @ None		Drill No : Drilling Method : <u>Rotary</u> Percussion Sonic Mud Type : Bentonite <u>Water</u> Mix Air Foam Drill Bit changes @ N/A		Logged by : S McDonald Date & Time Start : 30/3/20 @ 10:10	
X Co-ord Y Co-ord		Lost Circulation @ 31.5 m lost - losing all the time 9 - 31.5 Bore Hole Dia = 65mm		Date & Time Finish: 30/03/2020 16:00 T.D. 31.5	
Stratigraphy	Lithology Description	Graphic Log	Depth Mts	Water Level	Casing
Glacial Till	Made Ground: Sandy Ash with Railway Ballast & Bricks				
	Bricks		1		
	Very poor sandy returns		2		
			3		
	Light Grey Clay with sub rounded gravel of quartz		4		
	Igneous rocks - Glacial Till		5		
	Light Grey Clay with sub rounded gravel of quartz		6		
	Igneous rocks - Glacial Till		7		
	Light Grey Clay with sub rounded gravel of quartz		8		
	Igneous rocks - Glacial Till		9		
	Very poor returns - fine sand		10		
	almost losing circulation		11		
	Losing water to Sands		12		
			13		
	stop to regain circulation		14		
	almost no returns		15		
			16		
			17		
			18		
			19		
			20		
			21		
			22		
	Grey med - coarse rounded sands		23		

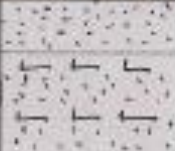
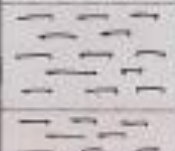
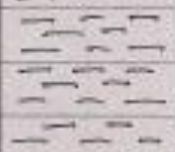
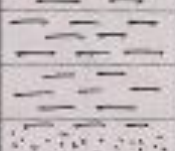
~~ Atlantic Environmental Consultants U.K. ~~
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Atlantic Environmental Consultants		Client : East Lancashire Railway Co Ltd.		B/H No = TDS 1A Sheet No 2 of 2	
Project : Baron Street Sheds 2020		Drill No :		Logged by : S McDonald	
Ground Eleveation :		Drilling Method : <u>Rotary</u> Percussion Sonic		Date & Time Start :	
Drilled By : Taylor Drilling Services		Mud Type : Bentonite <u>Water</u> Mix Air Foam		30/03/2020	
Drillers Name: Decklan Taylor		Drill Bit changes @ N/A		Date & Time Finish:	
Hard Drilling @ None		Lost Circulation @ from 9 - 31.5 losing all the time		30/03/2020	
X Co-ord		Bore Hole Dia = 65mm		T.D. 31.5	
Y Co-ord					
Stratigraphy	Lithology Description	Graphic Log	Depth Mts	Water Level	Casing
	Med - course grey sand rounded		--		
	Med - course grey sand rounded		-- 24		
			--		
			-- 25		
			--		
	No returns from hole circulation poor.		-- 26		
			--		
			-- 27		
			--		
			-- 28		
			--		
	Driller Comments - Hit Harder Drilling at 29 m		-- 29		
			--		
			-- 30		
			--		
	Losing water at @ 100 ltrs per 5 mins		--		
	Abandoned Hole at 31.5 m		-- 31		
			--		
			-- 32		
	Red Marl noted on drill bit on extraction		--		
			-- 33		
			--		
			-- 34		
			--		
			-- 35		
			--		
			-- 36		
			--		
			-- 37		
			--		
			-- 38		
			--		
			-- 39		
			--		
			-- 40		
			--		
			-- 41		
			--		
			-- 42		
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			-- 44		
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			-- 45		
			--		
			-- 46		
			--		

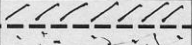
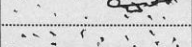
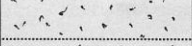
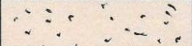
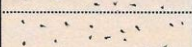
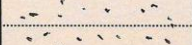
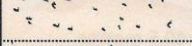
Lithology Borehole Log TDS 1B

Atlantic Environmental Consultants		Client : East Lancashire Railway Co Ltd.		B/H No = TDS 1B	
		Project : Baron Street Sheds 2020		Sheet No 1 of 2	
Ground Elevation :		Drill No :		Logged by : S McDonald	
Drilled By : Taylor Drilling Services		Drilling Method : Rotary Percussion Sonic		Date & Time Start :	
Drillers Name: Declan Taylor		Mud Type : Bentonite Water Mix Air Foam		31/3/20 @ 15:00	
Hard Drilling @ None		Drill Bit changes @ N/A		Date & Time Finish:	
X Co-ord		Lost Circulation @ Minimal losses		01/04/2020 13:00	
Y Co-ord		Bore Hole Dia = 65mm		Total Depth 40.5m	
Stratigraphy	Lithology Description	Graphic Log	Depth Mts	Water Level	Casing
Made Ground	Made Ground Sandy Ash with Railway Balast		1	not taken	
	Made Ground Sandy Ash with Railway Balast		2		
			3		
			4		
Glacial Till	Sandy Grey Clay with some Gravel of lithic frags		5		
			6		
	Sandy Grey Clay with some Gravel of lithic frags		7		
			8		
Glacial Sands & Gravels	Orange/Brown Course Sand & Gravel 10% clay (cement) (finished riling 31/03/20) to 9m 50% Soft Sandy Grey Clay 50% Course Gravel rounded		9		
			10		
			11		
			12		
	60% Soft Sandy Pink Clay 40% Course Gravel with clasts of igneous rocks		13		
			14		
	30% Soft Sandy Pink Clay 60% Course Gravel with clasts of igneous rocks sandstn & Siltstns/shales		15		
			16		
			17		
			18		
			19		
			20		
			21		
			22		
			23		

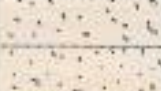
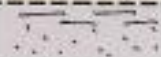
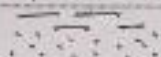
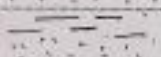
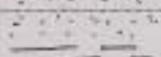
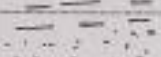
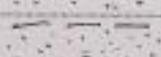
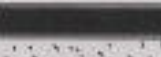
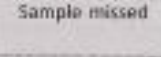
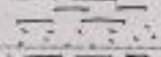
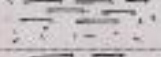
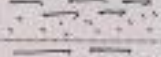
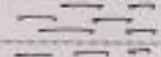
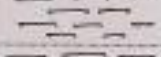
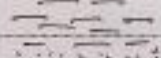
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Atlantic Environmental Consultants		Client : East Lancashire Railway Co Ltd.	B/H No = TDS 18 Sheet No 2 of 2		
Project : Baron Street Sheds 2020					
Ground Elevation : Drilled By : Taylor Drilling Services Drillers Name: Decklan Taylor Hard Drilling @ None		Drill No : Drilling Method : <u>Rotary</u> Percussion Sonic Mud Type : Bentonite <u>Water</u> Mix Air Foam Drill Bit changes @ N/A		Logged by : S McDonald Date & Time Start : 11/1/20 @ 15:00 Date & Time Finish: 01/04/2020 13:00 Total Depth 40.5m	
X Co-ord Y Co-ord		Lost Circulation minimal losses Bore Hole Dia = 65mm			
Stratigraphy	Lithology Description	Graphic Log	Depth Mts	Water Level	Casing
Glacial Sands	60% Soft Sandy Pink Clay 40% Coarse Gravel with clasts of igneous, sandstn & Siltstns/shales		24		
			25		
			26		
			27		
Carboniferous Sandstones Mudstones	Hard Grey fine grained sandstone frag. of hard yellow fine sandstone 50% soft red Marl 50% grey fine hard sandstone		28		
			29		
			30		
			31		
	low returns 100% soft grey mudstone/ clay		32		
			33		
			34		
			35		
	Red and grey mudstones		36		
			37		
			38		
			39		
	Red and grey mudstones one piece of coal with pyrites inclusions		40		
40 % Red and grey mudstones 60% Thin fine grained Cream & Grey sandstones 40 % Red and grey mudstones 60% Thin fine grained Cream & Grey siltstn					
TD = 40.5 Metres			41		T.D. 40.5 m
			42		
			43		
			44		
			45		
			46		

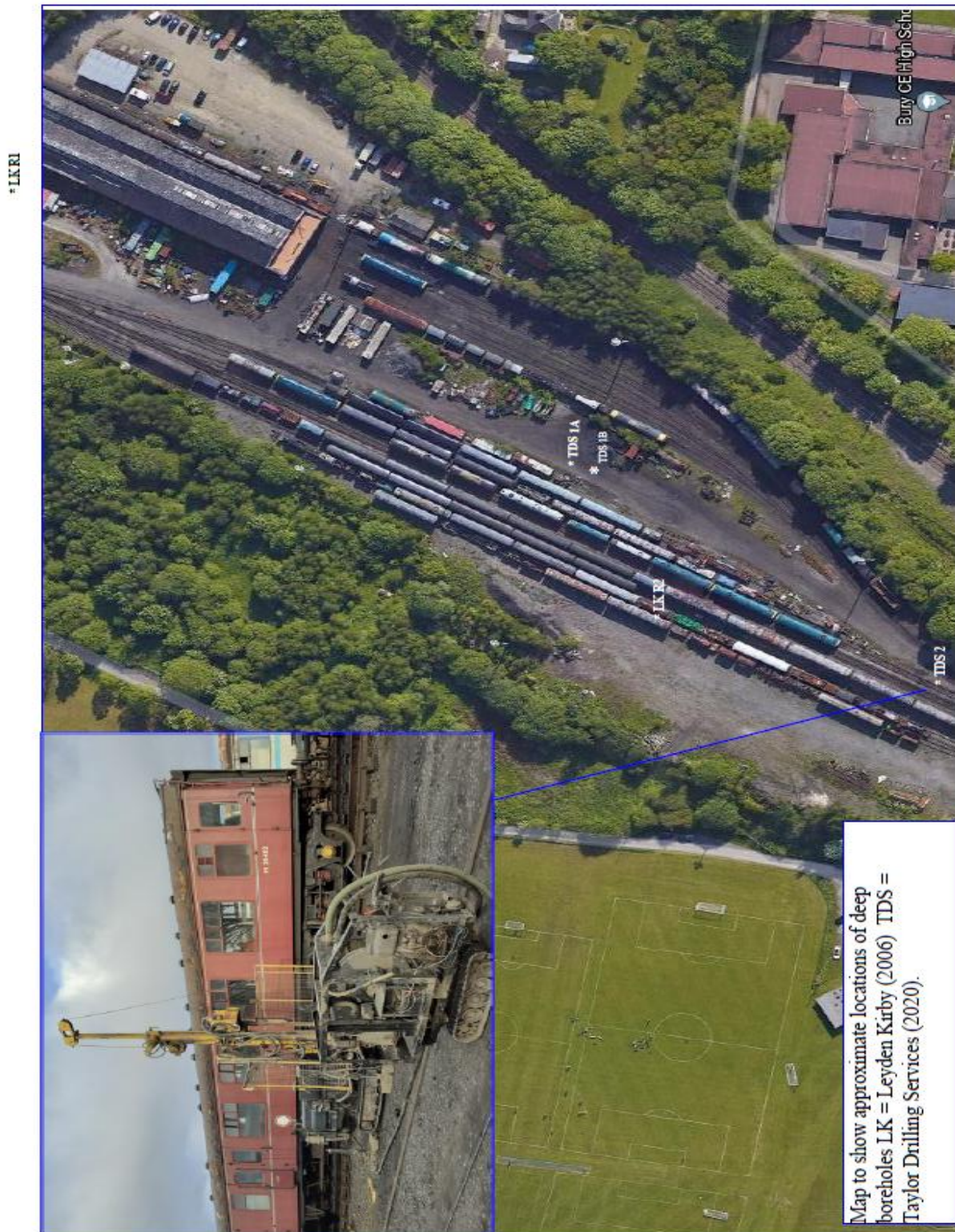
Lithology Borehole Log TDS 2

Atlantic Environmental Consultants		Client : East Lancashire Railway Co Ltd.		B/H No = TDS 2 Sheet No 1 of 2	
Project : Baron Street Sheds 2020		Drill No : Drilling Method : Rotary Percussion Sonic Mud Type : Bentonite Water Mix Air Foam Drill Bit changes @ N/A Lost Circulation @ None Bore Hole Dia = 65 mm		Logged by : S McDonald Date & Time Start : 31/03/2020 08:30 Date & Time Finish: 31/03/2020 13:00 T.D.= 40.5m	
Ground Eleveation : Drilled By : Taylor Drilling Services Drillers Name: Decklan Taylor Hard Drilling @ X Co-ord Y Co-ord					
Stratigraphy	Lithology Description	Graphic Log	Depth Mts	Water Level	Casing
Made Ground	Made Ground Black Ash with Railway balast				
	Grey Green Fine - Medium Sand well rounded & sub angular lithic fragments		1		
			2		
			3		
			4		
			5		
			6		
			7		
			8		
	Grey Green Fine sand & wood fragments		9		
			10		
	Grey Green Fine sand & wood fragments		11		
	80% Grey Green Sand 20% pink sdstn with Grey/dark grey shales		12		
			13		
Glacial Sands	Lithic Glacial sand medium sub ang grains of quartz and igneous rocks		14		
			15		
	Glacial Sands		16		
			17		
	Glacial Sands		18		
			19		
	Glacial Sands		20		
			21		
	Glacial Sands		22		
			23		

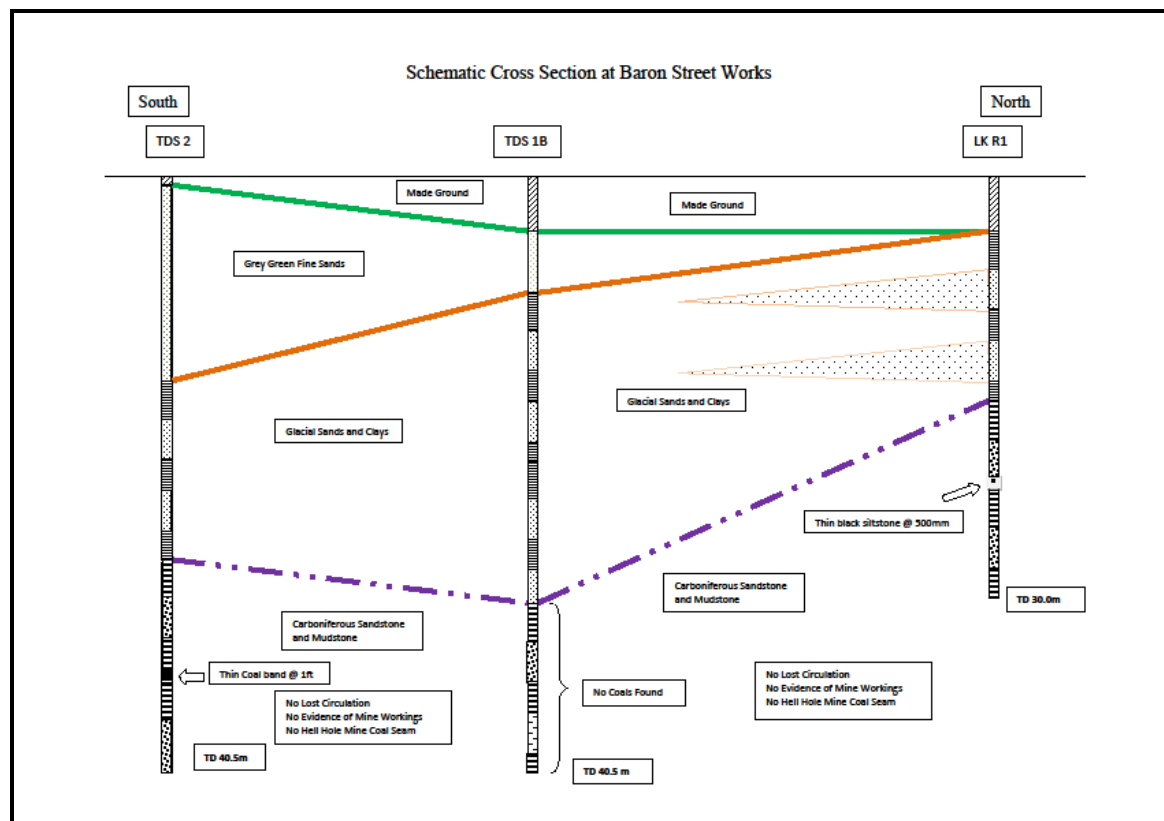
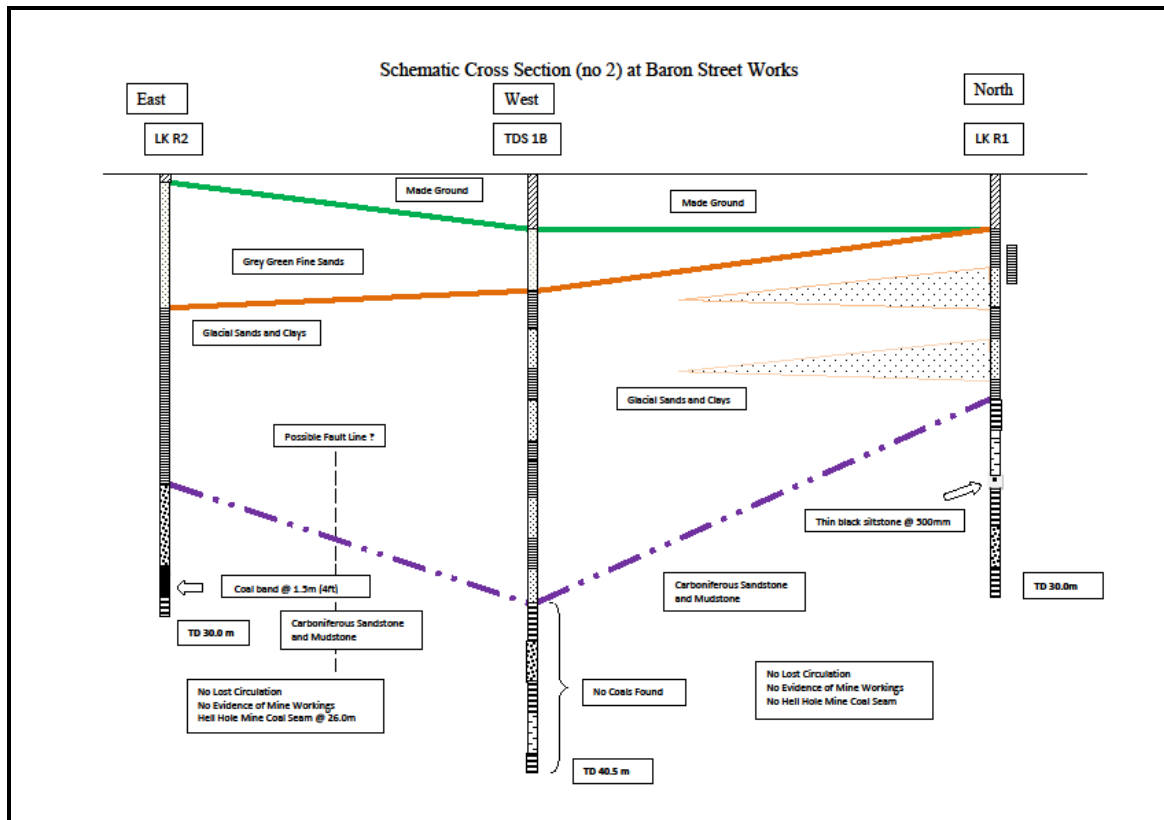
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07969 122 985

Atlantic Environmental Consultants		Client : East Lancashire Railway Co Ltd.		B/H No = TDS 2 Sheet No 2 of 2	
Ground Elevation : Drilled By : Taylor Drilling Services Drillers Name: Decklan Taylor Hard Drilling @		Project : Baron Street Sheds 2020 Drill No : Drilling Method : <u>Rotary</u> Percussion Sonic Mud Type : Bentonite <u>Water</u> Mix Air Foam Drill Bit changes @ None Lost Circulation @ None Bore Hole Dia = 65mm		Logged by : S McDonald Date & Time Start : 310320 @08:30 Date & Time Finish: 310320 @13:00 T.D. = 40.5 M	
X Co-ord					
Y Co-ord					
Stratigraphy	Lithology Description	Graphic Log	Depth	Water Level	Casing
Glacial Sands	Glacial Sands		24		
Carboniferous Sandstones Mudstones	Drill mud turned dark red Dark Red Mudstone		25		
	60% pink sandstone, 40% grey/dark grey shales		26		
			27		
			28		
			29		
			30		
			31		
	Thin Soft Coal Band < 12"		32		
	20% Coal Frags 80% pink sandstone No Sample Analysed	Sample missed	33		
			34		
	70% Soft grey mudstone 30% Pink Sdstsn Green shale with coal frags & red marl		35		
			36		
	Soft Grey and dark grey mudstones		37		
			38		
			39		
	90% soft grey mudstone 10% pink sdstsn		40		T.D 40.5 M
	T.D. = 40.5 metres		41		
			42		
			43		
			44		
			45		
			46		

Borehole Location Map



Schematic Cross Sections of Deeper Boreholes on Baron Street Site



DANBAR
Drilling Services Ltd.

[illegible]