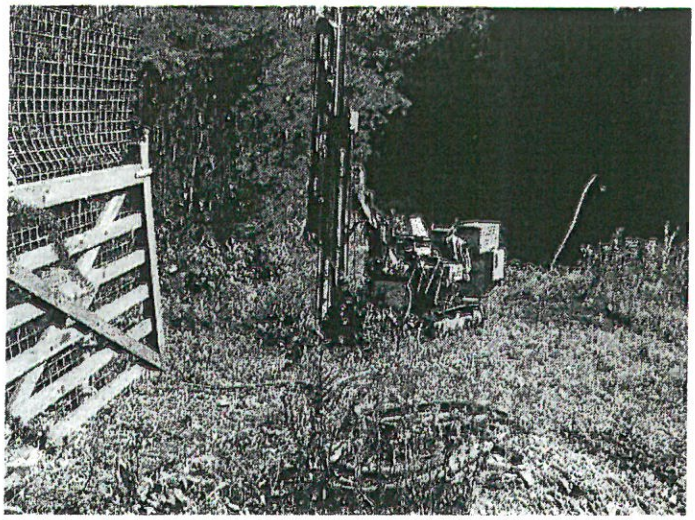


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Mining Investigation Report

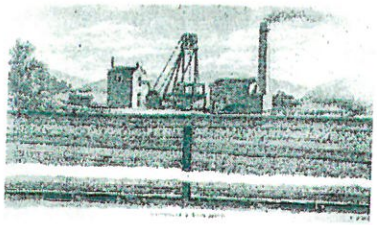


Pendil, Llangollen Road, Acrefair

0209
19 September 2002

C M Edwards
Pendil
Llangollen Road
Acrefair
LL14 3RS
3 0209 19 September 2002

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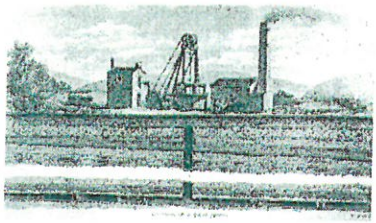
contents

5 site description and results of remedial work
6 borehole plan
7 results of remedial work
8 method statement

extract

This report meets NHBC D6 requirements and supplements a previous D5 detailed investigation report
The site is undermined by old workings which have now been stabilised
There is some contamination

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Site
A plot for a dwelling adjacent to Pendil, Llangollen Road, Acrefair

Stabilisation and site work by
Neil Catlow B.Sc F.G.S Engineering geologist.

Remedial work

Previous detailed investigation
Investigated by myself in August 2002, when shallow mineworkings were proved in the Yard Coal at a depth of 9.2m. There is 1.0m of colliery derived fill on the site, and the foundation soils are firm sandy clays. There were no gas emissions.

Current remedial work
A total of 8 holes were drilled into the Yard Coal workings, and subsequently grouted.
See results of remedial work.

Foundation design
A raft designed to span 3.0m will be required.

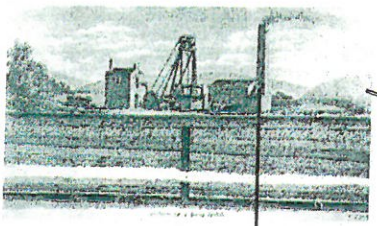
Contamination testing
The results of the contamination testing carried out at the time of the initial investigation are appended.
Levels of arsenic, polyaromatic hydrocarbons, and sulphate exceed the domestic theshold but are below domestic action levels. Whilst the arsenic and PAH levels are typical for coalfield sites, sulphate is particularly high and may indicate a previous industrial use. I recommend clean imported topsoil 500mm thick is used in the gardens to prevent uptake of contaminants by vegetation and to protect children playing in the garden areas.

For Nkc Geotech Ltd

Neil Catlow, B.Sc, F.G.S

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Borehole plan

Scale 1:200

Disused railway

Bh B

Bh 4

Bh 7

Bh 1

Bh 3

Bh 6

Pendil

Bh 8

Bh 2

Bh 5

N

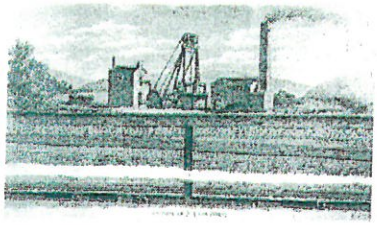
Brookmount Terrace

Bh A

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Llangollen Road

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Results of remedial work

hole	seam depth*	hole depth	grout take	status code	comments
Bh 1	8.3	15.0	0.0	sd	
Bh 2	7.7	15.0	1.6	cn	
Bh 3	9.2	30.0	1.6	cd	
Bh 4	9.0	15.0	4.0	vd	
Bh 5	7.4	15.0	2.1	cn	
Bh 6	8.9	15.0	1.6	cd	
Bh 7	8.2	15.0	0.0	sd	
Bh 8	9.5	15.0	2.0	cd	

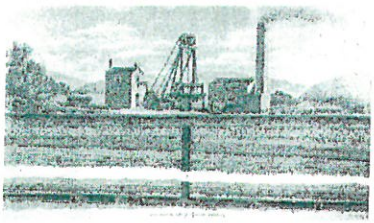
Grout mix 4:1 rockdust/PFA/cement and measured in dry tonnes
Injection pressure <150kN/m2
All work carried out by Neil Catlow B.Sc, F.G.S

Total grout take dry tonnes 12.9

* or depth to mineworkings or migrating cavity

Status codes **sd** solid **cd** collapsed **cn** cavitation **vd** void

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Method statement for remedial works

Stabilisation of mineworkings by grouting

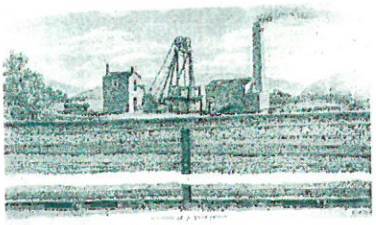
This work follows an initial investigation of a site which has shown that a coal seam of ecomonic importance is present at shallow depth and has been mined. There are therefore geotechnical hazards present.

Shallow mineworkings are stabilised by drilling a grid of holes 65mm or 75mm diameter down through the coal seam on an initial 6.0m grid pattern over the bearing area of the proposed building, reducing to 3.0m spacing when open workings are encountered. The workings are grouted using 4:1:1 sand/PFA/cement ready-mixed grout injected by casing to the bottom of the hole, and pressurised to 150 - 200kN/m2 when filled.

I carry out all this site work personally, and keep full records of each hole.

The report is submitted on completion is required for NHBC Validation D7.

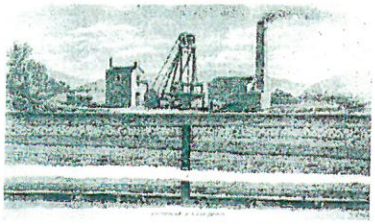
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Contamination tested to ICRCL 59/83
samples are taken by flight auger from 0.5m depth

	Bh A	%	domestic threshold mg/kg	%	domestic action level mg/kg	%	open space threshold mg/kg
Group A toxic							
Arsenic	31.0	310%	10	n/a	n/a	77%	40
Cadmium	<1.0	<33%	3	n/a	n/a	7%	15
Chromium Hex	<1.0	<4%	25	n/a	n/a		n/a
Chromium total	19.0	3%	600	n/a	n/a	2%	1000
Lead	42.0	8%	500	n/a	n/a	2%	2000
Mercury	<1.0	<100%	1	n/a	n/a	5%	20
Selenium	<1.0	<33%	3	n/a	n/a	17%	6
Group B phytotoxic							
Boron	<1.0	<33%	3	n/a	n/a	n/a	n/a
Copper	19.0	15%	130	n/a	n/a	n/a	n/a
Nickel	26.0	37%	70	n/a	n/a	n/a	n/a
Zinc	59.0	20%	300	n/a	n/a	n/a	n/a
PAH	297.0	594%	50	59%	500	30%	1000
Phenols	<0.1	<2%	5	0%	200	2%	5
Cyanides free	<2.5	<10%	25	0%	500	2%	100
complex	<2.5	<1%	250	0%	1000	1%	250
Thiocyanate	1.0	2%	50	n/a	none	2%	50
Sulphate	5100.0	255%	2000	51%	10000	255%	2000
Sulphide	26.0	10%	250	3%	1000	10%	250
Sulphur	0.2	0%	5000	0%	20000	0%	5000
Acidity	7.5				3		

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Contamination tested to ICRCL 59/83
samples are taken by flight auger from 0.5m depth

	Bh B	%	domestic threshold mg/kg	%	domestic action level mg/kg	%	open space threshold mg/kg
Group A toxic							
Arsenic	33.0	330%	10	n/a	n/a	82%	40
Cadmium	<1.0	<33%	3	n/a	n/a	7%	15
Chromium Hex	<0.1	<0%	25	n/a	n/a		n/a
Chromium total	20.0	3%	600	n/a	n/a	2%	1000
Lead	83.0	17%	500	n/a	n/a	4%	2000
Mercury	<1.0	<100%	1	n/a	n/a	5%	20
Selenium	<1.0	<33%	3	n/a	n/a	17%	6
Group B phytotoxic							
Boron	<1.0	<33%	3	n/a	n/a	n/a	n/a
Copper	22.0	17%	130	n/a	n/a	n/a	n/a
Nickel	27.0	39%	70	n/a	n/a	n/a	n/a
Zinc	99.0	33%	300	n/a	n/a	n/a	n/a
PAH	337.0	674%	50	67%	500	34%	1000
Phenols	<0.1	<2%	5	0%	200	2%	5
Cyanides free	<2.5	<10%	25	0%	500	2%	100
complex	<2.5	<1%	250	0%	1000	1%	250
Thiocyanate	<1.0	<2%	50	n/a	none	2%	50
Sulphate	2600.0	130%	2000	26%	10000	130%	2000
Sulphide	137.0	55%	250	14%	1000	55%	250
Sulphur	0.2	0%	5000	0%	20000	0%	5000
Acidity	7.8				3		

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