

Our ref: 8217mts

Outline Design and Specification

for

Treatment of Coal Workings

Beneath

Land at

Gladstone Way,

Hawarden

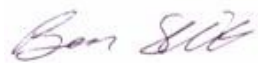
For: Castle Green Homes Ltd
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Date of Report: 19 October 2023

Outline Design and Specification for Treatment of Coal Workings beneath
Land at Gladstone Way, Hawarden

Document Verification

Project Title	Land off Gladstone Way, Hawarden.
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Document Revision

Report Reference	Date	Description	Prepared	Checked & Approved
8217mts	19 October 2023	Outline Design and Specification for Treatment of Coal Workings	B W Hill	P.R. Sykes

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Report Conditions

This report is an outline design and specification for the treatment of coal workings underlying the proposed residential development on Land off Gladstone Way, Hawarden. This report was prepared on instructions received from our client, Castle Green Homes Ltd, Unit 20, St Asaph Business Park, St Asaph, Denbighshire, LL17 0LJ.

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The accuracy of map extracts cannot be guaranteed, and it should be recognised that different conditions on/adjacent the site may have existed between and subsequent to the various map surveys. Historical map extracts are produced within the report from maps held in-house. Coopers can reproduce and use these extracts in this report under their Ordnance Survey Licence No. AL100005579.

Where data supplied by others, including that from previous investigations has been used, it has been assumed that the information is correct. No responsibility can be accepted by Coopers for inaccuracies within the data supplied by others. We would advise that our clients make their own detailed enquiries to the Local Authorities to determine any additional planning constraints which may be applied to this site, and which have not been identified within this report.

The results of the trial pit and borehole explorations are based upon the facts established from observations and field tests. It should be recognised that strata may vary considerably from point to point and the groundwater regime may be influenced by seasonal or other factors. While every attempt is made to assess the likelihood and extent of such variations, conditions may nevertheless exist which are undisclosed by this investigation.

This document forms a specification document rather than a tender and specification. All contractual agreements shall be decided between Castle Green Homes Ltd, hereafter referred to as Castle Green Homes Ltd, and their appointed contractor.

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1.0 Introduction

The site is proposed for development by Castle Green Homes Ltd, comprising of a residential development of 300 dwellings, together with vehicular / pedestrian access, open space, landscaping, and other related infrastructure. The dwellings comprise traditional residential housing, comprising of a combination of detached, semi-detached and 3-4 block mews buildings. The houses are assumed to be 2 storeys in height. The proposed development layout is shown on Castle Green Homes Ltd Proposed Site Plan, ref. ASHLN-MANC-SP01, rev. B. An extract of the planning layout is overlain on Coopers Drawing No. 8217/DG, within Appendix 2.

The site of the proposed residential development lies within an area of potential shallow coal mine workings. The presence of shallow coal mining may compromise future ground stability across the site and prior to the development of the site they should be thoroughly investigated and where necessary stabilised.

Previous assessments and investigation works were undertaken in the following reports:

- NKC Geotech Ltd "*Mining Investigation Report*", referenced 2306/1, dated 19 September 2023.
- E3P "*Performance Specification for consolidation of abandoned mine workings*", referenced 13-673-R3, dated May 2021.
- E3P "*Ph 1&2 Geo-environmental Site Assessment*", referenced 13-673-R2-1, dated April 2021.
- E3P "*Desktop Coal Mining Risk Assessment*", referenced 13-673-L1, dated September 2019.

The above referenced NKC Geotech Ltd report was undertaken on behalf of Castle Green Homes Ltd to further refine the assessments of mining risks and is considered to be the defined mining investigation report. This superseded previous reports by E3P, undertaken on behalf of the vendor, of which Castle Green Homes Ltd have full benefit..

2.0 Liaison With Third Parties

The following information and discussions have been held to date with the Coal Authority comprise:

- The Coal Authority Consultants Coal Mining Report, 51002173545001, dated 3 September 2023.
- The Coal Authority Mine Abandonment Plan, Sheet Reference 1072.
- The Coal Authority Mine Abandonment Plan, Sheet Reference 1963.
- The Coal Authority Mine Abandonment Plan, Sheet Reference 11437.
- The Coal Authority Mine Abandonment Plan, Sheet Reference 13434.
- The Coal Authority Permit to Enter or Disturb Coal Authority Interests, Permit No. 21011v2.

A permit for the proposed treatment of the mine workings would be required in the form of a further Permit to Enter or Disturb Coal Authority Interests.

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3.0 Summary of Geological Conditions, Mining Risks and Treatment Proposals

The desk study, ground investigation, and coal mining risk assessment was provided within the following report:

- NKC Geotech Ltd “*Mining Investigation Report*”, referenced 2306/1, dated 19 September 2023.

The above report should be reviewed for detailed information on the geology and coal mining risks. The subsequent sections provide a brief summary of this information.

Geology and Ground Conditions

The NKC Geotech Ltd report provided a detailed background to the geology of the Hawarden Coalfield, describing the carboniferous strata as primarily shales and sandstones, which are heavily faulted and dipping at a general rate of 1 in 6 (9.5°) to the north east. The following sequence of coal seams are described to be present at shallow depths beneath the site (specific to this coalfield):

- **Brassey Coal** 1.2m thick.
12m to:
- **Rough Coal** 1.0m thick
6m to:
- **Crank Coal** 0.5m thick
12m to:
- **Main Coal** 3.0m thick
24m to:
- **King Coal** 1.2m thick

Ground investigations identified reworked topsoil, primarily overlying glacial sands and clays on to rockhead at 6m to 15m depth (shallower in the north). The mining investigation report identified 3 No. faults within the site, 2 No. running east/west, downthrown towards the centre of the site (graben structure) and a fault running north/south. The downthrows on the faults are referenced as between 6m to 17m.

Summary of Mining Risk Assessment

The Coal Authority mining report references the recorded working of the Main Coal seam within 2 different fault blocks beneath the site, recording the thickness of the seam as 3m, depth 0m and 23m, and dipping to the east at 11.3°. The Coal Authority report records 5 No. mine shafts in the northern fault block within the site, and 1 No. mine shaft in the southern fault block. The Coal Authority mine abandonment plans are recorded for workings within the northern fault block, including mine shafts.

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The investigation and interpretation by NKC Geotech Ltd references that 3 No. filled mine shafts are on the site, 2 No. in the northern fault block and 1 No. in the southern fault block. The other recorded mine shafts were misidentified boreholes on the first edition geological map (which used similar symbols for shafts and boreholes) and brought through as mine shafts on subsequent map editions.

The NKC Report recommended the following in relation to the mine shafts & treatment works:

- Shaft 331366-050: *As rockhead cannot be reached by excavation the shaft filling needs to be grouted. A Zone of Influence with a radius of 12m from the shaft centre must be established and no construction allowed within this zone.*
- Shafts 331366-014 & -017: *are Mancot Colliery shafts abandoned in 1884 and located by excavation in 2019 by E3P.*
- Shafts 331366-019 & -020: *The area within 20m of the original mine plan locations for both Shafts 019 and 020 should be examined during site strip to verify neither shaft is present and perhaps uncover evidence of boring. If the site strip confirms the absence of the two shafts then there will be no Coal Authority Zone of Influence on the site layout.*

The interpretation of shallow mine workings by NKC Geotech Ltd identified no evidence of extensive working of the coal seams, other than in the northern part of the site, where drift was relatively shallow, worked by Mancot Colliery from 1879 to 1884. The remainder of the site was referenced as having adverse ground conditions for early mining, due to thick drift deposits, running sands, and coal seam elevations close to sea level, preventing natural drainage. The report however concluded that it is inevitable that attempts to mine the coal seams in pre-industrial revolution times would have been made despite the adverse ground conditions. The proposals for mine treatment works by NKC Geotech Ltd were as follows:

The remediation of shallow workings could be commenced by drilling a wide grid over the development area to identify areas where workings have taken place and the grout hole grid reduced in spacing in those areas. Any workings will be waterlogged.

Following consultation on the proposals, NKC Geotech Ltd confirmed that the wider spacing proposed would typically be acceptable at 1 No. location per detached/semi-detached building, and 2 No. locations per 3 or 4 block mews, subject to agreement with The Coal Authority.

Summary of Treatment Proposals – Mine Shafts

Guidance on the treatment of mine entries is provided within Chapter 14 of CIRIA C758 “*Abandoned Mine Workings Manual*” which details the treatment proposals should consider the following site specific items:

- Required permanence of treatment.
- Proposed development and ground level changes in and near to the mine shaft.
- Any requirements for future access and control works for water/gas pathways.
- Other mine entries connecting to the workings and the potential for displacement of mine gas or water.
- Type of proposed land use.

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- Commercial appraisals (although all treatment should be suitably designed and constructed).
- Coal Authorities requirements in respect of permitting and planning conditions.
- Any conservation, ecological or archaeological considerations.
- Requirement of other regulatory bodies and insurers (local authority and NHBC).

The recorded mine shafts have been accounted for within the development proposals, with proposed communal landscaping and open space within the areas of the recorded mine shafts, summarised as below:

- Shaft 331366-014: Located approximately 130m from closest proposed building.
- Shaft 331366-017: Located approximately 75m from closest proposed building.
- Shaft 331366-050: Located approximately 55m from closest proposed building.

The proposed ground levels are understood to be comparable with current ground levels. The primary risks with historical filling of mine shafts are associated with the potential for blockages of the shaft resulting in voids which can subsequently collapse to surface resulting in associated hazards to persons and limiting the suitability to be used as intended open space. The change of use from agricultural to communal open land would introduce the potential for members of the public to be within the area of the mine shafts, and therefore a risk if the shaft infill collapsed.

Conventional capping of the mine shafts on bedrock is not considered viable due to the depth of drift, and shallow perched groundwater/running sand. The mine shafts are considered to be relatively shallow, conjectured to be circa 30m to the Main Seam. The primary risks can therefore be mitigated by multiple full depth grouting of the shafts. If full depth grouting of the shafts cannot be achieved, the upper sections would be proof drilled and grouted and piled cap constructed.

There is a risk of potential unrecorded mine shafts being identified following stripping of topsoil on the site. These may require changing the development layout to ensure plots are located outside of the zone of influence, defined as a radius based upon the depth of drift and diameter of the mine shaft. Any unrecorded mine shafts would require full depth grouting, and depending on location may also require a designed piled mine shaft cap constructed to twice the diameter of the shaft.

Summary of Treatment Proposals – Shallow Mine Workings

The proposals for mine treatment are to undertake a program of drill and grout works as generally defined within Chapter 13.5 of CIRIA C758 “*Abandoned Mine Workings Manual*.” The treatment proposals vary by development layout and zoning of the mining risk, inferred from the investigation and mining records, recorded on drawings enclosed to this report.

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The investigation has identified areas of potential mining risk, with proposed investigation and treatment by risk area, and development proposals, as follows:

- Areas of recorded shallow mine workings on mine abandonment plan (Plots 33-49, 92-94, 189-209) = Drill and grouting on 6m primary grid to define potential workings beneath proposed buildings, 10m linear length on proposed adopted roads.
- Remaining plots/roads = Drill and grouting for investigation locations, 1 No. position per building for detached/semi-detached plots or 2 per building for 3 or 4 block mews, 20m linear length of roads.
- Open space areas = no proposed treatment (excluding mine shafts).

Proposals for investigation in areas outside of the defined zone of potential shallow coal mining are included with these works for purposes of confirmation. Should boreholes for the purposes of investigation identify the presence of shallow coal, mine workings or other associated mining risks these would be reported and treatment on a 6m grid undertaken for treatment of mine workings.

Areas of mine workings where higher grout takes are identified in primary locations would require secondary boreholes drilled on a 6m offset grid in the locations surrounding, higher grout takes in secondary locations then require tertiary holes, with typical alignment shown in Figure 1, below.

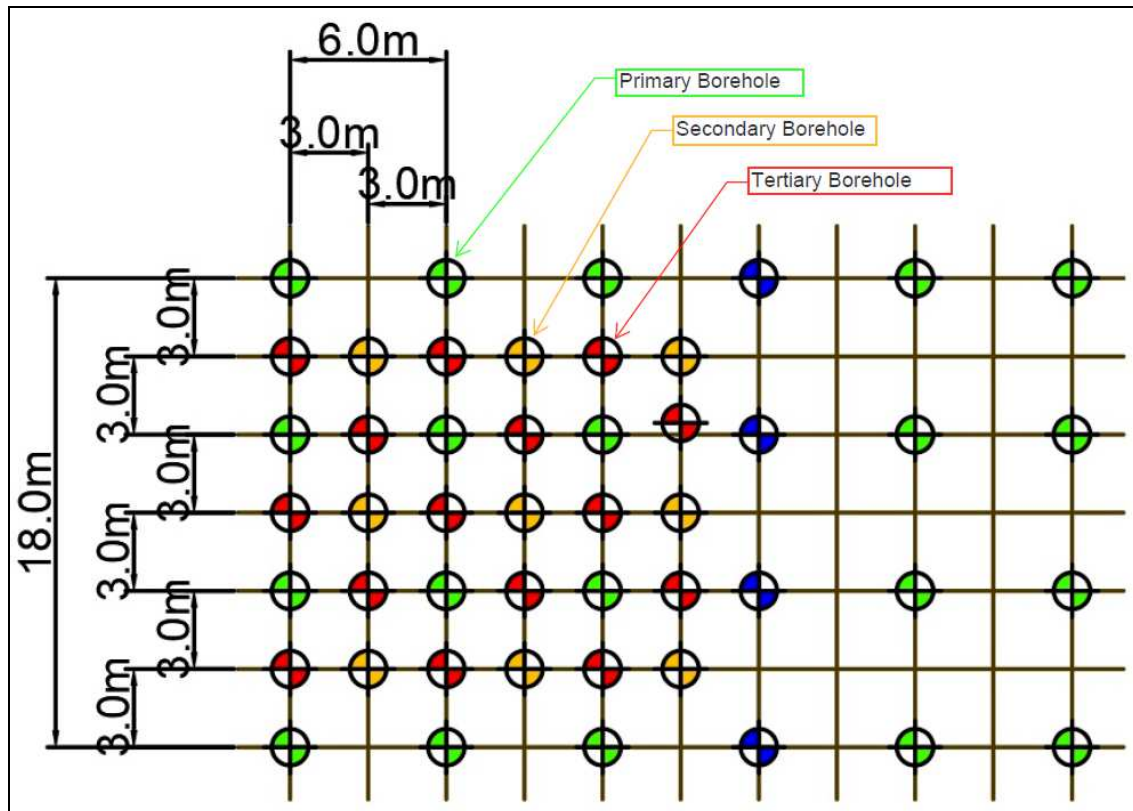


Figure 1: Borehole array grid showing primary locations on a 6m grid (green), potential secondary holes on 6m offset (orange) and tertiary locations (3m grid).

4.0 Conditions of Tender

Conditions of Contract

The contract will be directly between the designated contractor and the developer, Castle Green Homes Ltd, and are beyond the scope of this report.

The Contractor shall be deemed to have visited and examined the site and its surroundings and to have satisfied themselves, prior to the submission of their tender, as to the nature of the ground (so far as is practicable from visual inspection, and taking into account any relevant information which may have been provided in the tender documents), the form and nature of the site and its relationship to existing buildings outside the site boundaries. They shall also have assessed the extent and nature of the labour, water supply, and materials necessary for completion of the works, the means of access to the site, the facilities which they may require, and generally to have considered all necessary information (subject to the above mentioned) as to risks, contingencies and all other circumstances influencing or affecting this tender.

Should the contractor require further supply of water or other materials from the developer then this will be specified in the quote for the proposed works.

The contractor shall be responsible for supply of all resources, materials, plant and equipment to undertake the works, unless specifically agreed with the developer. The works will be fully recorded and documented by the contractors, under the supervision of an engineer appointed by the contractor. The engineer will be required to ensure adequate setting out, surveys, and records are provided, notify the developer of any adverse ground conditions which impacts on the ability to successfully complete the mine treatment works, and variations to the anticipated ground conditions and associated treatment.

The contractor will permit the developer and their representatives to be in attendance to independently witness the work and supply regular updates of the findings during the works. The contractors will be supplying a factual report to confirm the treatment was successful for interpretation by Coopers in relation to the requirements for development, accounting for the mine treatment.

The contractor will notify the developer of any third-party or sub-contractor which they intend to appoint and obtain prior approval for these parties' attendance, in advance of the works.

Developer Conditions

Castle Green Homes Ltd will secure all rights with the landowners to undertake the works, access to the site, and ensure that permits and notifications for the works are in place prior to commencement.

Castle Green Homes Ltd will issue a pre-tender health and safety file detailing all site-specific risks and conditions.

Castle Green Homes Ltd will notify the contractors of all limitations, restrictions or other site-specific requirements/conditions relating to the proposed works.

5.0 Outline Design of Investigation and Grout Injection Boreholes

Objectives of Mine Treatment Works

The proposed treatment of potential shallow mine workings will be specific to the areas of defined risk in relation to the development layout to mitigate potential surface subsidence associated with potential former shallow mining and mine entries. The works will be undertaken in a cautious approach to ensure safe future development, safety of persons on and adjacent to the site, with all works undertaken with due consideration of context of the site and its surroundings.

Shallow Mining Risks – Defined Depths of Proof Drilling/Treatment

CIRIA C758 (2019) “*Abandoned Mine Workings Manual*”, provides comments on the methods of predicting mining subsidence. The primary mechanism for subsidence of shallow mine workings is from roof collapse from pillar and stall mining, although other modes of failure can occur (floor heave and pillar failure).

Floor heave occurs where the underlying stratum beneath the workings are weak (examples are seatearth and underclay) which are softened by water ingress following completion of the mining, resulting in bearing capacity failure of the base of the pillars or heave into the overlying roof of the mining. For long abandoned pillar and stall mining the primary risks of floor heave occur with significant fluctuations in groundwater levels or strong flow rates within the coal mines. There was no evidence of soft strata underlying the coal units or variable groundwaters and therefore floor heave is not considered a significant risk for the site.

Pillar failure occurs where overburden pressures provides increased compressive stresses on the pillars causing collapse. The pillar collapse can vary across worked areas, with stresses being less on the periphery of the workings and greater in the center. In areas of pillar collapse these will result in increased compressive stress onto adjacent pillars and associated progressive collapse (domino effect) resulting in bowl shaped collapses across the region. Where pillar collapse occurs the extent of subsidence is widescale over the extent of the mining area, rather than traditional crown holes where proportional assessments of seam thickness to overburden are used.

Pillar collapse of coal measures is referenced as rarely occurring at depths of <30m, although expected to have occurred relatively quickly on workings deeper than 50-60m where pillars of coal are present (relative weak compressive strength and high compressive stress). Many of the cases of pillar collapse being significant long after mining were associated with limestone mining. Widescale subsidence is not evident in the region and given the age since shallow mining occurred within the region, there is a low likely potential for pillar collapse to be considered a significant risk to the proposed development.

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CIRIA C758 (2019) details the traditional method for prediction of void migration from roof collapse of shallow mine workings from the examination of the proportion of seam thickness to overlying rock cover. Other than in exceptional circumstances the 10 times seam thickness (termed 10T criterion) has been used by the industry for over 30 years to provide reasonable assurance against surface subsidence from roof collapse of pillar and stall mining. This is referenced as in many cases being overly conservative but can be insufficient in given situations, listed in Table 1 below. The situations where 10t rule can be reduced are provided in Table 2.

Table 1: Factors where increased cover ratios should be considered in relation to crown hole collapses based upon CIRIA C758

Ground Factor	Item	Risk/Hazard
Strata Dip	>20°	<ul style="list-style-type: none"> • Collapse materials to migrate down dip, preventing choke-out and upward migration of voids. • Potential for pillars to become stressed and collapse (pillar failure).
Groundwater	Change in flow or levels	<ul style="list-style-type: none"> • Strong ground/mine waters flow causing erosion or degradation of floors, pillars or roofs and washout of materials preventing choke-out and upward void migration. • Groundwaters rising into collapsed workings inducing subsequent movements. • Groundwater levels falling in mine workings increasing effective stress on pillars.
Extraction Ratio	Residual voids	<ul style="list-style-type: none"> • Where proportion of material removed is high relative to the pillars supporting the roof of the workings, resulting in variations to the collapse potential and failure mechanisms.
Multiple Seam Extractions	Interaction of workings	<ul style="list-style-type: none"> • Where uppermost seam has >10 times cover the influence of lower seams needs to be considered, either increasing the 10t rule to upper seam or contributory effective of collapse of lower workings to the upper workings.
Engineering Factor	Item	Risk/Hazard
Site Investigation Information	Uncertainty	<ul style="list-style-type: none"> • Where insufficient information is present to define rockhead profiles, geological structures, extent and thickness of mining.
Project Sensitivity	Exacting serviceability limits	<ul style="list-style-type: none"> • Situations where proposed development is considered by designers or regulators to have an increasing cover due to the sensitivity of the covers.

Table 2: Factors where decreased cover ratios should be considered in relation to crown hole collapses based upon CIRIA C758

Ground Factor	Item	Assessments
Roof Strata	Thickly bedded, massive, rigid strata.	<ul style="list-style-type: none"> • Detailed knowledge of rock units including weathering, jointing/fractures and discontinuities – often requires inclined holes to assess fractures normal to the plane of the roof strata. • Assessments that a low extraction ration has avoided roof collapse (requires detailed information on the location of the pillars, worked areas, and weathering condition of pillars) • Combination of multiple thickly bedded competent horizons.
Low Residual Voidage	Infilling or collapse of mine workings already occurred.	<ul style="list-style-type: none"> • Requires almost complete filling of the voids previously (either from collapse or previous treatment/grouting). Need to consider roadways may remain open, requires detailed investigations, include hydrogeological conditions, permeability testing and potential for trial grouting to prove.
Engineering Factor	Item	Assessments
Tolerable ground Movements	Surface movements can be reasonably assessed and justified as acceptable	<ul style="list-style-type: none"> • Consideration in the context of development, for example open spaces, roads and buildings would have different levels of tolerable surface movements.
Foundation Design	Span/cantilevered foundations designed to mitigate small areas of subsidence from void propagation.	<ul style="list-style-type: none"> • Requires as assessment of the potential crown hole dimensions based upon room dimensions in pillar and stall mines in conjunction with the condition of the solid and drift overburden.

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Based upon a review of the ground model it is generally assumed that a 10T rule can be applied to the primary recorded worked seam, the Main Seam (3m thick), resulting in treatment depths of 30m below rockhead, circa 40m below current ground level. The holes depths for investigation and treatment can be adapted to follow the Main Seam, to a minimum of 2m below the seam or workings.

As detailed in Section 3, there are 4 No. other workable coal seams in close vertical distances to the Main Seam, between 0.5m to 1.2m thick, spaced at 6m to 24m vertical distance. If the other seams are found to have been worked then the combined seam thickness and combined rock cover would be considered for treatment of multiple seams to a maximum depth of 50m (generally considered to be cautious maximum depth of early mining, given the presence of groundwater and the site being close to sea level and the Dee Estuary. Where treatment of multiple seams is required this should commence with the lowest seam first as outlined in CIRIA C758 (Section 13.5.5).

Hole Spacing and Grout Takes

The proposed proof drilling and pressure grouting in the area of recorded mine workings will be undertaken on a 6m primary grid in the area of recorded mine workings, drilled to the Main Seam or workings +2m, up to 30m below rockhead (unless multiple seams are found to have been worked where depths up to 50m below ground level). The extent of the drill and grout grid will be set out by the client's surveyor, but the Contractor shall be responsible for the setting out of the grout hole positions within the grid to ensure complete stabilisation of the mine workings beneath the proposed buildings and roads. Where higher grout takes are identified then a secondary grid of 6m offset drilling (effectively 4.24m grid), and if required tertiary 3m grid. Drilling also proposed along adopted highways on a 10m or 20m linear spacing (dependent on zones of recorded working).

The areas outside of the recorded shallow mine workings may have still been mined. There is a recorded mine shaft within one of the fault blocks which would have targeted the Main Seam, and the mining report references that it is inevitable that historical attempts to mine the other parts of the site would have been made, irrespective of the adverse conditions (depth of drift, running sand, groundwater relative to sea level, lack of effective means to drain mines prior to industrialisation). Initial hole spacing is proposed for 1 No. position per building for detached/semi-detached plots, and 2 No. positions per building for 3 or 4 block mews buildings.

The justification of the maximum volumes of grout, and determination of volumes for secondary and tertiary drilling volumes drilling are proposed as below, but subject to review by the contractor during the works to account for identified natural variations in the amount of grout taken outside of the mine workings (for aspects such as fractures/fissures in the shallow rock).

Where positive pressurisation and grout outflow from the injection point occurs above 5 tonnes then secondary positions are required. Where secondary positions achieve above 1 tonne of grout then tertiary positions to be applied.

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Where the boreholes take a grout above 10 tonnes of grout without pressurisation or appearance of grout at the point of injection, the application of grout should cease, grout tube/pipe withdrawn and position left for 12 hours. Subsequent grouting would be applied up to 10 tonnes where works would cease for a further 12 hours, injection of grout repeated up to 8 tonnes, left for 12 hours, 4 tonnes, 12 hours, 4 tonnes to a maximum of 36 tonnes, at which point the developer should be contacted to determine alternative measures for treatment.

It is impossible to completely determine the percentages of investigation holes which would require primary holes drilled to continue over the affected building footprint, nor the percentages of secondary and tertiary holes. For appraisal and tender comparison only, the assumptions of the number of holes are provided in Table 3.

Table 3: Assumed No. of Drilling and Grouting Holes for Appraisal and Tender Comparison Only:

Plots	
Type of Treatment	No. of holes
Investigation holes	179
Primary holes (planned)	187
Additional primary holes (5% of investigation holes, 9 holes to building footprint)	90
Secondary holes (10% of all primary to need 4 No. secondary)	112
Tertiary holes (10% of secondary holes to need 4 No. tertiary)	48
Roads	
Type of Treatment	No. of holes
Primary holes (planned)	95
Secondary/tertiary holes (10% of all primary, 4 each)	40
TOTAL	751

Drilling Methods, Grout Mixes and Testing

Methods of drilling are to comprise water flush mediums to mitigate potential risks of mine gas displacement. The contractor will need to monitor during the borehole drilling and record concentrations of potential hazardous mine gases (carbon dioxide, methane, carbon monoxide). Should elevated concentrations be identified the works should safely halt and the developer notified to further assess measures needed to safely mitigate against mine gas displacement.

The diameter of the drilling will be determined by the contractor, with consideration of comments within Section 13.5.4 of CIRIA C758. The typical procedure for treatment of mine workings would be assumed to be as follows (from CIRIA C758):

- *A rotary percussive steel casing of circa 100mm diameter drilled and bedded to rockhead.*
- *A 70mm hole will be drilled to the required depth.*
- *A 50mm polyethylene tremie tube will be inserted to the base of the hole.*
- *Grouts will be injected to perimeter and infill holes at agreed volumes and pressures.*
- *The tremie will be withdrawn in stages as required. When the grout overflows at the surface the tremie will be fully withdrawn and the hole casing pressurised by attaching the grout hose directly to the casing with a fitting that incorporates a pressure gauge.*
- *On completion of filling any hole the steel casing will be withdrawn and each hole topped out.*

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Where intact coal is identified the positions will be pressure grouted to surface and volumes recorded. Grout pressures of 3psi per metre of hole are assumed, gravity grouting is not permitted. Grout pressures will be reviewed by the contractor to control grout delivery and depths, limiting the possibility of ground heave.

Grout materials to be determined by the contractor, assumed to comprise a cement and pulverised fuel ash (PFA or fly ash) mixture at an appropriate water/cement ratio. To achieve maximum permeation a high slump is required, assumed to consist of PFA:cement ratio of 10:1. Material storage and plant needs to be situated to allow continuous sequencing of the drilling operations accounting for pressure loss.

Flow meters are required at the grout pump position, and pressure gauges at the injection point for monitoring and recording purposes. Following site establishment trials, testing and calibration of equipment, meters and grouting should be completed to ensure appropriate treatment.

As detailed within CIRIA C758, Section 13.5.4, to ensure quality control it is recommended to undertake testing of fluid grout for density, bleed and flow properties. In addition cube strength testing is required at regular intervals. The scope and testing protocols can be site specific and accounting for previous test results, the daily grouting, number of rigs, and nature of the mine workings encountered.

The contractors method statements should be provided to clearly state the types and frequency of the proposed testing, and the methods of recording the findings from the testing. This should specify or justify reasons to omit the following (from CIRIA C758):

- *Sand/PFA moisture content to confirm mix design and added water.*
- *Grout flow meter tests.*
- *Bleed tests.*
- *Grout cubes, which will be stored, stripped, and cured in controlled conditions (compressive strength of grout to achieve 1 to 2 MN/m²).*

Records and Reports

The contractor's engineer will need to be undertaking continual assessment of the site conditions and supervision. All production and investigation boreholes need to be logged and assessments undertaken to revise the proposed treatment depths, and requirements for secondary and tertiary boreholes as increased knowledge of the ground conditions are established.

Accurate records are required and daily summaries reviewed as part of the contractors engineer's scope of works. The contractor's summaries should include as a minimum the following list of daily works completed (based upon CIRIA C758):

- *Date of works*
- *Site location*
- *Driller name*
- *Shift times*
- *Equipment used*
- *Casing type and depth.*
- *As built drawings with location of boreholes using alphabetical and numerical grid (based up Coopers drill and grout plan).*

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- *Angle of drilling and inclination (where directional drilling is undertaken).*
- *Quantity of grout injected.*
- *Any unusual or anomalous site or drilling/grouting conditions.*

Daily drilling records are expected to include the following information, unless specific reasons are provided in advance for the exclusion of such information (Based upon CIRIA C758):

- *Job title and site location.*
- *Borehole reference*
- *Date*
- *Name of lead driller*
- *Plant in use*
- *Crew members and hours worked.*
- *Method of boring/drilling, flushing medium and type of drill bit.*
- *Type and diameter of casing and casing depths.*
- *Diameter and depth of hole at the beginning and end of each working day.*
- *Loss of any flushing medium during drilling.*
- *Any underground services identified.*
- *Any evidence of settlement/heave.*
- *Daily cumulative lengths drilled.*
- *Depth to each major change of stratum*
- *Identification and description of each major strata.*
- *Depths at which groundwater was encountered.*
- *Depths of any samples taken.*
- *Depths of any voids,*
- *Gas concentrations recorded.*
- *Any evidence of gas or water emissions.*
- *Depth of completed hole.*

Grouting records should include the follow information (based upon CIRIA C758):

- *Details of type of injection and grout-line dimensions.*
- *Type of grout mix and quantities injected.*
- *Details of grout samples taken for testing.*
- *Grout pressures recorded and corresponding depths.*
- *Details of any abandoned casing.*
- *Details of any settlement or heave identified during grouting.*

The contractor's completion report should include all records from the drilling and testing, with factual statement to confirm successful treatment of any potential shallow mine workings as identified prior to and during the works.

Coopers will provide an interpretative report based upon the contractor's report to include specific engineering assessments of the proposed development and any specific design requirements to account for the findings of the factual report. This may include specific foundation designs and requirements for protective measures for potential pathways for release of hazardous ground gas from the treated mine workings.

Outline Design and Specification for Treatment of Coal Workings beneath
Land at Gladstone Way, Hawarden

Appendix 1

Reference Drawings

<u>Drawing No.</u>	<u>Revision</u>	<u>Title</u>
8217/01	D	Site Plan (No Services Shown)
8217/DG	-	Drill and Grout Plan
8217/L1	-	Site Location Plan

33166-050

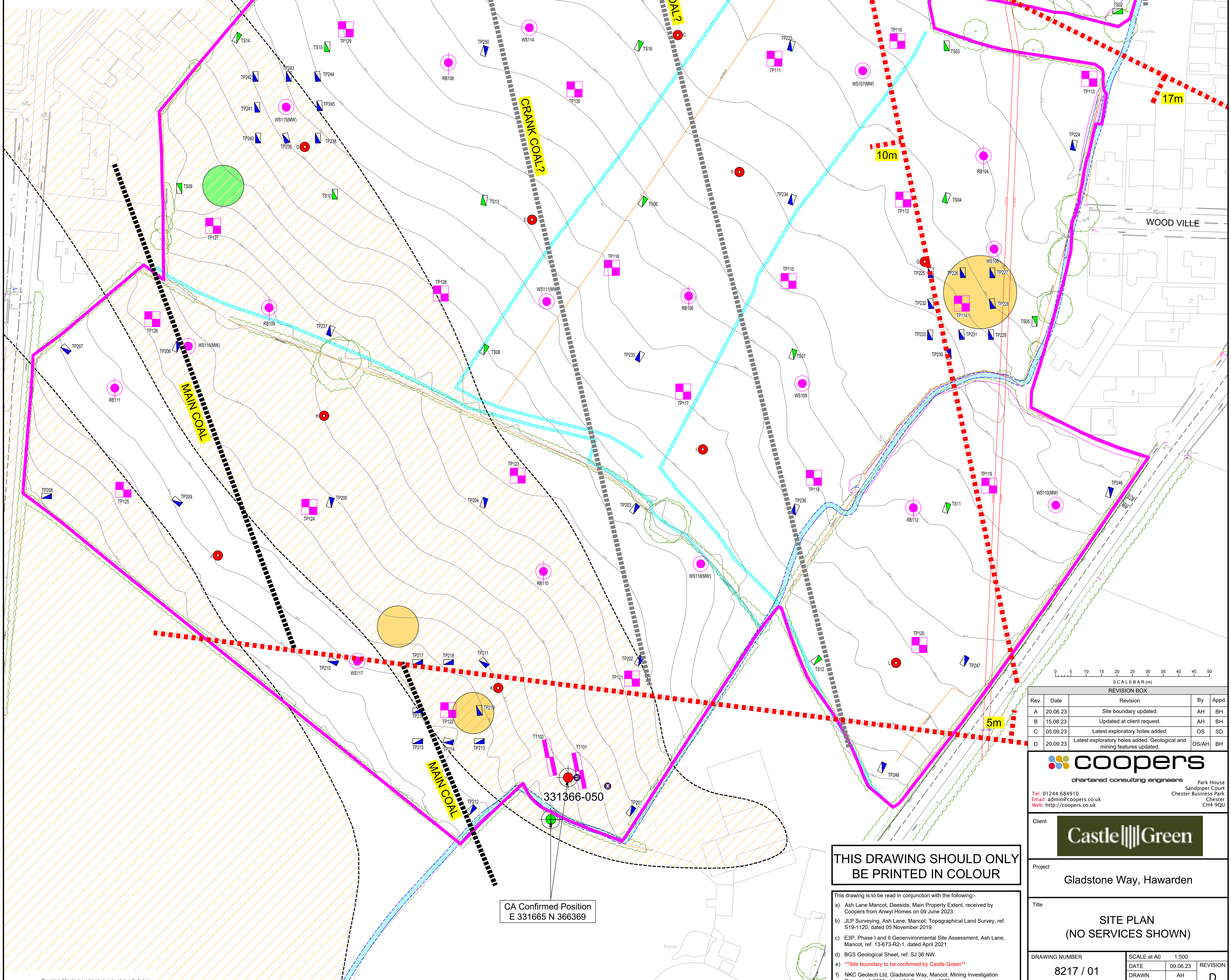
- KEY TO EXISTING FEATURES**
(All positions are approximate unless otherwise stated)
- Surveyed tree and canopy (taken from ref. b)
 - Surveyed hedge (taken from ref. b)
 - Surveyed overhead electric lines (taken from ref. b)
 - Surveyed overhead fence lines (taken from ref. b)
 - Surveyed top of bank (taken from ref. b)
 - Surveyed bottom of bank (taken from ref. b)
 - Topographical contours (taken from ref. b)
 - Site boundary (taken from ref. e)

- KEY TO EXPLORATORY HOLES**
(All positions are approximate unless otherwise stated)
- Trial pits TP201 - TP264 excavated by Coopers between 23 & 25 August 2023.
 - Topsoil samples TS01 - TS23 excavated by Coopers between 23 & 25 August 2023.
 - Rotary boreholes A - L drilled by RTD between 21 August & 09 September 2023 (taken from ref. f)
 - Probes M, N, P & Q drilled by NKC Geotech Ltd between 15 & 29 August 2023 (taken from ref. f)
 - Approximate ESP trial trench location: TT1 - TT18 between 30 November - 03 December 2020 (taken from ref. c)
 - Approximate ESP trial pit location: TP101 - TP124 between 30 November - 01 December 2020 (taken from ref. c)
 - Approximate ESP rotary borehole location: RB101 - RB112 between 30 November - 04 December 2020 (taken from ref. c)
 - Approximate ESP window sample borehole location: WS101 - WS118 between 30 November - 02 December 2020 (taken from ref. c)

- KEY TO FORMER FEATURES**
(All positions are approximate unless otherwise stated)
- Former hedgeline (taken from ref. c)
 - Former watercourse (taken from ref. c)

- KEY TO GEOLOGICAL FEATURES**
(All positions are approximate unless otherwise stated)
- Coal seam (taken from ref. f)
 - Inferred coal seam (taken from ref. f)
 - Fault line with downthrow (taken from ref. f)
 - Fluvioglacial sand & gravel (taken from ref. d)
 - Madeground (taken from ref. d)

- KEY TO MINING FEATURES**
(All positions are approximate unless otherwise stated)
- Mineshaft located by ESP investigations as presented on ESP drawing (DOES NOT MATCH COORDINATES STATED ON ESP DRAWING) (taken from ref. c)
 - Mineshaft located by ESP investigations moved to coordinates stated on ESP drawing (DOES NOT MATCH POSITION SHOWN ON ESP DRAWING) (taken from ref. c)
 - Surface depression visible (2023) (taken from ref. f)
 - Colliery spoil visible (2023) (taken from ref. f)



0 5 10 15 20 25 30 35 40 45 50
SCALE BAR (m)

Rev	Date	Revision	By	Appd.
A	20.06.23	Site boundary updated.	AH	BH
B	15.08.23	Updated at client request.	AH	BH
C	05.09.23	Latest exploratory holes added.	OS	SD
D	20.09.23	Latest exploratory holes added. Geological and mining features updated.	OS/AH	BH

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Castle Green
Park House
Sandipier Court
Chester Business Park
Chester
CH4 9QU

Client	Castle Green
Project	Gladstone Way, Hawarden
Title	SITE PLAN (NO SERVICES SHOWN)
DRAWING NUMBER	8217 / 01
SCALE AT A0	1:500
DATE	09.06.23
DRAWN	AH
CHECKED	BH
REVISION	D

THIS DRAWING SHOULD ONLY BE PRINTED IN COLOUR

- This drawing is to be read in conjunction with the following:-
- Ash Lane Mancot, Deeside, Main Property Extent, received by Coopers from Anwyll Homes on 09 June 2023.
 - JLP Surveying, Ash Lane, Mancot, Topographical Land Survey, ref. S19-1120, dated 05 November 2019.
 - ESP, Phase I and II Geoenvironmental Site Assessment, Ash Lane, Mancot, ref. 13-673-R2-1, dated April 2021.
 - BGS Geological Sheet, ref. SJ 36 NW.
 - **Site boundary to be confirmed by Castle Green**
 - NKC Geotech Ltd, Gladstone Way, Mancot, Mining Investigation Report, ref. 2306, dated 04 September 2023.

EXISTING DATA

KEY TO EXISTING FEATURES

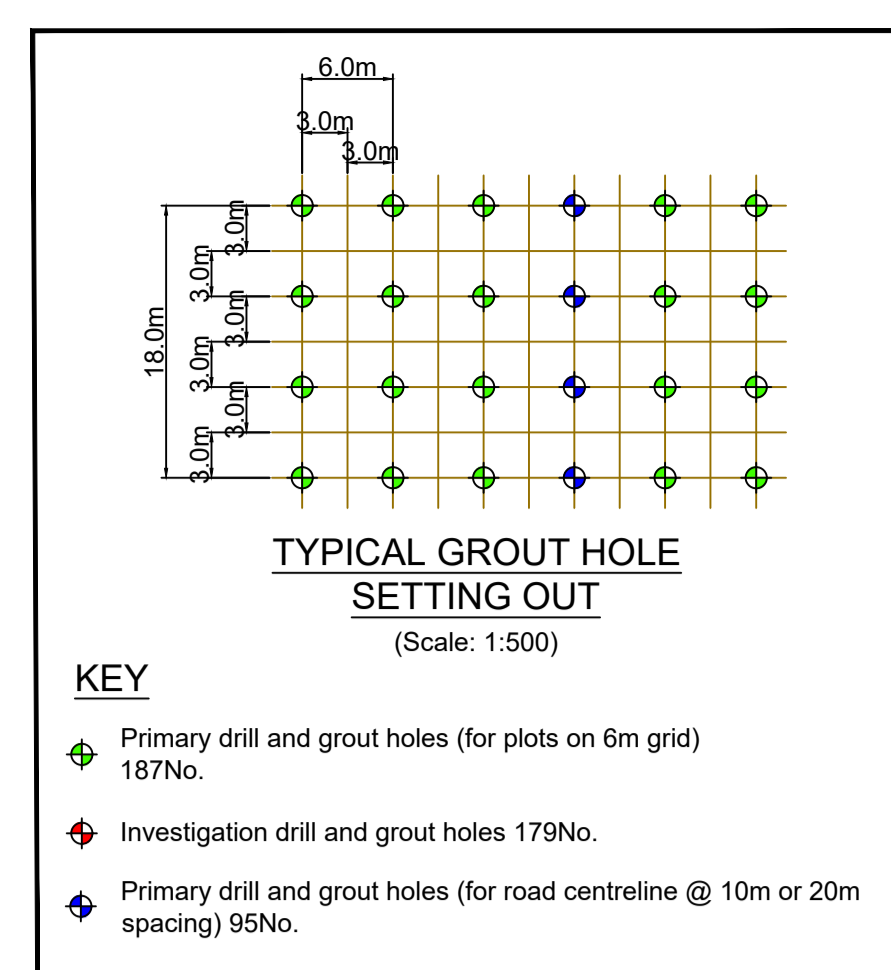
- Surveyed tree and canopy (taken from ref. b)
- Surveyed hedge (taken from ref. b)
- Surveyed overhead electric lines (taken from ref. b)
- Surveyed overhead fence lines (taken from ref. b)
- Surveyed top of bank (taken from ref. b)
- Surveyed bottom of bank (taken from ref. b)
- Topographical contours (taken from ref. b)
- Site boundary (taken from ref. e)

KEY TO GEOLOGICAL FEATURES

- Coal seam (taken from ref. f)
- Inferred coal seam (taken from ref. f)
- Fault line with downthrow (taken from ref. f)
- Fluvioglacial sand & gravel (taken from ref. d)
- Madeground (taken from ref. d)
- Roadways and worked area extent as shown on mine abandonment plan ref. 1963_395999 (See Coopers drawing B217 / ABD2)

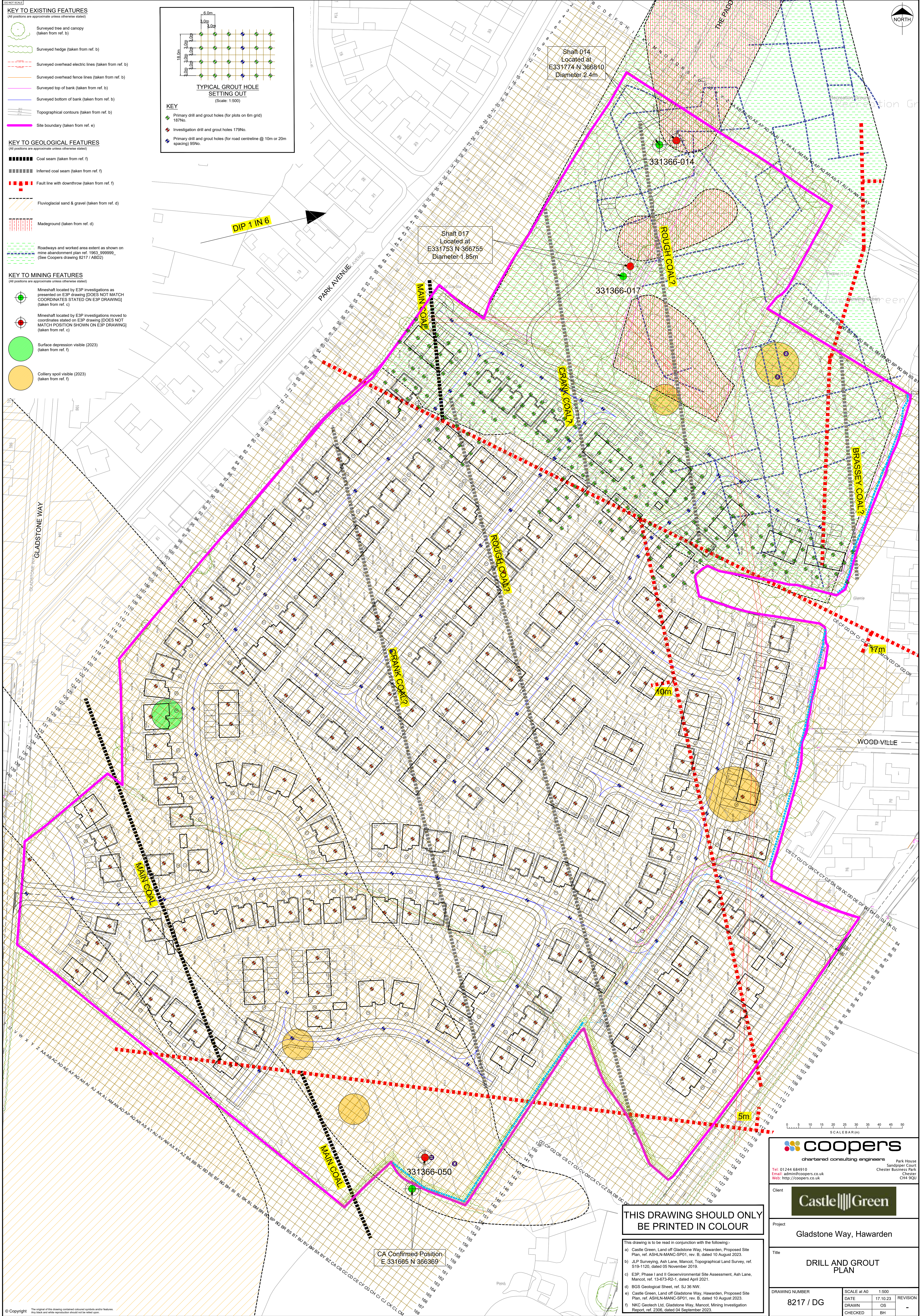
KEY TO MINING FEATURES

- Mineshaft located by E3P investigations as presented on ESP drawing (DOES NOT MATCH COORDINATES STATED ON ESP DRAWING) (taken from ref. c)
- Mineshaft located by E3P investigations moved to coordinates stated on ESP drawing (DOES NOT MATCH POSITION SHOWN ON ESP DRAWING) (taken from ref. c)
- Surface depression visible (2023) (taken from ref. f)
- Colliery spoil visible (2023) (taken from ref. f)



KEY

- Primary drill and grout holes (for plots on 6m grid) 187No.
- Investigation drill and grout holes 179No.
- Primary drill and grout holes (for road centreline @ 10m or 20m spacing) 95No.



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Castle Green
 Project: Gladstone Way, Hawarden

Title: DRILL AND GROUT PLAN

DRAWING NUMBER	SCALE AT A0	1:500	REVISION
8217 / DG	DATE	17.10.23	
	DRAWN	OS	
	CHECKED	BH	

THIS DRAWING SHOULD ONLY BE PRINTED IN COLOUR

- This drawing is to be read in conjunction with the following:-
- Castle Green, Land off Gladstone Way, Hawarden, Proposed Site Plan, ref. ASH-N-MANC-SP01, rev. B, dated 10 August 2023.
 - JLP Surveying, Ash Lane, Mancot, Topographical Land Survey, ref. S19-1120, dated 05 November 2019.
 - E3P, Phase 1 and 2 Geoenvironmental Site Assessment, Ash Lane, Mancot, ref. 13-673-R2-1, dated April 2021.
 - BGS Geological Sheet, ref. SJ 36 NW.
 - Castle Green, Land off Gladstone Way, Hawarden, Proposed Site Plan, ref. ASH-N-MANC-SP01, rev. B, dated 10 August 2023.
 - NKC Geotech Ltd, Gladstone Way, Mancot, Mining Investigation Report, ref. 2306, dated 04 September 2023.

CA Confirmed Position
E 331685 N 366369

SCALE	1:25000@A4
DATE	22.09.23
DRAWN	OS
CHEK'D	BH

Gladstone Way, Hawarden

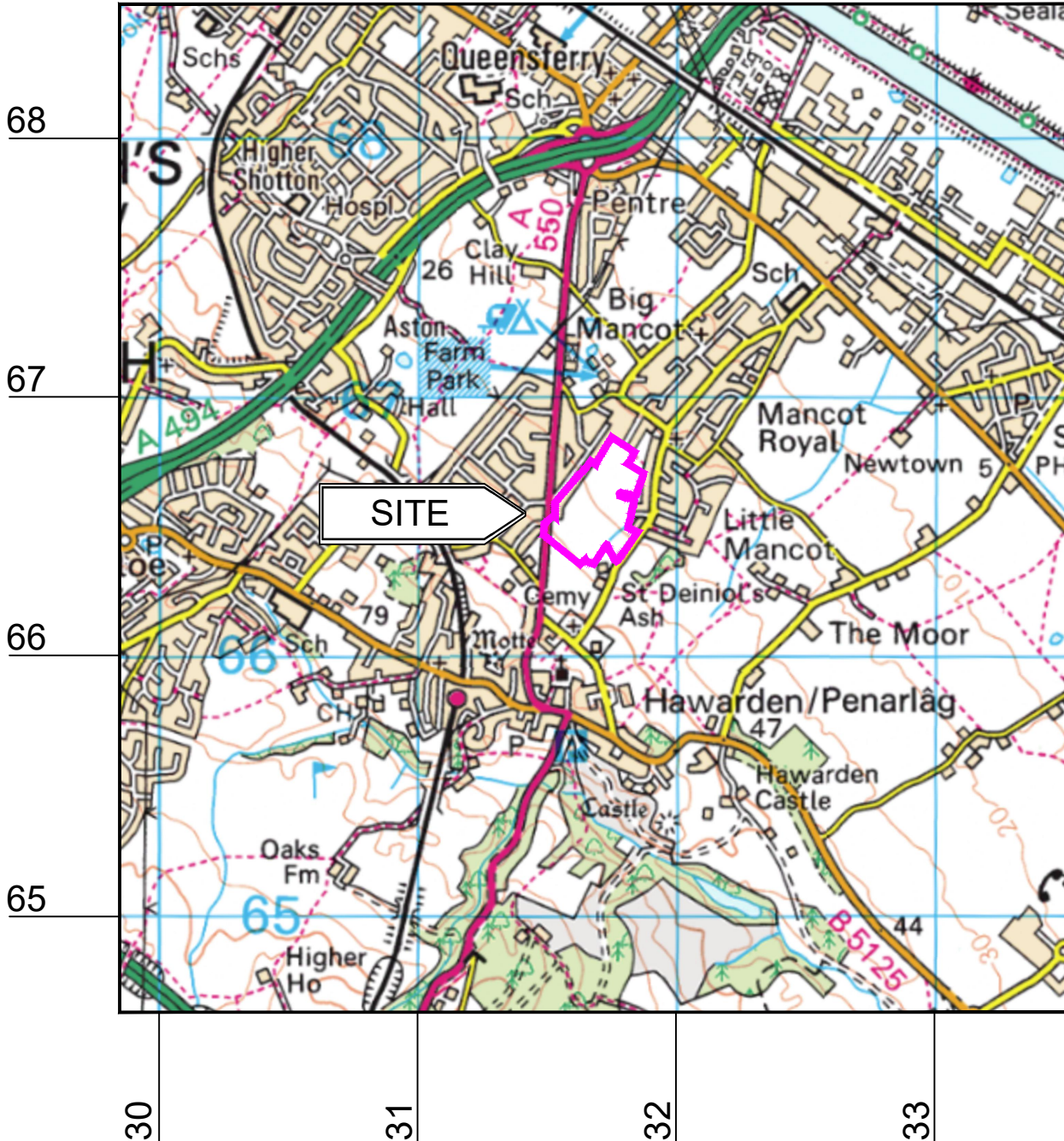
SITE LOCATION PLAN

Drg No: 8217 / L1



National Grid reference
 of the proposed site.

SJ 317 667



0 200 400 600 800 1000 1500 2000

SCALE BAR (m)

Outline Design and Specification for Treatment of Coal Workings beneath
Land at Gladstone Way, Hawarden

Appendix 2

NKC Mining Investigation Report, including appendices



nkc Geotech Ltd
engineering geologist specialising in the investigation and treatment of disused mineworkings

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Mining Investigation Report



Rob Dainton drilling on Bh A

Gladstone Way, Mancot

Castle Green Homes Ltd
Unit 20
St Asaph Business Park
St Asaph
LL17 0LJ

2306/1
19 September 2023



NKC Geotech Ltd

Site

A residential development site on agricultural pasture land at Gladstone Way, Mancot, Flintshire. The site was previously investigated by E3P in April 2021.

Summary of relevant mining information

CIRIA Special Publication C758D 'Abandoned Mineworkings Manual'
Coal Authority Consultants Report 51002173545001 dated 3 September 2019
Ordnance Survey 1:500 and 1:2500 First Edition 1875
Geological Survey 1:10560 plans
Mineplans of Little Mancot Colliery, Great Mancot Colliery and the Hawarden Coalfield

Previous investigations on this site

Ministry of Works opencast prospecting 1944
E3P Ltd Risk Assessment 13-673-L1 dated September 2019
E3P Site Investigation 13-673-R2-1 dated April 2021

Nkc Geotech Ltd investigations in this vicinity:

0712 Holly Lodge, Mancot
0382 Little Mancot Colliery Engine Shaft
9711 Holly Lodge, Mancot
9332 Leaches Lane, Mancot
9113 Little Mancot Colliery Bye Pit. Mancot
8953 The Paddocks, Mancot

Investigation results

Geology

The site lies on Carboniferous Westphalian 'A' rocks that form the small Hawarden Coalfield, heavily faulted and dipping to the north-east under the River Dee at 1 in 6. These rocks are predominantly shales and sandstones laid down in a humid, oxygen-rich tropical delta environment close to the Equator 320 million years ago, and contain successive seams of coal upto 3.5m in thickness at vertical intervals typically varying from 4.0m to 20.0m. Those coal seams which were of economic importance were given an identity when they were of sufficient quality and thickness to justify extraction by mining from the surface or at depth from mineshafts. Typical names for local coal seams reflect primarily on quality and thickness, for example Main Coal, Rough Coal, Crank Coal and Brassey Coal.

Coal seam names in the Flintshire Hawarden, Flint, Bagillt and Mostyn coalfields lack lateral and vertical consistency with the result that unique local names for the same seams are widespread, varying from colliery to colliery. This report will use the vernacular Mancot coalfield seam names, the subsequent 20th century Geological Survey and Coal Authority correlations are irrelevant to the local mining history here given the variations both in thickness and inter-seam intervals of the coal seams.

The coal seams relevant to the site, in descending order, are:

Brassey Coal 1.2m thick
12m
Rough Coal 1.0m thick
6m
Crank Coal 0.5m thick
12m
Main Coal 3.0m thick
24m
King Coal 1.2m thick



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The Brasseley Coal only occurs in the extreme north-east of the site as shown on the attached borehole plan. The Rough Coal and Crank Coals subcrop under predominantly sandy deposits across the centre of the site, and the Main Coal subcrops close to Daniels Ash Farm under sand upto 15m thick. All these seams dip to the north-east at 1 in 6. The sand is loose and fluid, and the water table is high. All the faults encountered in the drilling were heavily water bearing.

Past underground coal mining

Coal mining in Flintshire is recorded in 1292 when the area was part of the Swerewood Forest and mineral rights belonged to the Earl of Chester. Industrial mining deeper than the outcrop workings and simple bell pits of the 'cole farms' and 'coaleries' in the Forest dates from the 16th century with prospecting by 'boreing'. Prospecting for coal by boring was carried out on this site at Daniel's Ash, Mancot, in 1642.

The last underground coal mining in Flintshire was in the Main Coal at the small Tan Llan Colliery south of Mold and abandoned in 1987.

The Hawarden coalfield was prospected by the Hawarden Estate in the 18th and 19th centuries, and there are details of two historical boreholes on the site. Rectory Meadow No.2 Bore is 91m deep to the Wall & Bench Coal, and Great Mancot Main Colliery Bore passes through the Wall & Bench Coal at 60m and terminates at 81m in the Upper Four Foot Coal. Both these boreholes passed through solid Main Coal with no evidence of past workings in this seam..

The only records of coal mining under the site are the 1879 Mancot Colliery Main Coal workings in the northern part of the site which terminate in the southerly direction against an east-west fault with a displacement of 17m.

The Main Coal workings of Little Mancot Colliery 200m east of the site appear to terminate westwards close to Ash Lane but the mineplan is a small scale royalty plan and infers there may be older Little Mancot workings in the Main Coal under at least some of the eastern part of the site. The extent of these workings up the dip of the seam towards the subcrop is uncertain, and the miners would have been cautious approaching suspected older flooded workings or wet running sand. The opencast at Cross Tree Farm in Ewloe, 2km west of Mancot, in 1980 revealed the Main Coal there was worked right up the subcrop under dry sand.

The last mining in the immediate locality was Mancot Main Colliery in 1934, a small shallow venture adjacent to the north-western corner of the site into old Main Coal workings at a depth of 18m.

Ministry of Works opencast coal exploration 1944

Prior to the formation of the National Coal Board in 1947, the Ministry of Works commenced opencast coal production in 1942 and the site close to Daniel's Ash Farm was drilled by Cementation Ltd. The holes were too shallow to encounter the Main Coal which was assumed to subcrop parallel to Gladstone Way, and a subsequent trial excavation was abandoned due to running sand.

E3P shallow mineworkings investigation of 2019

This investigation comprised 12 holes to 40m and Rb101 and 102 encountered worked Main Coal in the area underlain by the Mancot Colliery workings of 1879. All the other holes except Rb108 found solid coal where the Main Coal was encountered, although holes Rb108, 109 and 111 all encountered 'fissured ground' for 18m below 22m with no strata description.

Recorded mine entries on or within 20m of the site boundary

There are five recorded mine entries on the site, three of which have been located.

Shafts 331366-014 and -017 are Mancot Colliery shafts abandoned in 1884 and located by excavation in 2019 by E3P.

Shafts 331366-019 and -020 are shown adjacent to the Mancot Colliery workings on a sketched copy plan traced from an original of 1884 in 1927. The 2019 E3P excavation of Shaft -019 found no shaft in the Coal Authority location but encountered a possible shaft 23m to the south. Shaft -020 was not investigated due to overhead cables.



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Shaft 331366-050 was discovered by the farmer in 1985 as a subsiding feature which was subsequently infilled by the National Coal Board. The E3P investigation confirmed the shaft location but excavations were terminated at an unknown depth due to groundwater.

Current intrusive investigation

Coal Authority Permit 27200 was obtained before any intrusive investigation work was carried out. (See Plan A).

Colliery spoil

Colliery spoil was visible on site in the vicinity of several trial pit excavations and in the vicinity of Shafts 019, 020 and 050, the Great Mancot Colliery borehole, and Bhs G and K. This may be evidence of former shaft spoil heaps or borehole debris being landscaped for agricultural improvement, or may have been imported from outside the site. The Geological Survey of 1923 also recorded 'tip stuff in soil' in the vicinity of Bh G. (Plan B).

Depression

A circular area 20m in diameter and 2m deep is visible close to Bh D where the Main Coal is at an estimated depth of 20m with an estimated rock cover of 6m.

Shallow mineworkings

An intrusive investigation of 12 holes to 40m on the site were drilled using rotary water-flush techniques to establish the depth, condition and identity of coal seams under the site. These are Bhs A to L on the borehole Plan A.

The Main Coal was encountered at full thickness in 10 of the 12 holes with no evidence of mining activity. Bh J was drilled beyond the Main Coal subcrop, and Bh G passed through a heavily water bearing fault at the Main Coal horizon. Strong water entries at the Main Coal horizon were noted in Bhs D E F G and L and may be an indication of flooded old workings in the vicinity.

The Crank Coal and Rough Coal were encountered as unworked seams. The Crank Coal is poor quality and known also in Mancot as the Foul Coal. The Rough Coal is good quality and has been extensively worked in Ewloe and Buckley.

The drift deposits above rockhead are sandy with water bearing sands interbedded with soft sandy clays.

Mineshaft 331366-019

An area extending to 10m from the Indicated shaft position was searched by both the 2019 excavation by E3P and the current probe drilling at 1.2m centres by Nkc but no shaft was found. The infilled feature located by the E3P search in 2019, 23m south of the Coal Authority location, was drilled in Bh M and filled ground was proved to a depth of 7m at rockhead. A probe hole adjacent to this feature, Bh N, was drilled to 15m confirming the rockhead depth but with old workings in the Rough Coal from 10.6m to 11.8m. (Plan E).

The source for the original shaft position is the 1928 sketched tracing of a deteriorating Mancot Colliery plan of 1884 which shows a circle annotated with '112 ft'. (Plan D). The Geological Survey field notes from 1923, within living memory of the colliery working, show this to be a borehole. (Plan B).

Mineshaft 331366-020

An area extending to 10m around the Coal Authority shaft position was probe drilled at 1.2m centres and no shaft found. Colliery fill upto 1.2m in thickness overlies natural brown sandy clay. The source for this shaft is the same as for 019 with the annotation of '84ft'. (Plan D). This shaft was also shown as a borehole by the Geological Survey. (Plan B).

Mineshaft 331366-050

The shaft location was drilled with Bh P and terminated at 15m without proving shaft bottom which is estimated to be 30m to the Main Coal. The shaft infill is water logged shale fill with frequent obstructions. A borehole alongside the shaft, Bh Q, proved rockhead at 11.5m below water bearing sands and clay.



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Conclusions

Shallow mineworkings

The Main Coal underlies the entire development area and is 3.0m thick. The safe rock cover to any workings would be $10 \times 3.0\text{m} = 30\text{m}$ and therefore all the proposed buildings will require remedial attention. Whilst the seam is thick, of high quality and was prospected by boring on this site as early as 1642, there is no evidence in the 24 boreholes that there are extensive workings other than in the north of the site where Mancot Colliery from 1879 to 1884 could work under a drift thickness reduced here to 6m and with access to pumping equipment.

However, it is inevitable that attempts were made to mine the coal in the pre-industrial period despite the adverse ground conditions of running sand, thick drift and a coal seam elevation close to sea level which precluded natural drainage.

Shaft sinking would be extremely difficult with running sand penetrating timber shuttering and accumulating on the floor of the excavation. The workings would be extremely wet. Little Mancot Colliery 100m to the east was sunk 90m to the Main Coal in 1760 and is recorded by the Geological Survey as a 'wet pit' even with steam powered pumping and a drainage level to the River Dee.

The remediation of shallow workings could be commenced by drilling a wide grid over the development area to identify areas where workings have taken place and the grout hole grid reduced in spacing in those areas. Any workings will be waterlogged.

Mineshafts

Shaft 331366-050 was proved and a remedial scheme must be designed by structural engineers to meet Coal Authority requirements. As rockhead cannot be reached by excavation the shaft filling needs to be grouted. A Zone of Influence with a radius of 12m from the shaft centre must be established and no construction allowed within this zone.

Shaft 331366-019 has been searched for by excavation by E3P and probe drilling by Nkc over an area upto 27m from the Coal Authority location but no shaft has been found.

The infilled feature located by E3P and attributed by them to Shaft 019 is a crown hole arising from workings in the Rough Coal at 10.5m.

Shaft 331366-020 was not found by probe drilling within a search area extending 10m from the mineplan location.

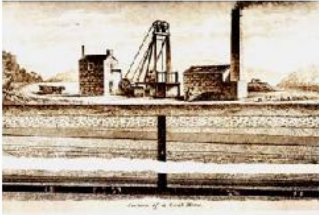
Site strip

The area within 20m of the original mineplan locations for both Shafts 019 and 020 should be examined during site strip to verify neither shaft is present and perhaps uncover evidence of boring. If the site strip confirms the absence of the two shafts then there will be no Coal Authority Zone of Influence on the site layout.

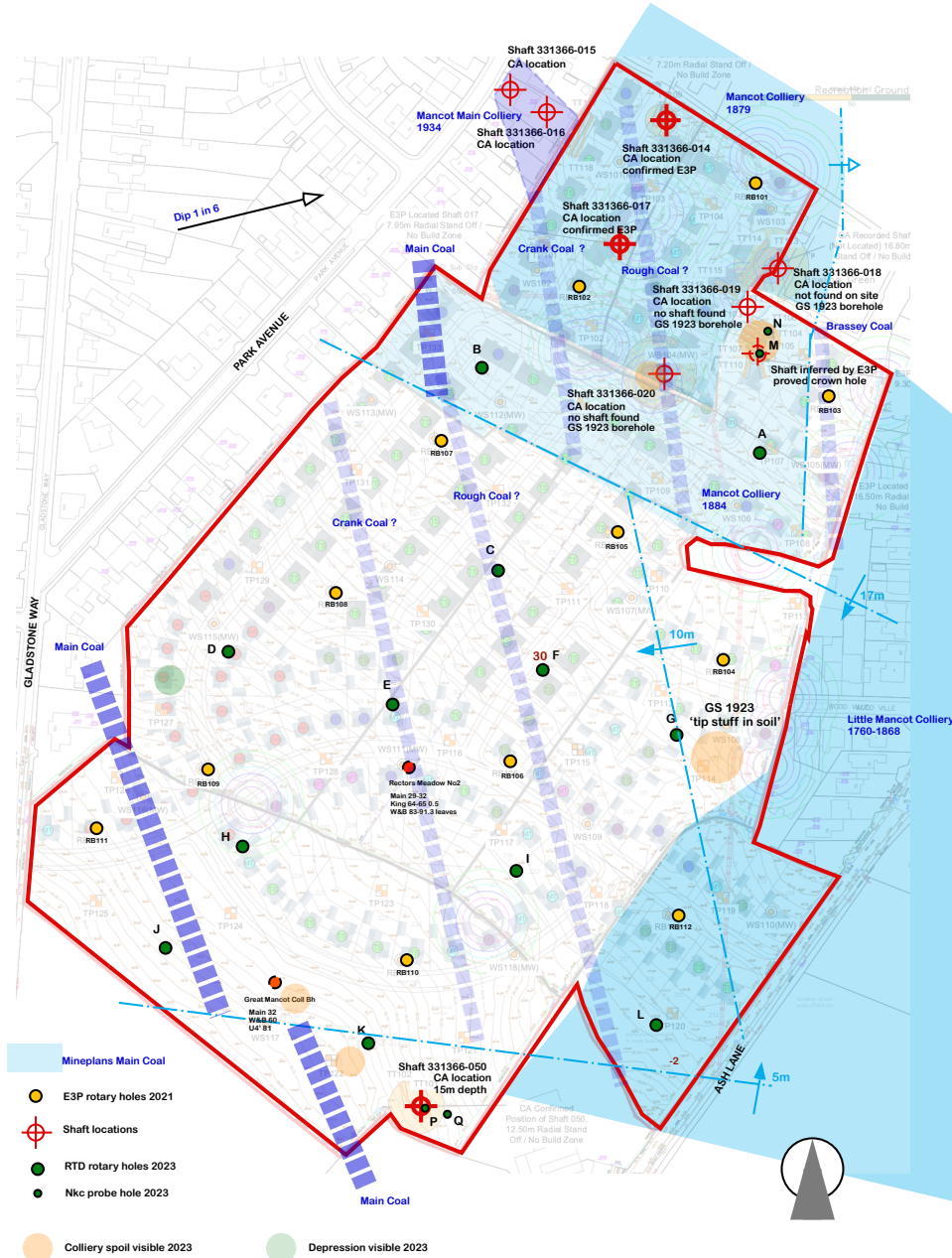
Areas of colliery spoil will be uncovered during site strip and these areas investigated to determine whether there is a shaft present or if the fill has been imported for landscaping.

For Nkc Geotech Ltd

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



Borehole plan A
Scale 1:2500 @ A4

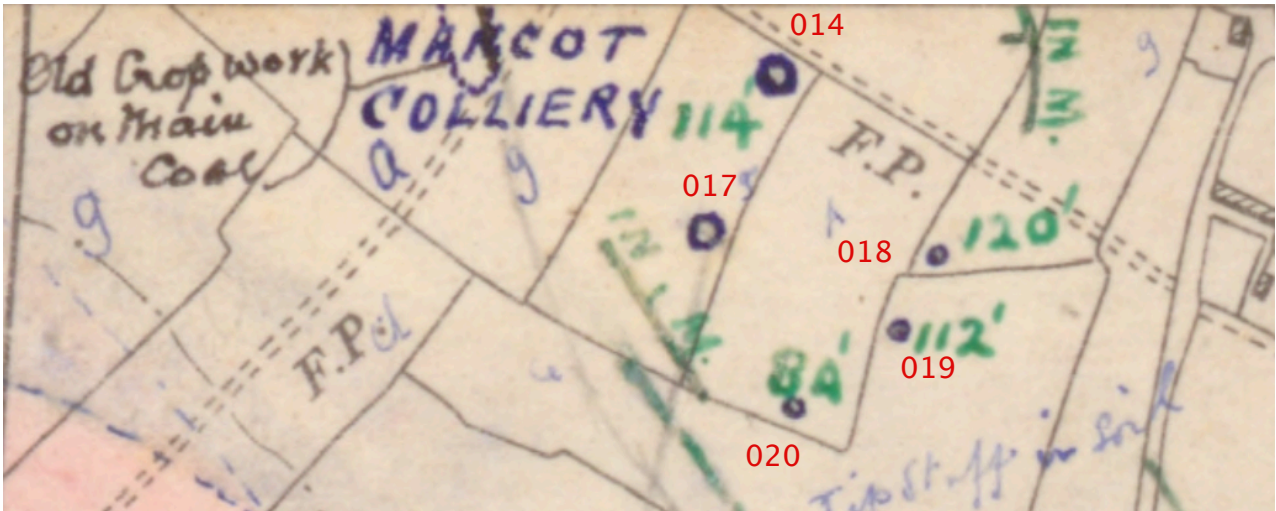




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Geological Survey 1923 plan B

showing shafts 014 017 and boreholes 018, 019 and 020
note also the remark 'tip stuff in soil'





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Mancot Colliery mineplan 1879 plan C
showing in seam roadways, extracted coal pillars (blue), and mining lease boundary (yellow)



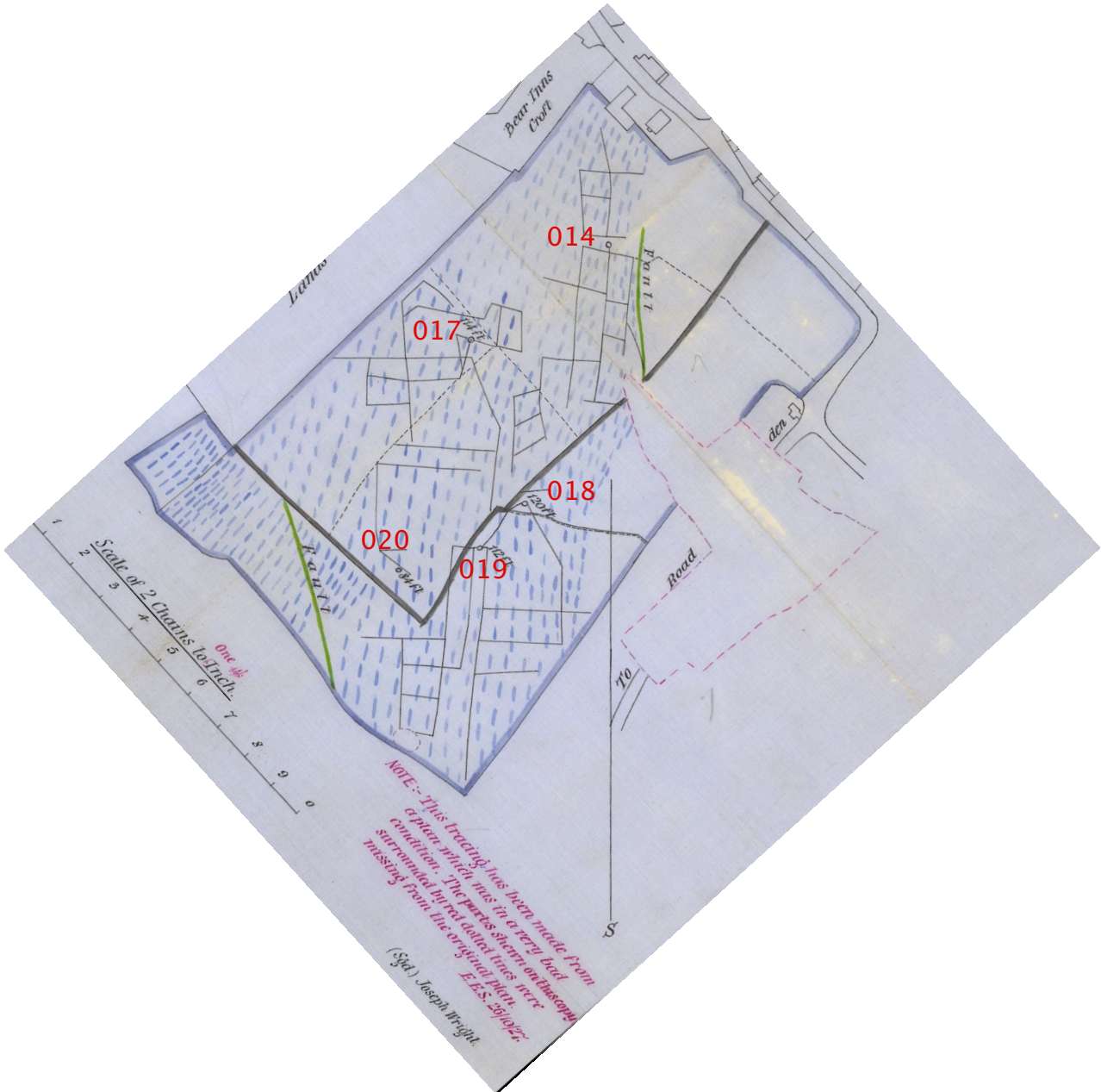


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Mancot Colliery mineplan 1884 plan D

Extension of the lease area from 1879

note different roadways layout to the original plan of 1879

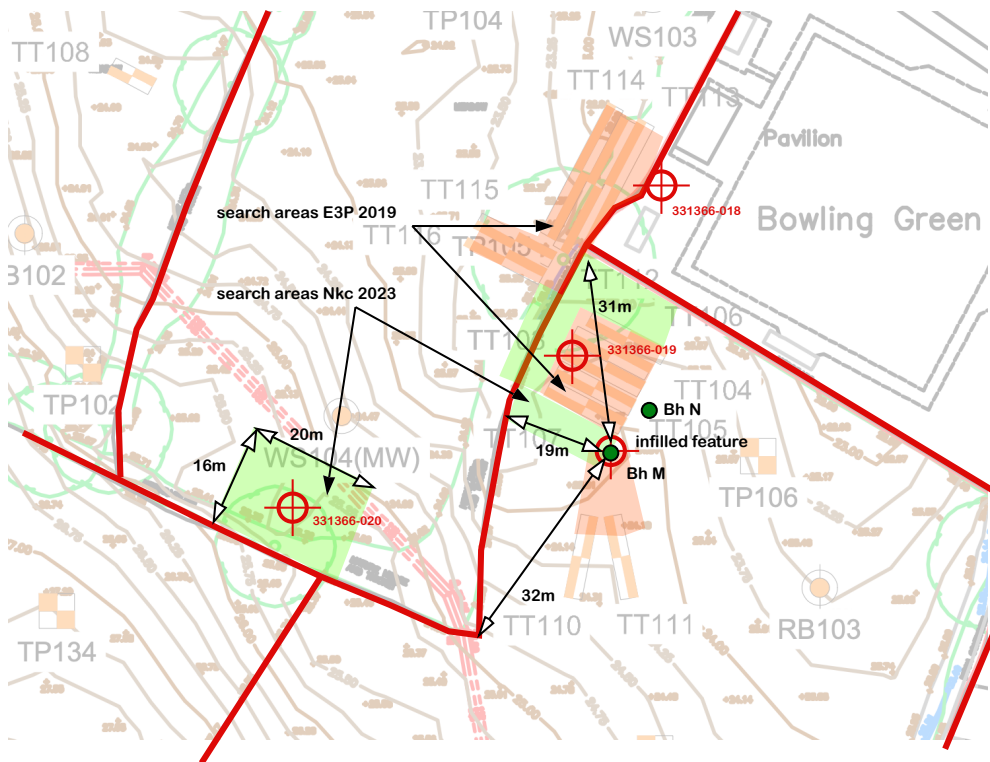




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Shaft searches E3P 2019 and Nkc 2023 plan E

Scale 1:1250 @ A4



Outline Design and Specification for Treatment of Coal Workings beneath
Land at Gladstone Way, Hawarden

Appendix 3

E3P Rotary Borehole Logs



Borehole Log

Borehole No.

RB101

Sheet 1 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331808E - 366793N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 30/11/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30		Brown slightly gravelly sandy CLAY (TOPSOIL). Gravel is fine sub angular to rounded of mudstone and sandstone. Grey brown slightly silty slightly gravelly sandy CLAY. Gravel is fine to coarse sub angular to rounded of mudstone and rare coal.	1	
					6.00		Grey hard SANDSTONE.	6	
					7.30		COAL.	8	
					8.40		Light grey MUDSTONE.	9	
					9.30		Grey MUDSTONE with occasional hard sandstone bands.	10	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 7.3-8.4, 16.5-17.7, 36.2-37.7 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB101

Sheet 2 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331808E - 366793N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 30/11/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Grey MUDSTONE with occasional hard sandstone bands.		
					13.00		Very hard light grey SANDSTONE with occasional mudstone bands.		
					16.50		COAL.		
					17.70		Grey MUDSTONE.		
					20.00				

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 7.3-8.4, 16.5-17.7, 36.2-37.7 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB101

Sheet 3 of 4

Project Name: Ash Lane	Project No. 13673	Co-ords: 331808E - 366793N	Hole Type BH
Location: Mancot, Deeside		Level:	Scale 1:50
Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents		Dates: 30/11/2020	Logged By E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Light grey SANDSTONE.		21
					22.30		Dark grey MUDSTONE.		22
					23.30		Very hard light grey SANDSTONE with occasional mudstone bands.		23
					26.50		Dark grey MUDSTONE.		24
					27.70		Light grey MUDSTONE.		25
									26
									27
									28
									29
									30

Remarks
 1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 7.3-8.4, 16.5-17.7, 36.2-37.7 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB101

Sheet 4 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331808E - 366793N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 30/11/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Light grey MUDSTONE.		
								31	
								32	
								33	
								34	
					34.60		Grey MUDSTONE		
								35	
								36	
					36.20		COAL.		
								37	
								38	
					37.70		Grey MUDSTONE.		
								39	
								40	
					40.00		End of Borehole at 40.00m		

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 7.3-8.4, 16.5-17.7, 36.2-37.7 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB102

Sheet 1 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331731E - 366731N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 30/11/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30		Brown slightly gravelly sandy CLAY (TOPSOIL). Gravel is fine sub angular to rounded of mudstone and sandstone. Grey brown slightly silty slightly gravelly sandy CLAY. Gravel is fine to coarse sub angular to rounded of mudstone and rare coal.	1	
								2	
								3	
								4	
								5	
								6	
					7.00		Grey MUDSTONE.	7	
								8	
					8.30		Very hard grey SANDSTONE.	9	
								10	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 13.6-14.2 m bgl. 4. Possible workings encountered 18.3-20.0 m bgl.





Borehole Log

Borehole No.

RB102

Sheet 2 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331731E - 366731N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 30/11/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Very hard grey SANDSTONE.		
					12.40			Grey MUDSTONE.	
					13.60			COAL.	
					14.20			Grey MUDSTONE with occasional sandstone bands.	
					16.40			Very hard light grey SANDSTONE with occasional mudstone bands.	
					18.30			Loss of flush very soft drilling. Possible workings.	
					20.00				

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 13.6-14.2 m bgl. 4. Possible workings encountered 18.3-20.0 m bgl.





Borehole Log

Borehole No.

RB102

Sheet 3 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331731E - 366731N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 30/11/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
							Hard drilling, No flush. Inferred to be sandstone with fractures.	
								21
								22
								23
								24
								25
								26
								27
								28
								29
								30

Remarks
1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 13.6-14.2 m bgl. 4. Possible workings encountered 18.3-20.0 m bgl.





Borehole Log

Borehole No.

RB102

Sheet 4 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331731E - 366731N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 30/11/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Hard drilling, No flush. Inferred to be sandstone with fractures.		
								31	
								32	
								33	
								34	
								35	
								36	
								37	
								38	
								39	
					40.00			40	
								End of Borehole at 40.00m	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 13.6-14.2 m bgl. 4. Possible workings encountered 18.3-20.0 m bgl.





Borehole Log

Borehole No.

RB103

Sheet 1 of 4

Project Name: Ash Lane	Project No. 13673	Co-ords: 331845E - 366691N	Hole Type BH
Location: Mancot, Deeside	Level:		Scale 1:50
Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents	Dates: 01/12/2020		Logged By E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40		Brown slightly gravelly sandy CLAY (TOPSOIL). Gravel is fine sub angular to rounded of mudstone and sandstone. Grey brown slightly silty slightly gravelly sandy CLAY. Gravel is fine to coarse sub angular to rounded of mudstone and rare coal.	1	
					6.50		SAND and GRAVEL.	7	
					7.80		COAL.	8	
					8.10		Grey MUDSTONE.	9	
					9.70		Shalley black MUDSTONE with coal traces.	10	

Remarks
 1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 7.8-8.1, 15.9-16.9 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB103

Sheet 2 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331845E - 366691N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 01/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					10.30		Shalley black MUDSTONE with coal traces.		
							Grey MUDSTONE with occasional sandstone bands.	11	
								12	
								13	
								14	
								15	
					15.90		COAL with slight loss of flush, no voids, coal intact.	16	
					16.90		Dark grey MUDSTONE.	17	
					17.40		Grey MUDSTONE occasional sandstone bands.	18	
								19	
								20	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 7.8-8.1, 15.9-16.9 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB103

Sheet 3 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331845E - 366691N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 01/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Grey MUDSTONE occasional sandstone bands.		21
					24.00		Hard drilling, lack of flush inferred to be sandstone with fractures.		22
									23
									24
									25
									26
									27
									28
									29
									30

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 7.8-8.1, 15.9-16.9 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB103

Sheet 4 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331845E - 366691N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 01/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Hard drilling, lack of flush inferred to be sandstone with fractures.		
								31	
								32	
								33	
								34	
								35	
								36	
								37	
								38	
								39	
					40.00			40	
								End of Borehole at 40.00m	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 7.8-8.1, 15.9-16.9 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB104

Sheet 1 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331798E - 366574N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 01/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.50		MADE GROUND: Brown gravelly sandy clay. Gravel is fine to coarse sub angular to subrounded of mudstone and brick.		
							Grey brown slightly silty slightly gravelly sandy CLAY. Gravel is fine to coarse sub angular to rounded of mudstone and rare coal.	1	
								2	
								3	
								4	
								5	
								6	
								7	
								8	
								9	
								10	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 17.8-19.7, 25.9-27.8 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB104

Sheet 2 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331798E - 366574N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 01/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					11.00		Grey brown slightly silty slightly gravelly sandy CLAY. Gravel is fine to coarse sub angular to rounded of mudstone and rare coal.	11	
					12.10		Light grey MUDSTONE.	12	
					14.00		Hard light grey SANDSTONE.	13	
					17.80		Grey MUDSTONE with occasional sandstone bands.	14	
					19.70		COAL.	15	
							Grey MUDSTONE.	16	
								17	
								18	
								19	
								20	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 17.8-19.7, 25.9-27.8 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB104

Sheet 3 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331798E - 366574N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 01/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					20.20		Grey MUDSTONE.		
					20.40		Shalley black MUDSTONE.		
							Light grey SANDSTONE with occasional mudstone bands.	21	
								22	
								23	
					24.20		Grey MUDSTONE.	24	
								25	
					25.90		COAL.	26	
								27	
					27.80		Grey MUDSTONE with sandstone bands.	28	
								29	
								30	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 17.8-19.7, 25.9-27.8 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB104

Sheet 4 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331798E - 366574N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 01/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Grey MUDSTONE with sandstone bands.	31	
					32.30		Dark grey MUDSTONE.	32	
					33.40		Grey MUDSTONE with occasional sandstone bands.	33	
								34	
								35	
								36	
								37	
								38	
								39	
					40.00		End of Borehole at 40.00m	40	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 17.8-19.7, 25.9-27.8 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB105

Sheet 1 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331742E - 366633N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 02/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40		MADE GROUND: Brown gravelly sandy clay. Gravel is fine to coarse sub angular to subrounded of mudstone and brick.		
							Grey brown slightly silty slightly gravelly sandy CLAY. Gravel is fine to coarse sub angular to rounded of mudstone and rare coal.	1	
								2	
								3	
								4	
								5	
								6	
								7	
								8	
					9.20		Grey MUDSTONE with occasional sandstone bands.	9	
								10	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 11.8-13.6, 31.0-34.0 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB105

Sheet 2 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331742E - 366633N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 02/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Grey MUDSTONE with occasional sandstone bands.	11	
					11.80		COAL.	12	
					13.60		Light grey MUDSTONE.	14	
					14.30		Grey MUDSTONE with occasional hard sandstone bands.	15	
								16	
								17	
								18	
					18.60		Dark grey MUDSTONE with coal traces.	19	
					19.10		Grey MUDSTONE.	19	
					20.00			20	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 11.8-13.6, 31.0-34.0 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB105

Sheet 3 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331742E - 366633N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 02/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Light grey hard SANDSTONE with occasional mudstone bands.		
					23.90		Grey MUDSTONE.		
					27.00		Very hard grey SANDSTONE.		
					28.30		Dark grey MUDSTONE with coal traces.		
					29.00		Grey MUDSTONE.		

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 11.8-13.6, 31.0-34.0 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB105

Sheet 4 of 4

Project Name: Ash Lane	Project No. 13673	Co-ords: 331742E - 366633N	Hole Type BH
Location: Mancot, Deeside	Level:		Scale 1:50
Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents	Dates: 02/12/2020		Logged By E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					30.20		Grey MUDSTONE.		
							Hard grey SANDSTONE with mudstone bands.		
					31.00		COAL.	31	
								32	
								33	
					34.00		Black MUDSTONE with coal traces.	34	
					34.70		Hard light grey SANDSTONE with mudstone bands.		
					34.90		Black shaley MUDSTONE with coal traces.	35	
								36	
					36.00		Grey MUDSTONE.	36	
								37	
								38	
								39	
					40.00		End of Borehole at 40.00m	40	

Remarks
 1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 11.8-13.6, 31.0-34.0 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB106

Sheet 1 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331698E - 366528N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 02/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40		MADE GROUND: Brown gravelly sandy clay. Gravel is fine to coarse sub angular to subrounded of mudstone and brick.		
							Grey brown slightly silty slightly gravelly sandy CLAY. Gravel is fine to coarse sub angular to rounded of mudstone and rare coal.	1	
								2	
								3	
								4	
								5	
								6	
								7	
								8	
					9.50		Brown medium SAND with gravel bands. Gravel is fine to coarse subangular to subrounded of mudstone, sandstone and rare coal.	9	
								10	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 12.8-13.3, 20.3-23.2 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB106

Sheet 2 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331698E - 366528N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 02/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Brown medium SAND with gravel bands. Gravel is fine to coarse subangular to subrounded of mudstone, sandstone and rare coal.	11	
					11.90		Dark grey MUDSTONE with coal traces.	12	
					12.50		Grey MUDSTONE.		
					12.80		COAL.	13	
					13.30		Dark grey MUDSTONE with coal traces.		
					14.00		Hard grey SANDSTONE with mudstone bands.	14	
								15	
								16	
								17	
								18	
								19	
								20	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 12.8-13.3, 20.3-23.2 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB106

Sheet 3 of 4

Project Name: Ash Lane Project No. 13673 Co-ords: 331698E - 366528N Hole Type BH

Location: Mancot, Deeside Level: Scale 1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents Dates: 02/12/2020 Logged By E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Hard grey SANDSTONE with mudstone bands.		
					20.70		Dark grey MUDSTONE with coal traces.	21	
					21.30		Black shaley MUDSTONE with coal traces.		
					21.90		Very hard grey brown SANDSTONE with mudstone bands.	22	
								23	
								24	
								25	
								26	
								27	
								28	
								29	
					30.00			30	

Remarks
 1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 12.8-13.3, 20.3-23.2 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB106

Sheet 4 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331698E - 366528N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 02/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Loosing flush, hard drilling, no voids. Inferred to be sandstone with fractures.		
								31	
								32	
								33	
								34	
								35	
								36	
								37	
								38	
								39	
					40.00			40	
								End of Borehole at 40.00m	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 12.8-13.3, 20.3-23.2 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB107

Sheet 1 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331670E - 366678N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 03/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40		MADE GROUND: Brown gravelly sandy clay. Gravel is fine to coarse sub angular to subrounded of mudstone and brick.		
							Grey brown slightly silty slightly gravelly sandy CLAY. Gravel is fine to coarse sub angular to rounded of mudstone and rare coal.	1	
								2	
								3	
								4	
								5	
								6	
								7	
								8	
					9.10		Grey MUDSTONE with coal traces.	9	
					10.00			10	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 20.3-23.2 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB107

Sheet 2 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331670E - 366678N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 03/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					11.60		Very hard grey SANDSTONE.	11	
							Grey MUDSTONE.	12	
								13	
								14	
								15	
								16	
								17	
								18	
								19	
								20	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 20.3-23.2 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB107

Sheet 3 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331670E - 366678N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 03/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					20.30		Grey MUDSTONE.	
							COAL.	
					23.20		Black shaley MUDSTONE with coal traces.	
					23.90		Grey MUDSTONE with occasional sandstone bands.	
					29.00		Dark grey MUDSTONE with sandstone bands.	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 20.3-23.2 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB107

Sheet 4 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331670E - 366678N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 03/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					30.80		Dark grey MUDSTONE with sandstone bands.		
							Grey MUDSTONE with sandstone bands.	31	
								32	
								33	
								34	
					36.40		Dark grey MUDSTONE.	37	
					38.00		Grey MUDSTONE with sandstone bands.	38	
								39	
					40.00		End of Borehole at 40.00m	40	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 20.3-23.2 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB108

Sheet 1 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331621E - 366603N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 03/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40		MADE GROUND: Brown gravelly sandy clay. Gravel is fine to coarse sub angular to subrounded of mudstone and brick.		
							Grey brown slightly silty slightly gravelly sandy CLAY. Gravel is fine to coarse sub angular to rounded of mudstone and rare coal.	1	
								2	
								3	
								4	
								5	
								6	
								7	
								8	
					9.00		Brown medium SAND with occasional gravel bands. Gravel is fine to coarse subangular to subrounded of mudstone, sandstone and rare coal.	9	
								10	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. No Coal encountered 4. Possible workings encountered 19.3-20.5m bgl.





Borehole Log

Borehole No.

RB108

Sheet 2 of 4

Project Name: Ash Lane Project No. 13673 Co-ords: 331621E - 366603N Hole Type BH

Location: Mancot, Deeside Level: Scale 1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents Dates: 03/12/2020 Logged By E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Brown medium SAND with occasional gravel bands. Gravel is fine to coarse subangular to subrounded of mudstone, sandstone and rare coal.		11
					13.00		Grey MUDSTONE with sandstone bands.		12
									13
									14
									15
					17.60		Black SHALE with coal.		16
									17
									18
					19.30		Loss of flush, soft drilling. Possible workings.		19
									20

Remarks
 1. Complete. 2. Final depth 40.00m bgl. 3. No Coal encountered 4. Possible workings encountered 19.3-20.5m bgl.





Borehole Log

Borehole No.

RB108

Sheet 3 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331621E - 366603N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 03/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					20.50		Loss of flush, soft drilling. Possible workings.	
							No flush, hard drilling, no voids. Inferred to be sandstone with fractures.	21
								22
								23
								24
								25
								26
								27
								28
								29
								30

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. No Coal encountered 4. Possible workings encountered 19.3-20.5m bgl.





Borehole Log

Borehole No.

RB108

Sheet 4 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331621E - 366603N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 03/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							No flush, hard drilling, no voids. Inferred to be sandstone with fractures.		
								31	
								32	
								33	
								34	
								35	
								36	
								37	
								38	
								39	
					40.00			40	
								End of Borehole at 40.00m	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. No Coal encountered 4. Possible workings encountered 19.3-20.5m bgl.





Borehole Log

Borehole No.




RB109

Sheet 1 of 4

Project Name: Ash Lane Project No. 13673 Co-ords: 331567E - 366531N Hole Type BH

Location: Mancot, Deeside Level: Scale 1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents Dates: 03/12/2020 Logged By D. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20		 Brown slightly gravelly sandy CLAY (TOPSOIL). Gravel is fine sub angular to rounded of mudstone and sandstone.		
							 Grey brown slightly silty slightly gravelly sandy CLAY. Gravel is fine to coarse sub angular to rounded of mudstone and rare coal.	1	
					2.20		 Brown medium gravelly fine to coarse SAND with clay bands. Gravel is fine to coarse subangular to subrounded of mudstone, sandstone and rare coal.	2	
								3	
								4	
								5	
								6	
								7	
								8	
								9	
								10	

Remarks
 1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 24.2-25.8 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB109

Sheet 2 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331567E - 366531N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 03/12/2020

Logged By
D. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Brown medium gravelly fine to coarse SAND with clay bands. Gravel is fine to coarse subangular to subrounded of mudstone, sandstone and rare coal.		
					14.80		Grey SANDTONE.		
					16.60		Grey MUDSTONE with coal TRACES.		

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 24.2-25.8 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB109

Sheet 3 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331567E - 366531N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 03/12/2020

Logged By
D. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Grey MUDSTONE with coal TRACES.		
					24.20		COAL with black shale.		
					25.80		Grey SANDSTONE.		
					27.00		No flush, hard drilling, no voids. Inferred to be sandstone with fractures.		

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 24.2-25.8 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB109

Sheet 4 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331567E - 366531N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 03/12/2020

Logged By
D. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							No flush, hard drilling, no voids. Inferred to be sandstone with fractures.		
								31	
								32	
								33	
								34	
								35	
								36	
								37	
								38	
								39	
					40.00			40	
								End of Borehole at 40.00m	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 24.2-25.8 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB110

Sheet 1 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331654E - 366444N

Hole Type
BH

Location: Mancot, Deeside




Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 03/12/2020

Logged By
D. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20		 Brown slightly gravelly sandy CLAY (TOPSOIL). Gravel is fine sub angular to rounded of mudstone and sandstone.		
							 Grey brown slightly silty slightly gravelly sandy CLAY. Gravel is fine to coarse sub angular to rounded of mudstone and rare coal.		1
					2.40		 Brown gravelly medium SAND with occasional clay bands. Gravel is fine to coarse subangular to subrounded of mudstone, sandstone and rare coal.		2
									3
									4
									5
									6
									7
									8
									9
									10

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 13.1-13.6, 27.6-28.6, 31.0-33.5, 36.1-36.7 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB110

Sheet 2 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331654E - 366444N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 03/12/2020

Logged By
D. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					10.40		Brown gravelly medium SAND with occasional clay bands. Gravel is fine to coarse subangular to subrounded of mudstone, sandstone and rare coal. Grey SANDSTONE.	11	
					13.10		COAL with shale.	12	
					13.60		Grey MUDSTONE with sandstone bands.	13	
					19.20		Dark grey SANDSTONE.	14	
								15	
								16	
								17	
								18	
								19	
								20	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 13.1-13.6, 27.6-28.6, 31.0-33.5, 36.1-36.7 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB110

Sheet 3 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331654E - 366444N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 03/12/2020

Logged By
D. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
							Dark grey SANDSTONE.	21
								22
								23
								24
								25
								26
								27
					27.60		COAL.	28
					28.60		Grey SANDSTONE with dark bands.	29
					30.00			30

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 13.1-13.6, 27.6-28.6, 31.0-33.5, 36.1-36.7 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB110

Sheet 4 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331654E - 366444N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 03/12/2020

Logged By
D. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Strong grey SANDSTONE.		
				30.60			Dark grey MUDSTONE.		
				31.00			Possible COAL - inferred from drill speed and torque of drilling.	31	
								32	
								33	
				33.50			Grey MUDSTONE.		
				33.80			Grey SANDSTONE.	34	
				34.80			Dark grey black MUDSTONE.	35	
				36.10			COAL.	36	
				36.70			Grey MUDSTONE with sandstone bands.	37	
								38	
								39	
				40.00			End of Borehole at 40.00m	40	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 13.1-13.6, 27.6-28.6, 31.0-33.5, 36.1-36.7 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB111

Sheet 1 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331515E - 366504N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 04/12/2020

Logged By
D. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20		<p>Brown slightly gravelly sandy CLAY (TOPSOIL). Gravel is fine sub angular to rounded of mudstone and sandstone.</p> <p>Grey brown slightly silty slightly gravelly sandy CLAY. Gravel is fine to coarse sub angular to rounded of mudstone and rare coal.</p>	1	
					2.30		<p>Brown gravelly medium SAND with occasional clay bands. Gravel is fine to coarse subangular to subrounded of mudstone, sandstone and rare coal.</p>	2 3 4 5 6 7 8 9 10	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 26.0-27.3 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB111

Sheet 2 of 4

Project Name: Ash Lane Project No. 13673 Co-ords: 331515E - 366504N Hole Type BH

Location: Mancot, Deeside Level: Scale 1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents Dates: 04/12/2020 Logged By D. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Brown gravelly medium SAND with occasional clay bands. Gravel is fine to coarse subangular to subrounded of mudstone, sandstone and rare coal.		
					15.10		Grey SANDSTONE.		
					17.20		Grey MUDSTONE with coal traces.		

Remarks
 1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 26.0-27.3 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB111

Sheet 3 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331515E - 366504N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 04/12/2020

Logged By
D. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Grey MUDSTONE with coal traces.		
								21	
								22	
								23	
								24	
								25	
					26.00		Black shaley COAL.	26	
								27	
					27.30		Grey SANDSTONE with strong bands and fissures.	28	
								29	
					29.00		Loosing flush, hard drilling, no voids. Inferred to be sandstone with fractures.	29	
								30	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 26.0-27.3 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB111

Sheet 4 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331515E - 366504N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 04/12/2020

Logged By
D. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Loosing flush, hard drilling, no voids. Inferred to be sandstone with fractures.		
								31	
								32	
								33	
								34	
								35	
								36	
								37	
								38	
								39	
					40.00			40	
								End of Borehole at 40.00m	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 26.0-27.3 m bgl. 4. No voids encountered.





Borehole Log

Borehole No.

RB112

Sheet 1 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331770E - 366461N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 04/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40		MADE GROUND: Brown gravelly sandy clay. Gravel is fine to coarse sub angular to subrounded of mudstone and brick.		
							Grey brown slightly silty slightly gravelly sandy CLAY. Gravel is fine to coarse sub angular to rounded of mudstone and rare coal.	1	
								2	
								3	
					4.00		Brown medium SAND.	4	
								5	
								6	
								7	
								8	
								9	
								10	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 12.0-12.5, 33.8-36.0 m bgl. 4. Small voids in coal encountered 33.8-36.0m bgl.





Borehole Log

Borehole No.

RB112

Sheet 2 of 4

Project Name: Ash Lane	Project No. 13673	Co-ords: 331770E - 366461N	Hole Type BH
Location: Mancot, Deeside		Level:	Scale 1:50
Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents		Dates: 04/12/2020	Logged By E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					10.40		Brown medium SAND.		
					10.90		Brown gravelly medium SAND with occasional clay bands. Gravel is fine to coarse subangular to subrounded of mudstone, sandstone and rare coal.		
					11.60		Grey MUDSTONE.	11	
					12.00		Dark grey MUDSTONE with coal traces.		
					12.50		COAL.	12	
					13.00		Black shaley MUDSTONE with coal traces.		
							Very hard light grey SANDSTONE.	13	
								14	
								15	
								16	
								17	
								18	
					19.00		Dark grey MUDSTONE.	19	
								20	

Remarks
 1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 12.0-12.5, 33.8-36.0 m bgl. 4. Small voids in coal encountered 33.8-36.0m bgl.





Borehole Log

Borehole No.

RB112

Sheet 3 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331770E - 366461N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 04/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					20.30		Dark grey MUDSTONE.		
							Grey MUDSTONE with occasional sandstone bands.		
								21	
								22	
								23	
								24	
								25	
								26	
								27	
								28	
								29	
								30	

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 12.0-12.5, 33.8-36.0 m bgl. 4. Small voids in coal encountered 33.8-36.0m bgl.





Borehole Log

Borehole No.

RB112

Sheet 4 of 4

Project Name: Ash Lane

Project No.
13673

Co-ords: 331770E - 366461N

Hole Type
BH

Location: Mancot, Deeside

Level:

Scale
1:50

Client: William Hall & Co. Chartered Surveyors, Land & Estate Agents

Dates: 04/12/2020

Logged By
E. Pennington

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Grey MUDSTONE with occasional sandstone bands.		
					33.80		COAL with small voids from drops in drill head.		
					36.00		Grey MUDSTONE with sandstone bands.		
					40.00		End of Borehole at 40.00m		

Remarks

1. Complete. 2. Final depth 40.00m bgl. 3. Coal encountered 12.0-12.5, 33.8-36.0 m bgl. 4. Small voids in coal encountered 33.8-36.0m bgl.



Outline Design and Specification for Treatment of Coal Workings beneath
Land at Gladstone Way, Hawarden

Appendix 4

Coal Authority Reports and Permits



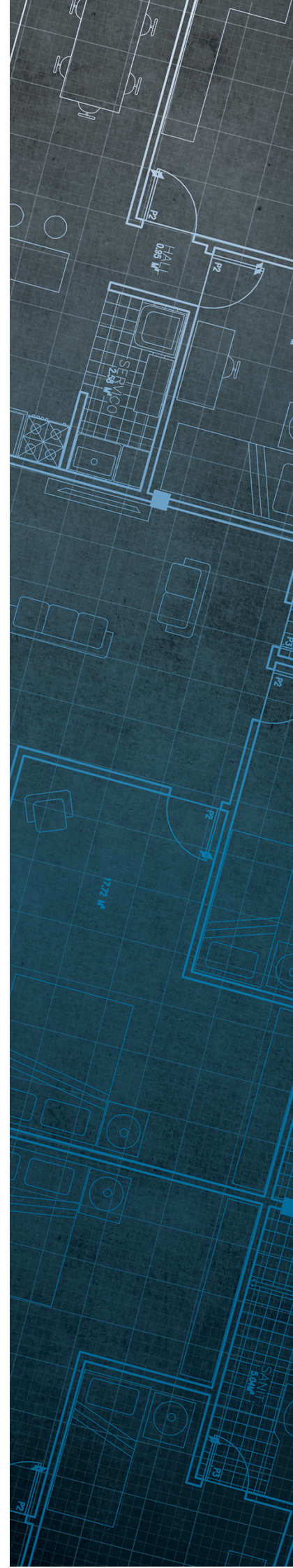
The Coal
Authority

Consultants Coal Mining Report

Land Off Ash Lane
Park Avenue
Mancot
Hawarden
Flintshire
CH5 3HY

Date of enquiry: 3 September 2019
Date enquiry received: 3 September 2019
Issue date: 3 September 2019

Our reference: 51002173545001
Your reference: 13-673-EM-33233



Consultants Coal Mining Report

This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

E3P

Enquiry address

Land Off Ash Lane
Park Avenue
Mancot
Hawarden
Flintshire
CH5 3HY


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Nottinghamshire
NG18 4RG

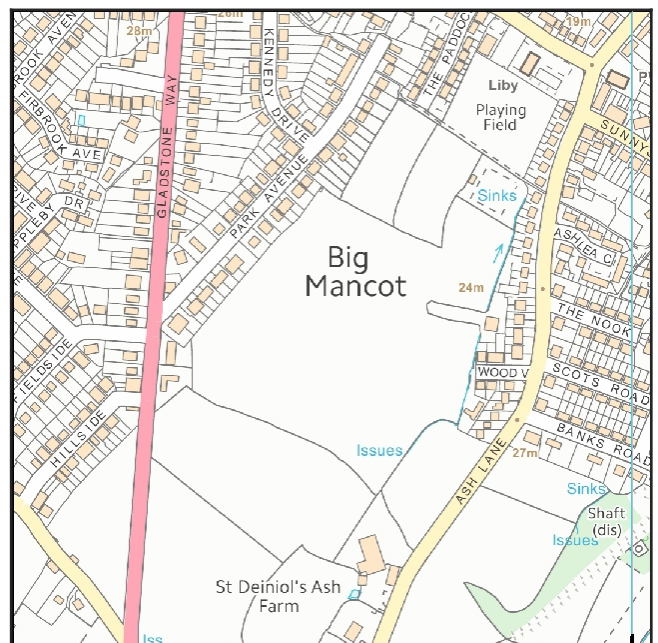
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Approximate position of property



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Section 1 – Mining activity and geology

Past underground mining

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	MAIN	Coal	37VC	0	Beneath Property	11.3	East	300	1934
unnamed	MAIN	Coal	7901	23	Beneath Property	11.3	East	300	1934

Probable unrecorded shallow workings

Yes.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyancing details
Shaft	331366-012	331839 366887		Coal	
Shaft	331366-013	331829 366876		Coal	
Shaft	331366-014	331778 366812		Coal	
Shaft	331366-015	331698 366819		Coal	
Shaft	331366-016	331715 366809		Coal	
Shaft	331366-017	331755 366756		Coal	
Shaft	331366-018	331824 366746		Coal	
Shaft	331366-019	331811 366719		Coal	
Shaft	331366-020	331774 366698		Coal	
Shaft	331366-050	331665 366369	This entry has been filled to an unknown specification at an unknown date. During site investigation in 1985 the shaft was excavated to 7.6m without reaching the bottom due to water problems. The shaft was topped up on completion. In 1987 drainage pipes were laid across the area of the shaft at a depth of 0.7m surrounded by 200mm of hardcore.	Coal	

Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

13434	1072	16748
1963	11437	

Please contact us on 0345 762 6848 to determine the exact abandoned mine plans you require based on your needs.

Outcrops

No outcrops recorded.

Geological faults, fissures and breaklines

Please refer to the 'Summary of findings' map (on separate sheet) for details of any geological faults, fissures or breaklines either within or intersecting the enquiry boundary.

Faults under or close to the property recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations

None recorded within 50 metres of the enquiry boundary.

Remediated sites

None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence

There are 2 claim(s) within 50 metres of the property boundary that do not match the property address. These are shown on the enquiry boundary plot.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

If further subsidence damage claims information is required, please visit www.groundstability.com.

See Section 4 for further information.

Mine gas

None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes

None recorded within 500 metres of the enquiry boundary.

Section 3 – Licensing and future mining activity

Future underground mining

None recorded.

Coal mining licensing

None recorded within 200 metres of the enquiry boundary.

Court orders

None recorded.

Section 46 notices

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

Withdrawal of support notices

The property is not in an area where a notice to withdraw support has been given.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

Payments to owners of former copyhold land

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

Section 4 – Further information

The following potential risks have been identified and as part of your risk assessment should be investigated further.

Development advice

The site is within an area of historical coal mining activity. Should you require advice and/or support on understanding the mining legacy, its risks to your development or what next steps you need to take, please contact us.

Coal mining subsidence

The site is within an area of previous interest. It is close to where the Coal Authority or licensed mine operator has investigated and where necessary remediated issues relating to coal mining subsidence.

The site requires further investigation and may influence your risk assessment. We recommend that you order the appropriate **Coal Authority Subsidence Claims Report**, which will include more information about the hazard.

For further information on specific site or ground investigations in relation to any issues raised in Section 4, please call us on 0345 762 6848 or email us at groundstability@coal.gov.uk.

Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk**.

Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

Opencast mines

Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips

Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations

Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites

Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence

Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas

Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission.

Mine water treatment schemes

Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining

Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

Coal mining licensing

Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders

Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices

Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices





Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

Payment to owners of former copyhold land

Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

The map highlights any specific surface or subsurface features within or near to the boundary of the site.

Key

- Approximate position of the enquiry boundary shown 
- Disused mine shaft 
- Geological faults 
- Coal claim 



How to contact us
0345 762 6848 (UK)
+44 (0)1623 637 000 (International)
www.groundstability.com



The Coal
Authority

Permit to Enter or Disturb Coal Authority Interests

Permit 21011v2

Name and Address of Permit Holder:

*William Hall & Co Chartered Surveyors
The Estate Office
Hawarden
Flintshire
CH5 3NX*

Site Location:

*Land west of
Ash Lane
Mancot
Deeside
CH5 2BR*

This certificate hereby grants the above named Permit Holder a Permit to carry out:-

Ground investigation by 12 boreholes to c.40m bgl, trial trenching to locate/disprove 7 mine entries from the site at CA and other Plots:

Reference:	Types:	CA Approx Co-ordinates:
Reference: 331366-014	Type: Shaft	331778E 366812N
Reference: 331366-016	Type: Shaft	331715E 366809N
Reference: 331366-017	Type: Shaft	331755E 366756N
Reference: 331366-018	Type: Shaft	331824E 366746N
Reference: 331366-019	Type: Shaft	331811E 366719N
Reference: 331366-020	Type: Shaft	331774E 366698N
Reference: 331366-050	Type: Shaft	331665E 366369N

within the Authority's interests at the identified site location above as shown on the Grant Permit Boundary (overleaf) for the period of 12 months from the granted date shown below. *The granting of this Permit does not constitute advice given by the Authority in relation to the proposed operations. It is the Permit Holder's responsibility to obtain appropriate health, safety, environmental, technical and legal advice.*

Conditions:

- *Water flush*
- *Gas Monitoring CO, CH₄, CO₂, O₂, H₂S at borehole and rig*
- *Operators undertaking the work must be in possession of this certificate and the Permit boundary plan at the time of works*
- *Coal Authority property exposed by these works must be appropriately secured*
- *Appropriate borehole sealing without delay and to withstand site level changes*

**20 November 2020
(amended 23 November
2020)**

Signed: *Darren Hurst* Granted Date: 20 November 2020

For and on behalf of The Coal Authority

Nominated Representative: Darren Hurst, Permitting Manager;

The Coal Authority, Permitting Office, 200 Lichfield Lane, Mansfield, Notts, NG18 4RG

Tel: 01623 637450; E-Mail: permissions@coal.gov.uk



Granted Permit Boundary

Permit Ref: 21011

Permit Boundary:

