



**A PHASE 1 PRELIMINARY RISK
ASSESSMENT OF LAND BETWEEN
PENNINE VIEW AND PHEASANT
DRIVE, BIRSTALL**

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Executive Summary

Introduction	Terra97 was commissioned by Mileway Real Estate to undertake a Phase 1 Preliminary Risk Assessment and desk Based Shallow Coal Mining Risk Assessment of the land between Pennine View and Pheasant Drive, Birstall (the "site")
Site Walkover	Terra97 undertook a site walkover survey on the 11 th March 2020 which recorded a number of potential sources of contamination including tanks, fuel pumps, oil storage and vehicle repair.
Past land uses, environmental setting and likely contamination	- A number of potentially contaminative land uses are present around the site. The Site is currently occupied by a portal frame building which is used for vehicle service and repair and storage. - The site walkover has recorded numerous sources of potential contamination, including fuel storage tanks, wash down areas and gas oil tanks from a former vehicle repair garage on site. - Pertinent on Site and surrounding historical and current land uses include multiple phases of commercial and industrial development, involving the waste reclamation, collieries and chemical waste transfer - The Site is expected to be underlain by various Made Ground soils originating from historical on Site redevelopment and possibly from local collieries. - The bedrock beneath the Site is expected to comprise a combination of mudstones, siltstones and sandstones belonging to the Emley Stone Sandstone (Secondary A Aquifer). These deposits are anticipated to be weathered in the upper horizons. - The Site is located in a Coal Mining Area with 2 No. seams of influencing depth below the site. - The Site is not located within a Source Protection Zone. - The site does not pose a significant risk to surface waters. - There are landfills reported within 250m of the Site and natural coal seams and Made Ground soils are present locally. As such, a ground gas risk assessment is required. - The Site is not within an area which requires basic Radon Protection Measures.
Coal Mining	The general ground conditions suggest around 1-2m of Made Ground and / or weathered bedrock, underlain by mudstones, siltstones and sandstones. Around 0.80m thick coal, considered to represent the Adwalton Black Bed coal seam, was recorded at depths of around 7 and 8m bgl and, as such, the quality of the overlying cover will be critical (should this seam be found to have been worked) in order to determine the requirements for remediation. Similarly, the Middleton Main Seam is located at some 38m bgl and therefore is likely to have acceptable cover between the site surface and it's known workings, however, again, this will only be assessable through site investigation.

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1 INTRODUCTION

Terra97 was commissioned by Mileway Real Estate Ltd to undertake a Phase 1 Preliminary Risk Assessment and desk based Coal Mining Risk Assessment for a site referred to as Norquest Industrial Estate, Birstall (the "Site"). It is understood the development involves the demolition of existing building and the construction of four modern purpose-built employment units to attract B1c, B2 and or B8 tenants, along with landscaping and associated works.

Taking into account the planned future use of the Site, the objectives of this appraisal were:

- Review historical plans, geology, hydrogeology, site sensitivity, flood-plain issues, mining records and any local authority information available in order to complete a Desk Study in line with current guidance.
- Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors;
- Assess the desk study information and where possible, provide preliminary recommendations in relation to foundations, pavement construction and floor slabs; and,
- Provide recommendations regarding future works required and to allow the client to undertake a preliminary pre-construction cost appraisal.

This report, which was designed to meet the requirements of all relevant current guidance, presents the factual information available during this appraisal, interpretation of the data obtained and recommendations relevant to the defined objectives.

1.1 SOURCES OF INFORMATION

In the production of this Phase 1 Preliminary Risk Assessment, the following sources of information have been used in order to develop and refine the ground model and conceptual site model:

- Groundsure Report;
- Historical mapping
- Coal Authority Mining Report
- Coal Authority Consultants Report
- Coal Authority Abandonment Plans
- On-line planning records held by the Local Council;
- Consultations with representatives of the Local Council;
- Groundwater Vulnerability Map;
- Radon: Guidance on protective measures for new buildings (BRE Document BR 211, 2015); and,
- British Geological Survey Map.

1.2 LIMITATIONS

This report and its findings should be considered in relation to the terms of reference and objectives agreed between Terra97 and the Client as indicated earlier in this Section.

For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information, it has been assumed it is correct. No attempt has been made to verify the information. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals. Whereas the report does not state that the subject site is free from asbestos containing materials (ACMs) or Japanese Knotweed (JKW), any suspected evidence recorded during the site walkover survey will be noted and described.

During the site walkover reasonable effort has been made to obtain an overview of the site conditions; however, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.

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2 SITE DETAILS AND DESCRIPTION

2.1 SITE DETAILS

Due to the size of the site and the varying topography, current land use and ground surface type, the site has been subdivided into two main areas for the purposes of this part of the assessment, Namely Area A in the south and Area B in the north. It is envisaged that this will carry through to the main site investigation works. The area division is presented in the appendices.

Table 2-1 **Current Site Overview.**

Site name	Norquest Industrial Estate
Site address	Norquest Industrial Estate, Between Pennine View and Pheasant Drive, Birstall, WF17 9LT
National Grid Reference	423295 427014
Location description	The application site (the 'Site') is previously developed (brownfield) land containing a large warehouse unit and workshop located between Pennine View and Pheasant Drive, Norquest Industrial Estate, Birstall. 2.7. The Site is approximately one mile from Junction 27 of the M62 (via the A62 Geldard Road), which is also the confluence of the M621 (providing access to Leeds).
Approximate Site area	Approximately 1.8 ha
Site shape	The site is irregularly shaped
Current land use	the Site contains a part single part two storey warehouse unit that is set back from Pheasant Drive and Pennine View.
Surrounding land uses	The surrounding land use is predominantly commercial in the area surrounding the Site. 2.6. The nearest residential dwellings are approximately 140 metres away from both the southern boundary of the Site (on Moat Hill Farm Drive) and beyond the western boundary (on Greenacres Drive).
Existing structures	The unit is constructed of metal sheeting with a brick base and has various openings and dock levellers, particularly on the southern elevation, to accommodate the loading and unloading of goods from Heavy Goods Vehicle (HGVs). • The Site also contains a smaller workshop located to the north-west corner which is separate from the main warehouse unit and is outside of the palisade fencing and has been used as a vehicle servicing business. The workshop is constructed in brick, with openings to the front to accommodate the servicing of vehicles. Attached to the workshop is a two-storey brick building which contains a flat roof.
Invasive plant species	None recorded.

2.2 SITE WALKOVER SURVEY

Following an extensive site walkover survey with the current tenant, the following points are considered pertinent when considering the potential pollutant linkages associated with the redevelopment of the site. For ease of reference, the notes from the Site Walkover are divided into Area A and Area B. Photographs are presented in the appendices.

2.2.1 Area A

- Surrounding land uses to the northeast is a chemical reclamation facility, with chemical drums (assumed empty) used for hydrogen peroxide. A single empty drum appears to have fallen over the fence onto the study site.
- Engineering bays are present within the main building.
- There is a tank located on a mezzanine within the main building; however, this is considered to be for water.
- Foul drainage found to be overflowing locally in the northeast of the site.
- The boundary to the south, west and east is Pennine View road.
- Within and at the roller shutter doors, several unbanded and open oil drums were noted; however, spillages were not noted to be significant.

- There are no known current or former underground bulk storage tanks recorded at the site; however, this does not rule out unrecorded tanks. The following above ground tanks were noted adjacent west, external to the main building:
 - Three large (55,000l) brick banded diesel tanks (coloured blue and rusting slightly) used for lorry refuelling. The tanks are monitored with a gauge and an alarm; staining was observed at the fill points and dispensing points, as shown in photographs.
 - The bunds around the above tanks are of brick construction in a poor state of repair, with cracks in some areas.
 - One large grey fuel tank of unknown capacity.
 - One double skinned blue plastic tank containing Adblue, which is a self-contained tank, with integrated fill point and pump.
- Waste oil store is located in the northeast corner of the site; bund does not appear to be able to hold 110% of the volume of the drums.
- The general topography slopes from the break between Area A and Area B in the north of Area A, down to the access road at the south of the site.
- The site is around 1.5m higher than the surrounding land at the northeast, around 1.2m higher in the southwest, around level in the west of the area and around 1.5m lower than the surrounding land in the northwest.
- The visitor's car park in the east of Area A is covered by several layers of tarmac and may contain coal tar.
- The main area for wagon movements is concrete covered by a thin layer of tarmac which may contain coal tar.
- The parking at the periphery of Area A comprises several layers of tarmac and may contain coal tar.
- A wagon was noted to be being repaired on the hardstanding in the north western part of the site.

2.2.2 Area B

- This area is mainly covered in gravel hardcore, with some localised areas of concrete, possibly from former buildings.
- The site is around 1m higher than Area A and is relatively flat lying.
- There is a wash down area in the southeast corner of the area which also has a shipping container with several open oil drums of unknown contents. Storage containers of cleaning fluids are also present.
- To the east lies the chemical reclamation facility and a large stack of IBCs.
- In the northwest corner lies a former mechanic garage with an unbanded tank labelled gas oil which is upgradient from the rest of the site and may be a source of hydrocarbon contamination.

3 SITE HISTORY

3.1 HISTORICAL MAPPING

Extracts of Ordnance Survey (OS) plans dated from 1854 to 2020 were reviewed. These were obtained as part of the GroundSure report for the Site, which is presented in the appendices.

Table 3-1 presents a summary of the main aspects of the Site from 1852 relevant to the current and proposed future end uses. It is not the intention of this report to describe in detail all of the changes that have occurred on or adjacent to the Site, where these are not relevant to the land use.

Table 3-1. *Site History.*

Source (Map edition)	On-Site features	Off-Site features
1854 to 1908	- The site is generally open ground, considered to be agricultural. - Nab Lane runs through the centre of the site from east to west.	- A railway cutting lies 100m south of the site. - An area of raised ground (considered likely to be associated with colliery spoil from the Howden Clough Colliery) - A reservoir is shown 180m east of the site.
1922 - 1955	No significant changes.	- A shaft is shown 250m northeast of the site. - The colliery spoil encroaches closer to the site. - The reservoir to the northeast is no longer shown - A reservoir is shown 95m to the west of the site. - A pond is shown within the suspected colliery spoil 145m east of the site.
1970 - 1987	- A small rectangular building is being developed in the south of the site. - The north west of the site has rectangular features, suspected to be concrete hardstanding associated with the adjacent road transport depot.	- The land to the north has been developed with the existing Tuffnell's warehouse and is noted to be a road transport depot. - Land to the northeast has been developed as an engineering works. - A friction material factory is located 105m to the west of the site. - A warehouse is located 35m west of the site.
1987 - 2020	- The site is now labelled as "Gelderd Road Industrial Estate" - The existing portal frame building has now been developed. - A tank is shown in the centre of the site.	- Tanks are shown 10m west of Area B and 10m north of Area A. - Tanks are shown 20m southwest of the site but, due to topography, are unlikely to pose a risk to the site.

3.2 AERIAL PHOTOGRAPHS

The GroundSure report has presented the following aerial photographs:

- 1999: The site is occupied by a number of trailers in Area B and Area A is predominantly car parking. It appears that Area B may be covered by hardstanding; however, this is not conclusive.
- 2012: No significant changes, other than the ground surface of Area B may be at its current gravel configuration.
- 2020: No significant changes

3.3 LOCAL HISTORIC CONTAMINATIVE LAND USES

Table 3-2 presents a summary of the past land uses which may have resulted in contamination of the site or its surrounding environs. The entries relate to activities within *circa* 250 m of the Site. Those activities which are significantly downgradient of the site or which otherwise do not pose a risk to the site are not presented in the table below.

Table 3-2. Historic Contamination Sources or Land Uses in the Locality.

	Location	Comments
Pertinent Historic Land Uses	• Adjacent to eastern boundary of the site.	• Colliery (noted in historical mapping) which it noted by the GroundSure report to be on site; however, this may be due to poor georeferencing.
Historic Tanks	• On site • 5m and 10m E	• Records from 1989 – 1991; however, these are still present on site. • 1985 to 1991, still present at the site and noted during the site walkover
Historic Energy Features	• None within 50m of the site.	
Historic Garages	• 170m NE	• Unlikely to pose a risk to the site
Historic Landfill Sites	• 101m S • 270m E	• Associated with the former railway cutting identified in the historical mapping. Surrendered in 1988 and accepted inert, commercial and industrial wastes. As this is downgradient from the site it is unlikely to pose a risk from leachate migration; however, there is a risk of ground gas migration. • Associated with the former Howden Clough Colliery site and Inert, Industrial, Commercial, Household, Liquid sludge. Given the distance from the site, it is unlikely to pose a risk from leachate migration; however, there is a risk of ground gas migration.
Historic Waste Sites	• Adjacent to western boundary of the site.	• Planning application reference: 93/62/04544/E0 Description: Scheme includes conversion of former chemical works to plant for recycling containers & waste storage/transfer station.

4 ENVIRONMENTAL SETTING

4.1 LANDFILL AND WASTE

Table 4-1 *Pertinent Recent Waste Related Activities.*

	Presence/location	Comments
Active or Recent Landfill Sites	NR	
Licenced Waste Sites	18m N (30, Pheasant Drive, Birstall, Batley, West Yorkshire, WF17 9LT)	Material Recycling Treatment Facility Size: 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: RSP003 EPR reference: EA/EPR/HP3295ZC/V003 Operator: R Spivey & Son Ltd Waste Management licence No: 61047 Annual Tonnage: 4999
Waste Exemptions	No pertinent sites recorded.	
Is a ground gas risk assessment required?	Yes	The presence of coal measures beneath the site and on and off site Made Ground suggests that a ground gas risk assessment is required

NR - none recorded

4.2 RECENT POTENTIALLY CONTAMINATIVE LAND USES

Historical potentially contaminative activities, which are considered to pose a risk to the site, are shown in Table 4-2. The entries relate to activities within circa 250 m of the Site, with the exception of COMAH facilities where the assessment is extended to a distance of circa 1 km from the Site. Those activities which are significantly downgradient of the site or which otherwise do not pose a risk to the site are not presented in the table below.

Table 4-2. *Potentially Contaminative Processes in the Locality.*

	Location	Comments
Recent Industrial Land Uses	- On site - On site - On site	- Vehicle servicing and repair - Distribution and Haulage - Tank (see site walkover section)
Fuel station entries	NR within 250m of the Site/	
Gas pipelines or Electricity Cables	NR within 250m of the Site.	
Sites determined as Contaminated Land under Part2a (EPA 1990)	NR within 250m of the Site.	
COMAH sites	40m NE	Tennants Distribution Limited, Batley, Gelderd Road Industrial Estate, Gelderd Road, Batley, West Yorkshire, WF17 9NF COMAH Lower Tier Operator
Hazardous Substance Storage	As above	As above
Licenced Industrial Activities (PartA(1))	NR within 250m of the Site.	
Licenced Pollution Release	NR within 250m of the Site.	
Registered radioactive substances	NR within 250m of the Site.	

Licenced Discharge Consents to Controlled Waters	NR within 250m of the Site.	
Pollutant release to Surface Waters	NR within 250m of the Site.	
Pollutant release to Public Sewer	NR within 250m of the Site.	
EA and NRW Pollution Incidents	1m east of the site	Incident Date: 30/09/2002 Incident Identification: 111561 Pollutant: Specific Waste Materials Pollutant Description: Inorganic Chemical Wastes Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)

NR - none recorded, COMAH – Control of Major Accident Hazards (regulations);

4.3 GROUNDWATERS

Table 4-3. **Groundwater Occurrence and Abstraction.**

	Presence/location	Comments
Depth(s)	On Site: Made Ground	Shallow groundwater may occur within Made Ground overlying lower permeability bedrock.
	On Site: Secondary A Aquifer	Interbedded mudstone, siltstone and sandstone bedrock is anticipated at and may include permeable layers capable of supporting water supplies at a local rather than strategic scale. In addition, fractures identified on Site and within the local Site vicinity may enhance the permeability of the bedrock strata from low to medium.
Direction of flow	Groundwater flow is expected to be in the direction of the general topography of the site, to the southeast.	
Groundwater Vulnerability Status	Secondary bedrock aquifer -High Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures
Soluble Rock Risk	NR within 500m of the Site.	
Groundwater abstractions	NR within 500m of the Site.	
Surface Water Abstractions	NR within 500m of the Site.	
Potable Abstractions	NR within 500m of the Site.	
Source Protection Zones	NR within 500m of the Site.	
Springs	NR within 500m of the Site.	

NR - none recorded.

4.4 SURFACE WATERS

Table 4-4. *Surface Water Features.*

	Presence/location	Comments
Nearest Surface Water Bodies	176m SE	Watercourse contains water year round (in normal circumstances)
Unclassified watercourse(s)	NR	
Licensed abstractions	NR within 1km	
Canals, ponds, lakes, etc.	NR within 1km	
Flood risk status	NR	Very Low
Surface run-off and Site drainage	On site	Drainage is likely to flow from the ground surface and into the public sewerage system via manholes in the adjacent roads.

NR - none recorded. Environment Agency GQA assessments: A = very good to E = poor

4.5 ECOLOGICAL FEATURES

Table 4-5 *Ecological Features.*

	Presence/location	Comments
Environmental Designations	NR within 500m	
SSSIs	NR within 500m	
Conserved Wetland Sites	NR within 500m	
Land use controls (e.g. SACs, SPAs, NNRs, LNRs)	NR within 500m	
Invasive plants	None observed.	A survey by a qualified invasive plant consultant is required to confirm the absence or extent of invasive species.
Ancient Woodland	NR within 500m	
Habitat Designations	NR within 500m	

NR - none recorded

4.6 GEOLOGY

Table 4-6. *Geological Summary.*

Maps and publications referenced	GroundSure BGS GeoIndex
Made Ground	Available records give indication as to the presence of Made Ground on the Site; however, no details are presented as to the origin or composition. Given the nature of the surrounding Site coal mining history and the phases colliery spoil type Made Ground is expected to be present.
Drift geology	No superficial drift deposits are recorded in the vicinity of the Site.
Solid geology	The bedrock beneath the Site is expected to comprise of mudstones, siltstones and sandstones of the Emley Rock Sandstone.
Bedrock Faults and Other Linear Features	114m NW, 121m SE and 126m SE lies a normal fault where the position has been inferred.

Dip of solid strata	The gradient of the dip is not explicitly stated on geological records, however, based on the surrounding topography and the published geological maps, the strata is anticipated to dip towards the north.
Landslip and Landslip Permeability	NR
Borehole Records	8 No. BGS borehole records are present on the site: • (423270 426960) 9.0 m depth • (423370 426960) 9.5 m depth • (423370 426960) 15.0 m depth • (423300 426980) 7.8 m depth • (423290 427000) 7.8 m depth • (423320 427010) 9.0 m depth • (423330 426980) 8.6 m depth • (423330 426990) 8.5 m depth The general ground conditions suggest around 1-2m of Made Ground and / or weathered bedrock, underlain by mudstones, siltstones and sandstones. Around 0.80m thick coal, considered to represent the Adwalton Black Bed coal seam, was recorded at depths of around 7 and 8m bgl.
Natural Ground Stability (subsidence, volume change potential, running sands, dissolution features)	NR

4.7 NON COAL MINING EXTRACTIVE INDUSTRIES

Table 4-7 *Other Extractive Industries.*

	Yes/No	Comments
Superficial drift deposits		
Evidence of extraction on or within 250 m of the Site?	No	
Action required?	No	
Solid Strata		
Any evidence of mineral extraction on or within 250 m of the Site?	Yes	Ponds and reservoirs recorded in geological mapping.
Action required?	Yes	A ground gas risk assessment is recommended.

Other, undocumented mineral workings on or close to the Site cannot be completely dismissed.

4.8 RADON RISK

Table 4-8. *Radon Risk Status.*

	Radon protection measures required? (Yes/No)	Comments
BRE (1999), Report 211	No	The property is not in a Radon Affected area defined by the Health Protection Agency (HPA) as less than 1% of properties are above the Action level.
BGS Site-specific report	Not requested	

5 SHALLOW COAL MINING RISK ASSESSMENT

5.1 COAL MINING RECORDS

In accordance with CIRIA 758D (Abandoned Mine Workings Manual), the following desk based assessment has been carried out, given the coal mining history and the geology of the site and the local area. As part of this assessment, a GroundSure Consultant's Mining Report was obtained (Ref: 51002263216001). This report is based on and limited to the records held by the Coal Authority at the time the report was produced. In addition, coal mining abandonments plans from within 50m (vertical distance) of the site surface were obtained from the Coal Authority in order to determine the known worked voids below the site. The following items are considered to be salient when assessing the risk of shallow coal mining:

- The report has identified 8 No. seams below the site which have recorded workings, with depths ranging from 38m bgl to 246m bgl.
- There are no recorded mineshafts within 20m of the site boundary.
- No outcrops or subcrops of coal seams are recorded within the site boundary of its immediate local area.
- There are no Coal Authority Managed Tips within 500m of the site.
- There are no remediated sites within 50m of the site boundary
- The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.
- 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.
- Mine gas has not been recorded within 500 metres of the enquiry boundary.
- Mine water treatment schemes are not recorded within 500 metres of the enquiry boundary.
- Future underground mining is not planned at the site.
- No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.
- 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.
- The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

5.2 WORKABLE SEAMS BELOW THE SITE, WITHIN INFLUENCING DEPTH

The past underground mining records show that the extractable seam thickness for the worked seams below the site range from 1.3m to 0.61m. Given that drift deposits (other than Made Ground) are not recorded in the area or in the BGS borehole logs, it is considered that the site would not be at risk from subsidence of any seam below 50m depth. As such, the Middleton Main Seam is considered to be the only *recorded* seam which could potentially pose a risk to the proposed development.

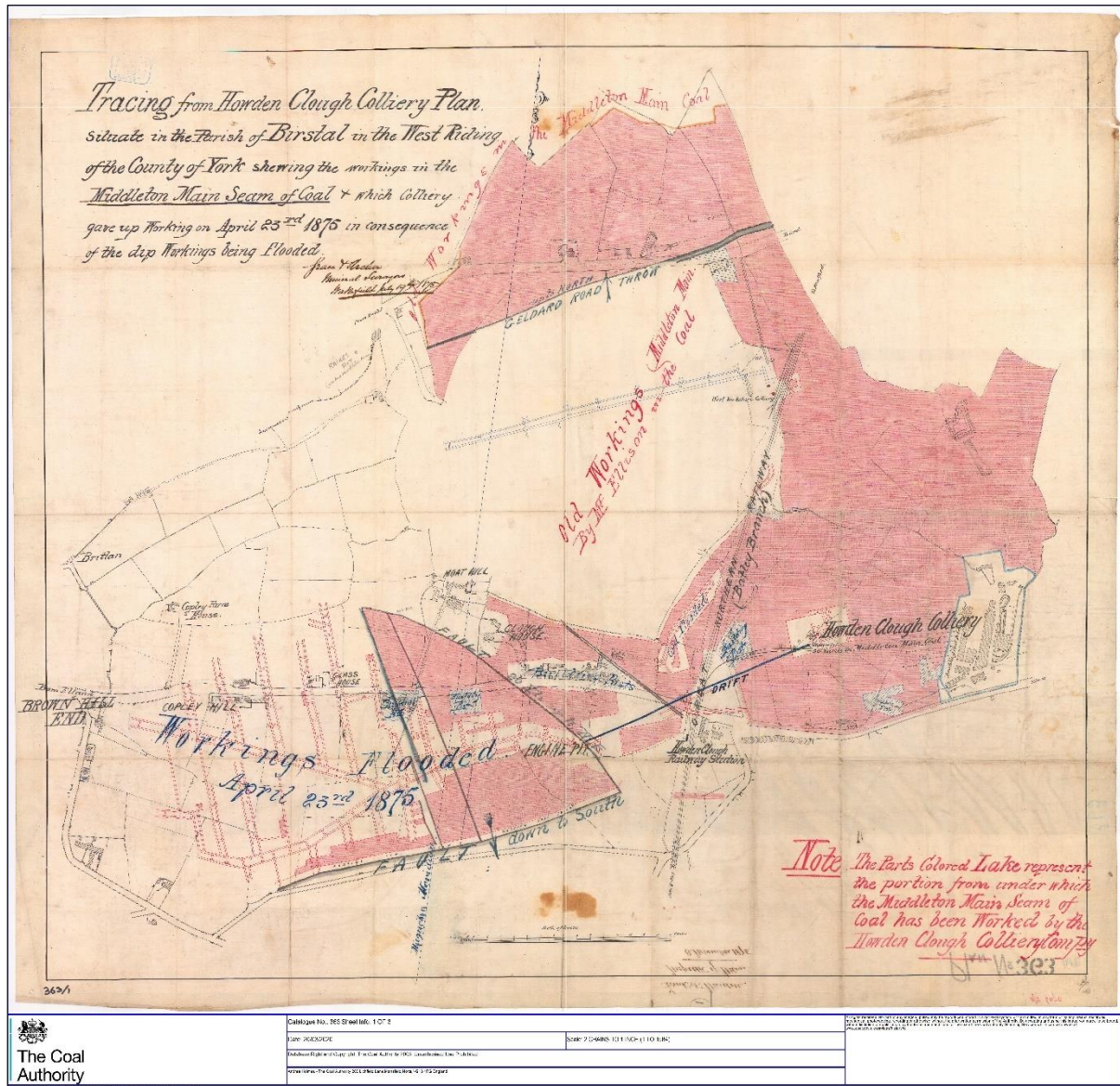
Information from BGS borehole records suggest that there are other, unrecorded seams below the site. It is unknown whether the Adwalton Black Bed coal seam, which was recorded at depths of around 7 and 8m bgl, has been worked; however, it was not until the statute of the Coal Mines Regulation Act of 1872, that the obligations were placed on mine owners to record their activities with the Secretary of State. As such, most mining which occurred post 1872 is likely to have abandonment plans, any mining which pre dates 1872 could remain without record. This seam appears to be only 0.80m thick and is unlikely to have been work economically, this does not remove all risk of shallow workings being present at this seam and, as such, it is also considered to pose a risk.

It should also be considered possible that both the coal and the seatearth may have ben extracted from below the site. It should also be noted that no visible depressions or other evidence of shallow mining were noted during the site walkover.

5.3 COAL AUTHORITY ABANDONMENT PLANS

The Middleton Main Seam abandonment plans are presented in Figure 5-1 below.

Figure 5-1 Middleton Main Seam Abandonment Plans



5.4 SHALLOW MINING RISK ASSESSMENT

Throughout the UK, a 10 x seam thickness 'rule of thumb' has been used as a method of assessing the likelihood of the cover of bedrock between any worked seam and the proposed development. This method has, however, ignored the wide ranging evidence which suggests that the acceptability of cover is heavily dependent upon the stratigraphy and the type of coal working methods which were employed. Nevertheless, this empirical method has introduced a degree of conservatism at many sites which has resulted in an apparently successful method of cover assessment. More recent reassessments of this method, however, have cast doubt upon its use, in favour of the application of geomechanical modelling, the basis of this is information which can only be obtained through very detailed site investigation. In any case, serious consideration should be given to the possibility of atypical failure of the cover, or even atypical ground conditions which may induce failure.

The cost of this investigation may, however, be prohibitive in certain development and this is certainly the case when mining assessments are being undertaken at the pre-planning stage. A more suitable approach, in this instance, would be for a qualified specialist to take an objective view of all ground conditions and future development proposals.

The general ground conditions suggest around 1-2m of Made Ground and / or weathered bedrock, underlain by mudstones, siltstones and sandstones. Around 0.80m thick coal, considered to represent the Adwalton Black Bed coal seam, was recorded at depths of around 7 and 8m bgl and, as such, the quality of the overlying cover will be critical (should this seam be found to have been worked) in order to determine the requirements for remediation. Similarly, the Middleton Main Seam is located at some 38m bgl and therefore is likely to have acceptable cover between the site surface and its known workings, however, again, this will only be assessable through site investigation.

As such, it is considered that these 2 No. seams (and indeed, any unrecorded seams in between) may pose a risk to the site and the risk should be assessed through site investigation thus:

1. Determine the general thickness and quality of the cover of the shallow Adwalton seam in detail, as well as determining the dip, strike and continuity. This can be done through both rotary cored and openhole methods.
2. Determine the quality of the cover above the Middleton Main Seam through rotary cored boreholes.

Good practice would be to prove a minimum of two metres below the target seam or working, which would certainly be an objective of the Adwalton seam investigation. The foundations of the proposed development, however, will not be highly loaded and, as such, the assessment of the Middleton Main Seam would be therefore to prove that the foundations of the proposed development will be isolated from the working by 10 x the maximum extractable thickness of 1.30m. It is stressed that this will remain a 'rule of thumb' for the purposes of the ground investigation and will not constitute an absolute assessment criterion for cover acceptability in the final report.

6 PREVIOUS INVESTIGATION FINDINGS

6.1 PHASE 1 ENVIRONMENTAL SUMMARY REPORT

A Phase 1 Environmental Summary Report was undertaken in August 2017 by Ambiente International LLP. The study was limited to the environmental liabilities for a continued use of the site and does not take into account the redevelopment proposals.

This report covers the whole of the Norquest Industrial Estate site, of which the study site for this report forms the northern part.

The objectives of the Phase 1 Environmental Summary Report was to determine the potential environmental liabilities associated with the current and historical use of the acquisition property. The Environmental Review included the following key activities:

- A visual inspection of the site to determine current site activities;
- A review of available information provided by the Vendor, including a Phase I Environmental Assessment for the site produced by WSP UK Ltd (Ref. 70006481) in September 2014 to obtain:
 - Historical information to ascertain historical use of the site and its immediate surroundings;
 - A review of geological, hydrogeological and hydrological information to establish environmental sensitivities at the site and in its vicinity;
 - A review of available information from public databases (Landmark Envirocheck), the local authority and Environment Agency (note: no updated or full Envirocheck report was obtained as part of this review).
- An updated standard enquiries / consultation with the Local Authority;
- A review of environmental documents provided by the tenants; and
- Preparation of a summary report outlining the findings of the review, a preliminary assessment of potential environmental risks and liabilities and recommendations/requirements for further work as required.

The report concluded that, although a potential "contamination linkage" with the significant possibility of significant harm (SPOSH) to human health, non-human receptors or controlled waters was not identified, there was the potential for residual contamination to be present at the site due to its former uses.

The level of environmental risk associated with the subject property was assessed to be acceptably low and the property has not been registered as contaminated land, therefore no further environmental investigation or assessment was considered necessary prior to acquisition.

The report also concluded that, subject to the implementation of the recommendations of the report, under continued use it was not expected that significant environmental residual liability would be realised at the property.

6.2 JAPANESE KNOTWEED SURVEY

A site survey was undertaken by Japanese Knotweed Ltd on 06 September 2018 and the report has been presented to Terra97; however, it does not cover the study site.

7 PROPOSED DEVELOPMENT

The proposed Site plan (see appendices) shows the proposed layout. The current planning application is for:

"Demolition of existing warehouse and workshop unit and the erection of employment units with reconfigured access from Pennine View and associated landscaping, parking and hardstanding for manoeuvrability"

The site layout has been subdivided to accommodate 3 separate buildings providing 4 units. Unit 1 is positioned to the north of the site reconfiguring the site access point from Pennine View. The proposed building is aligned parallel to the northern site boundary and has been positioned to make best use of the site.

Upon entering the site, turning left leads to the car park which has been located to the front of the building for ease of access and adjacency to the office entrance area. The proposed car park provides 47 car spaces, including 3 accessible and 8 bicycle spaces. Driving straight ahead from the site entrance leads to gated access to the large yard. The south elevation of the building features 2 level access doors and 2 dock levellers.

The existing site access is to be utilised at the south of the site, from Pheasant Drive. This provides access to Unit 2 and Units 3A & 3B. A new substation is positioned to the right of this new site entrance. Unit 2, positioned at the south-west corner of the site, features warehouse space on the ground floor. First floor office space overlooks the car park to the south, which provides 36 car parking spaces including 2 accessible and 6 bicycle spaces. A gated access yard provides access to 3 level access doors on Unit 2's east elevation.

Units 3A and 3B, positioned to the east of the site, are housed within the third proposed building. These units share an access yard, 18 car parking spaces and a cycle stand. The southern elevation features 2 level access doors, one for each unit..

8 PRELIMINARY CONCEPTUAL MODEL

Based on the desk study, a combined preliminary conceptual site model and conceptual exposure model has been developed for the proposed future land use. This summarises the understanding of surface and sub-surface features, the potential contaminant sources, transport pathways and receptors. In assessing the likely contaminants present at the Site, reference has also been made to Defra and Environment Agency supporting documentation. A preliminary qualitative risk assessment has also been made of the likelihood of the linkage operating and its potential significance.

The potential pollutant linkages identified and the qualitative risk assessment for these are presented in Table 8.1. The terms used in the preliminary qualitative risk assessment are defined in the appendices.

8.1 JUSTIFICATION

The following factors are considered pertinent in defining the conceptual model.

8.1.1 Land Use

- The Site is currently occupied by a portal frame building which is used for vehicle service and repair and storage.
- The site walkover has recorded numerous sources of potential contamination, including fuel storage tanks, wash down areas and gas oil tanks from a former vehicle repair garage on site.
- Pertinent on Site and surrounding historical and current land uses include multiple phases of commercial and industrial development, involving the waste reclamation, collieries and chemical waste transfer
- The Site is expected to be underlain by various Made Ground soils originating from historical on Site redevelopment and possibly from local collieries.
- The bedrock beneath the Site is expected to comprise a combination of mudstones, siltstones and sandstones belonging to the Emley Stone Sandstone (Secondary A Aquifer). These deposits are anticipated to be weathered in the upper horizons.
- The Site is located in a Coal Mining Area with 2 No. seams of influencing depth below the site.
- The Site is not located within a Source Protection Zone.
- The site does not pose a significant risk to surface waters.
- There are landfills reported within 250m of the Site and natural coal seams and Made Ground soils are present locally. As such, a ground gas risk assessment is required.
- The Site is not within an area which requires basic Radon Protection Measures.

8.1.2 Potential Sources

- Possible metal, PAH, asbestos, phenol, petroleum hydrocarbons, VOC/SVOC, sulphate, glycol, acid and alkali contamination associated with on-site Made Ground.
- Possible hydrocarbon, PAH, phenol, sulphate, acid, alkali and metal contamination from historical industrial uses adjacent to the Site.

8.1.3 Potential Pathways

- Dermal contact, ingestion and inhalation of contaminants on site.
- Lateral and/or vertical migration of mobile contaminants within shallow groundwater.
- Migration of mobile contaminants from Made Ground soils to adjacent sites along services and conduits.
- Contaminated dust migration during construction.
- Migration via water pipes.

8.1.4 Potential Receptors

- Future, current and adjacent users of the Site.

- Site investigation, demolition and construction staff and future underground service maintenance workers from hazardous short term exposure.
- Buildings, hardstanding and services.
- Secondary A Aquifer beneath the Site.

8.2 UNCERTAINTIES

The following uncertainties exist in the preliminary conceptual model.

- Any potential sources of contamination not highlighted from the historical maps during the desk based third party investigation of the Site.
- Any unrecorded geological features.
- Any unrecorded pollution events during the Site's history.
- Any unrecorded underground storage tanks or unreported spillages/leaks.

Table 8-1. **Preliminary Assessment of Potential Pollutant Linkages.**

Pollutant linkage				
	Source	Pathway(s)	Receptor(s)	Qualitative risk assessment
1	Possible metal, PAH, phenol, petroleum hydrocarbons, VOC/SVOC, glycol, asbestos and sulphate contamination associated with on-site Made Ground, Tanks and wash down areas.	Dermal contact, ingestion and inhalation of contaminants including contaminated dust migration during construction.	Future site users (commercial)	Medium x Low Likelihood = Moderate/Low Risk
			Current site users (site visitors and commercial workers)	Medium x Very Low Likelihood = Low Risk
		Migration via water pipes.	Adjacent site users (commercial/residential)	Medium x Very Low Likelihood = Low Risk
			Construction, site investigation, demolition and future maintenance workers	Medium x Low Likelihood = Moderate Risk
		Migration of mobile contaminants from Made Ground soils to adjacent sites along services and conduits. Lateral and/or vertical migration of mobile contaminants.	Adjacent site users (commercial/residential)	Medium x Low Likelihood = Moderate/Low Risk
			Secondary A Aquifer located beneath the Site	Medium x Low Likelihood = Moderate Risk
		Dermal contact, ingestion and inhalation of contaminants including contaminated dust migration during construction.	Future site users (commercial)	Medium x Low Likelihood = Moderate Risk
2	Hazardous Ground Gases	Migration of ground gases from Made Ground soils and coal bearing strata from adjacent sites along services and conduits.	Future site users (commercial)	Medium x Low Likelihood = Moderate/Low Risk
			Current site users (site visitors and commercial workers)	Medium x Low Likelihood = Moderate/Low Risk
		Lateral and/or vertical migration of mobile contaminants onto the site from adjacent sites.	Adjacent site users (commercial/residential)	Medium x Low Likelihood = Moderate/Low Risk
			Construction, site investigation, demolition and future maintenance workers	Medium x Low Likelihood = Moderate/Low Risk
3	Possible, PAH, phenol, petroleum hydrocarbons, VOC/SVOC glycol, acid and alkali contamination associated with off-site Made Ground, Tanks and chemical works	Migration of mobile contaminants from Made Ground soils from adjacent sites along services and conduits.	Future site users (commercial)	Medium x Low Likelihood = Moderate/Low Risk
			Current site users (site visitors and commercial workers)	Medium x Low Likelihood = Moderate/Low Risk
		Lateral and/or vertical migration of mobile contaminants onto the site from adjacent sites.	Adjacent site users (commercial/residential)	Medium x Low Likelihood = Moderate/Low Risk
			Construction, site investigation, demolition and future maintenance workers	Medium x Low Likelihood = Moderate/Low Risk
			Future site users (commercial)	Medium x Low Likelihood = Moderate/Low Risk

9 ENVIRONMENTAL CONSTRAINTS

9.1 GENERAL

This Phase 1 Preliminary Risk Assessment has been performed for the Norquest Industrial Estate development, located in Birstall, (the "Site").

9.2 POTENTIAL CONTAMINATION ISSUES

The site has been occupied by industrial and commercial buildings since at least the 1970s, including the presence of fuel tanks and vehicle repair workshops. These are likely to have the potential for contamination and ground gas generation. The geology underlying the site is anticipated to be Made Ground overlying the solid geology of the Thick Stone Sandstone Formation, underlain by the Pennine Lower Coal Measures at significant depth. The site has local landfill sites as is potentially at risk from ground gas ingress. The site does not pose a risk to any surface water courses and there are no surface water abstractions within the vicinity of the site. The underlying bedrock is designated as a Secondary A Aquifer; however, there are no groundwater abstractions within the vicinity of the site and the site is not within a source protection zone.

9.3 CLEAN COVER SYSTEM / OFF-SITE DISPOSAL

There is a potential, given the previous industrial Site use, for Made Ground to be present on Site which may be contaminated due to previous land use which presents a potentially significant risk to human health; however, as there is widespread hardstanding in the proposed development, it is envisaged that the majority of Made Ground soils would be covered and inaccessible to site users. There is, however, a risk that contamination may be present beneath the landscaped areas of the proposed development. This would be established via site investigation works that would include soil sampling for laboratory chemical analysis and human health/controlled waters risk assessment undertaken in accordance with current guidance. In the event that potentially significant risks to future site users are identified from the risk assessment, then there is a potential for an abnormal cost to be realised associated with the implementation of excavation and disposal of impacted soils to break potential pollutant pathways.

9.4 WASTE SOILS

Due to the nature of the site and the proposed development, it is envisaged that a volume of soil arisings are to be disposed off-site. Material exported from the site to landfill should be hauled by a registered waste carrier in accordance with Duty of Care Regulations, 1991 and the Hazardous Waste Regulations, 2005.

Characterisation of soils for waste will be required prior to off Site disposal. This provides a preliminary assessment of whether a material is potentially either inert / non-hazardous or hazardous waste, with the final outcome being determined by WAC testing. Final categorisation is the responsibility of the producer or holder of the waste.

The classification of the soils as different waste types will be extremely important to this project, due to the volume of soils which will need to be removed from site during the basement excavation. Hazardous waste commands a very high premium and, as such, it is important to attempt to segregate soils into separate waste streams in order to make significant savings.

There will be requirement for the waste producer to provide appropriate Waste Acceptance Criteria (WAC) testing of the soils for disposal to ensure that the soils are appropriately classified and that the landfill is licensed to receive such soils. In the event that asbestos is identified within Made Ground soils, then the nature and extent of the

asbestos should be determined along with the content by weight in order to assist with final waste classification. Any asbestos content recorded in excess of 0.1% w/w should be classified as hazardous waste.

9.5 UPGRADED WATER PIPES

The measured concentrations of determinands in the soil should be assessed to determine the potential for upgraded water pipes to protect human health from migration of contaminants in the future water supply. Laboratory chemical analysis results, applicable for the materials in which the water pipes will be laid, should be compared against the UK Water Industry Research (UKWIR) 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites' (10/WM/03/21).

As a further measure, it is recommended that the results of laboratory chemical testing are provided to the appropriate utility companies to determine the necessity for service protection, due to the fact that utility companies commonly refer to their own proprietary Assessment Criteria. The results of this could be that upgraded water pipes including barrier pipes or polyethylene pipes are required at the Site which may present an abnormal cost to the development works.

9.6 GAS PROTECTION MEASURES

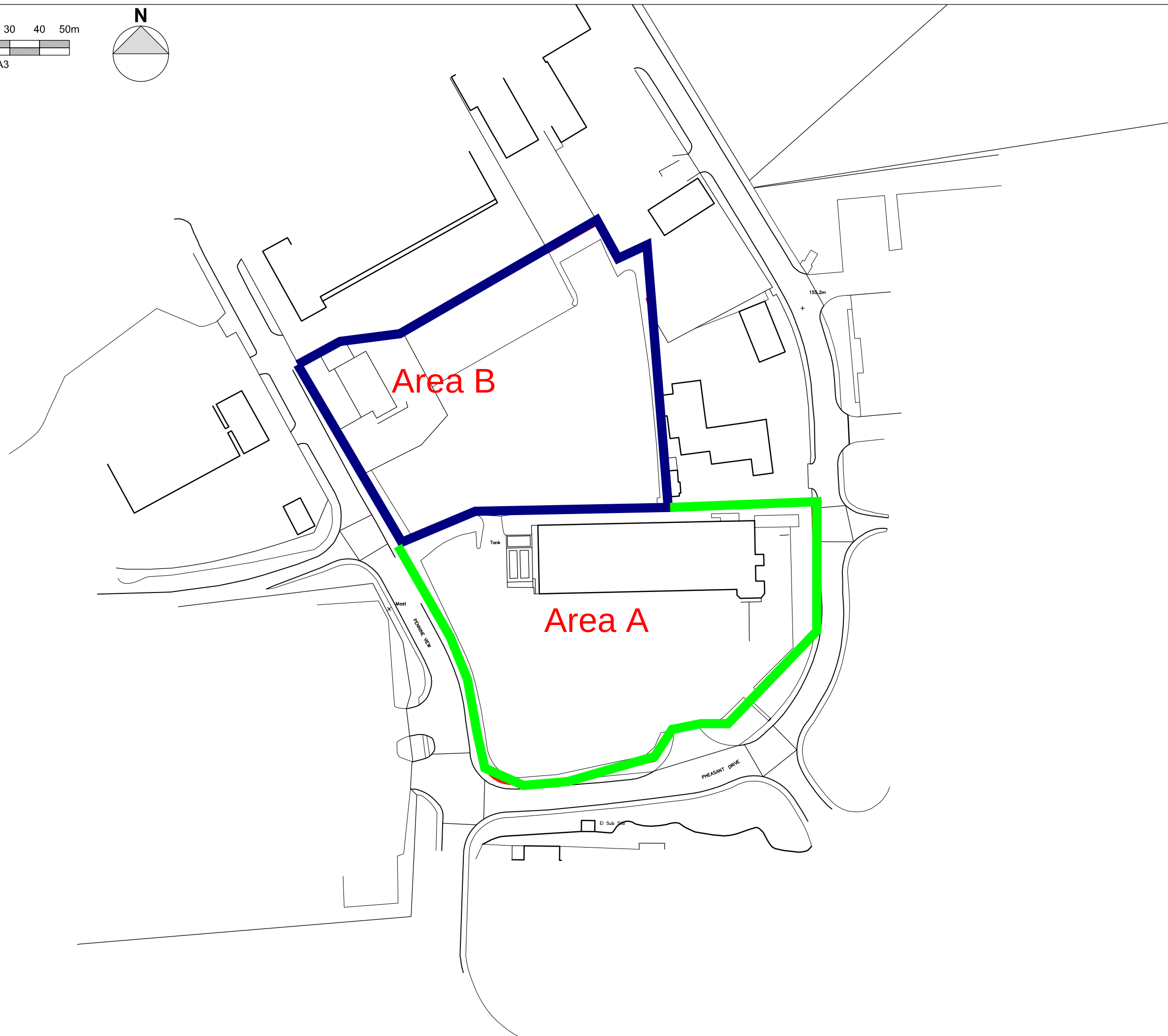
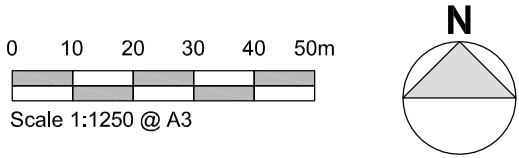
Upon completion of ground gas monitoring and assessment at the Site, it is possible that measured concentrations of potentially hazardous ground gases may be reported at concentrations and flow rates that present a potentially significant risk to the future site users. In this case, it may be that gas protection measures may be required as specified in CIRIA C665 in order to reduce or mitigate the migration of ground gases at the surface. These protection measures may include passive or active systems such as venting or membrane systems dependent on the outcome of the ground gas assessment which may present an abnormal cost to development works. This said, the presence of a fully tanked and ventilated basement at the site may be sufficient to mitigate the potential gas risks.

10 REGULATORY APPROVALS

The conclusions and recommendations presented above are considered reasonable based on the findings of the site investigation. However, these cannot be guaranteed to gain regulatory approval and, therefore, the report should be passed to the appropriate regulatory authorities and/or other organisations for their comment and approval prior to undertaking any works on site.

It is recommended that conditions placed on any planning permission are discharged prior to commencement of site works.

APPENDIX A – DRAWINGS



NOTES **AEWTP029C**

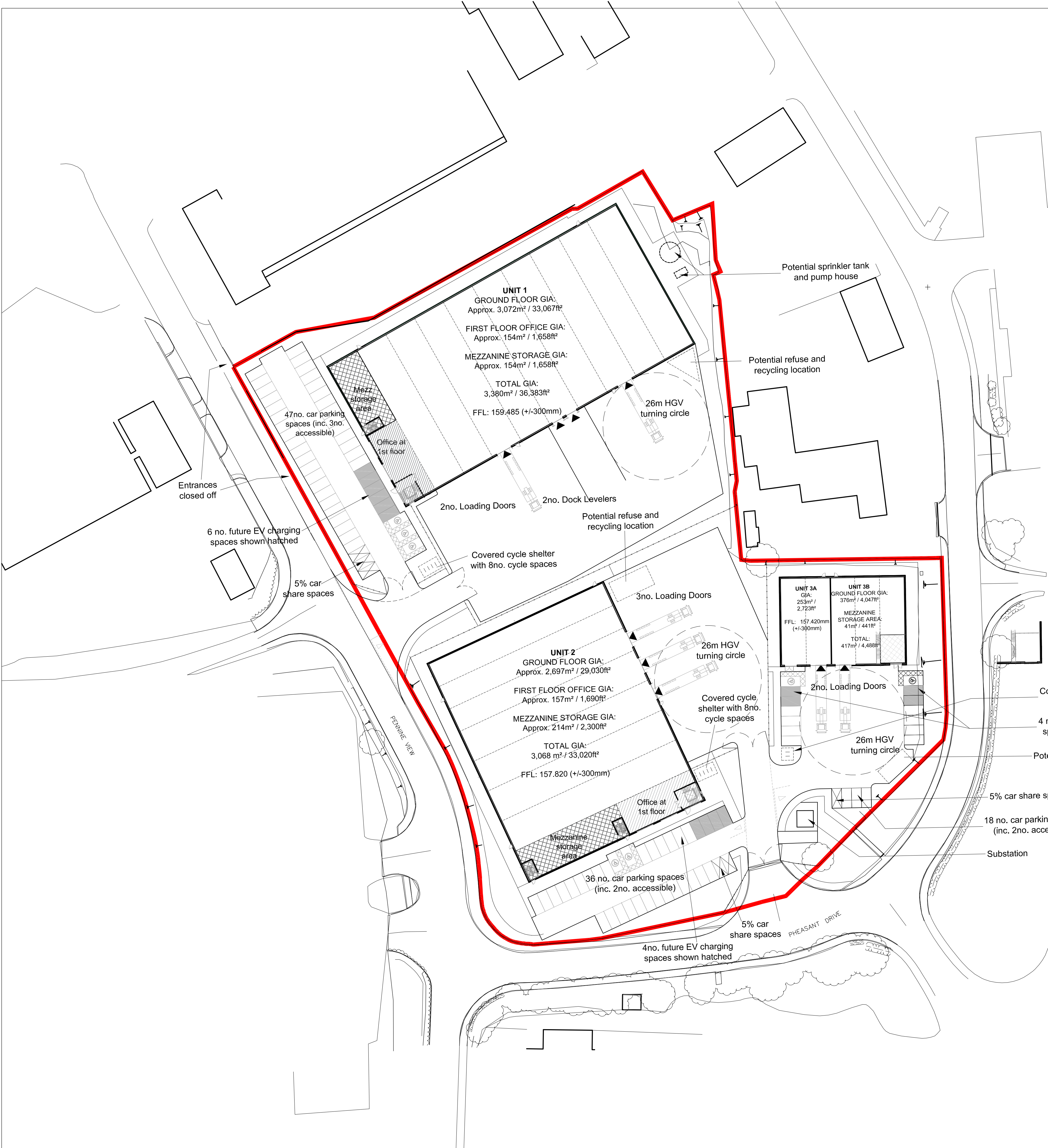
- All dimensions and levels are to be checked on site.
- Any discrepancies are to be reported to the architect before any work commences
- This drawing shall not be scaled to ascertain any dimensions. Work to figured dimensions only.
- This drawing shall not be reproduced without express written permission from AEW.
- Title overlay drawings and ownership boundaries are produced using all reasonable endeavors. AEW cannot be responsible for the accuracy or scale discrepancy of base plans supplied to them.
- All works are to be undertaken in accordance with Building Regulations and the latest British Standards.
- All proprietary materials and products are to be used strictly in accordance with the manufacturers recommendations.

CDM 2015

Client notified of duties: **29/04/2019**
Principal Designer: **AEW**

Unless noted below, all known hazards have been highlighted on the drawing.

P1	31/01/20	AS	AS
Initial Issue			
REV	Date	Drawn by: -	Checked by: -
Status	Purpose of Issue		
S2	For Information		
drawing stage	Feasibility		
client	Sunflower UK Industrial Property IV LP		
project	Norquest Industrial Estate Pheasant Drive Birstall, Leeds		
drawing title	Site Location Plan		
date	31/01/20	drawn	AS
scale@A3	1:1250	checked	AS



NOTES

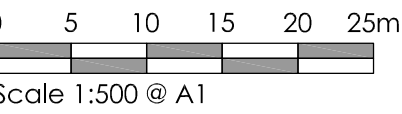
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- All proprietary materials and products are to be used strictly in accordance with the manufacturers recommendations.

CDM 2015

Client notified of duties: April 2020

Principal Designer: AEW

Unless noted below, all known hazards have been highlighted on the drawing:



Schedule of Accommodation							
Unit	Ground Floor Area		First Floor Office Area		Mezzanine Storage Area		Total
1	3,072 sqm	33,067 sqft	154 sqm	1,658 sqft	154 sqm	1,658 sqft	3,380 sqm / 36,383 sqft
2	2,697 sqm	29,030 sqft	157 sqm	1,690 sqft	214 sqm	2,300 sqft	3,068 sqm / 33,020 sqft
3A	253 sqm	2,723 sqft	n/a	n/a	n/a	n/a	253 sqm / 2,723 sqft
3B	376 sqm	4,047 sqft	n/a	n/a	41 sqm	441 sqft	417 sqm / 4,488 sqft
Total							7,118 sqm / 76,614 sqft
Red line boundary (Overall site)							
				4.47 Acre		1.80 Hectare	

NOTE

Finished floor levels stated are approximate only based on preliminary cut and fill exercise to balance the site, carried out by the Engineer.

An allowance of +/- 300mm has been included, to allow for final cut and fill to be carried out by the Contractor and final levels determined accordingly.

P6	11/08/20	AB	AS
Mezzanine storage area added to units, car and cycle spaces amended to BREEAM requirement			
P5	09/04/20	AS	AS
Finished floor levels added			
P4	02/04/20	AB	AS
Red line boundary amended			
P3	27/03/20	AB	AS
Future EV charging spaces and potential refuse and recycling added			
P2	20/03/20	AB	AS
Minor updates following DTM			
P1	21/02/20	AB	AS
Initial Issue			

REV	Date	Drawn by: -	Checked by: -
S2		For Information	
drawing stage			
Planning			
client			

Mileway Real Estate

Norquest Industrial Estate
Pheasant Drive
Birstall

drawing title

Proposed Site Plan

date	21/02/20	drawn	AB
scale@A1	1:500	checked	AS

Rev

P6

Job No

11321-AEW-XX-SI-DR-A-0502

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APPENDIX B – GLOSSARY OF TERMS

ACEC	Aggressive Chemical Environment for Concrete (classification)
aOD	Above Ordnance Datum
bgl	Below ground level
BGS	British Geological Survey
BRE	Building Research Establishment
CBR	California Bearing Ratio (test)
COMAH	Control of Major Accident Hazards (regulations)
Designated location	Site (and the ecosystem on that site) protected under national or international legislation. A potential ecological receptor to be considered as part of the assessment of land contamination. Example designated locations include SSSIs (q.v.), SACs (q.v.), national nature reserves, Ramsar sites and bird special protection areas.
DQA	Data Quality Assessment
DQO	Data Quality Objective
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EQS	Environmental Quality Standard
GAC	Generic Assessment Criterion
GQA	General Quality Assessment (Environment Agency)
GSV	Gas Screening Value
HCV	Health Criteria Value
IPPC	Integrated Pollution Prevention and Control (regulations)
K _{ow}	Octanol-water partition coefficient
LEL	Lower Explosive Limit
LL	Liquid Limit
LoD	Limit of Detection (analytical)
LoQ	Limit of Quantification (analytical)
Mean Value Test	Statistical test (described in the CIEH Guidance) to estimate the mean value of a normally distributed population of data at a given level of confidence. Normally for contaminated land assessment, the 95th percentile (referred to as the 95%UCL or US95) is applied as a reasonable but conservative estimate of the mean concentration for comparison with the relevant assessment criteria.
Maximum Value Test	Statistical test (described in the CIEH Guidance) to identify whether an elevated concentration within a normally distributed data set forms part of the underlying population from which it has been sampled or whether it is an outlier (such as a localised area of contamination) that merits further consideration.
MC	Moisture Content
NGR	National Grid Reference
NIHHS	Notification of Installations Handling Hazardous Substances (regulations)
OS	Ordnance Survey
PI	Plasticity Index
PID	Photoionisation Detector
PL	Plastic Limit
ppm	Parts per million
ppmv	Parts per million by volume
QA	Quality Assurance
QC	Quality Control
SAC	Special Area of Conservation
SOM	Soil Organic Matter
SPT	Standard Penetration Test
SPZ	Source Protection Zone (see Appendix E)
SSAC	Site-Specific Assessment Criterion

SSSI	Site of Special Scientific Interest
SVOC	Semi-Volatile Organic Compound
TEF	Toxicity Equivalent Factor
TPH	Total Petroleum Hydrocarbons
TWA	Time Weighted Average
US95	95 th percentile estimate of the true mean value of a data population (also known as 95%UCL).
VOC	Volatile Organic Compound

APPENDIX C – PHOTOGRAPHS

Photograph 1 – General view of Area A.



Photograph 2: Tanks in Area A.

