

**Contaminated Land
Air Quality
Environmental Audit**



Partnership No: OC 300776

**REDWITHER CENTRAL AREA,
WREXHAM INDUSTRIAL ESTATE,
WREXHAM**

**STAGE 1 PRELIMINARY
ENVIRONMENTAL RISK
ASSESSMENT**

**For: Wrexham County
Borough Council**

February 2011

R1570-R01-v2

DOCUMENT CONTROL SHEET

Report Title: Redwither Central Area, Wrexham Industrial Estate, Wrexham
Industrial Estate, Wrexham

Stage 1 Preliminary Environmental Risk Assessment

Client: Wrexham County Borough Council

Report Reference Number: R1570-R01

Issue Final

Version: v2

Report Date: February 2011



Signed For Smith Grant LLP

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Document Revision Record:

Version	Report Status	Date	Details of Revision
v1	draft	25.01.11	Draft for client review
v2	final	28.02.11	Final

REDWITHER CENTRAL AREA, WREXHAM INDUSTRIAL ESTATE

STAGE 1 PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT

February 2011

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1. Introduction

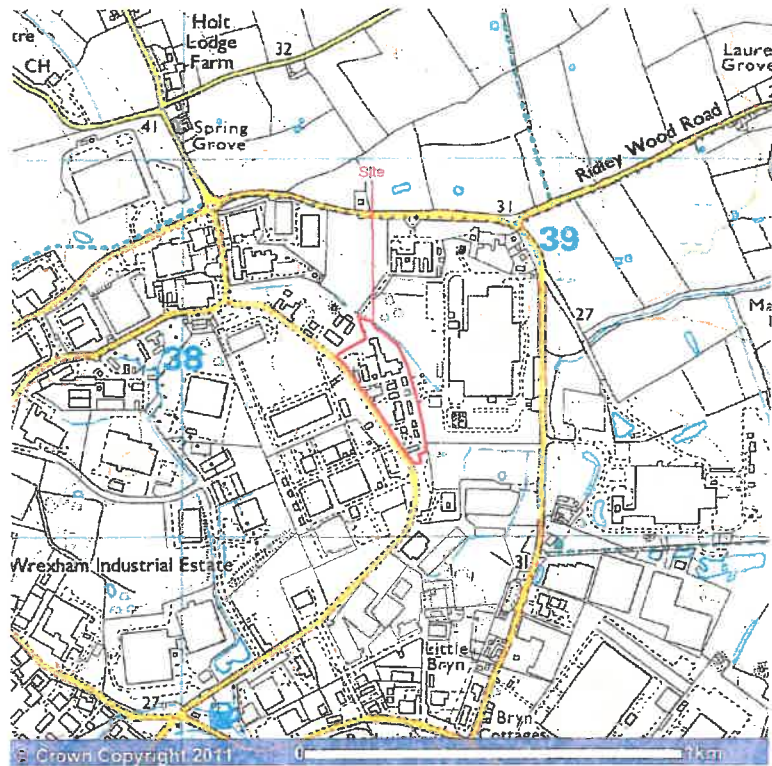
- 1.1. Wrexham County Borough Council (WCBC) instructed Smith Grant LLP (SGP) to undertake a Stage 1 Preliminary Environmental Risk Assessment of an area of land located on the Wrexham Industrial Estate, Wrexham.
- 1.2. WCBC presently owns the land and may consider selling the land at some point in the future. The assessment has been undertaken to determine any potential liabilities with regard to contamination associated with the historical and current use of the site and surrounding land that may impact both on-going use of the site and any future sale for redevelopment or otherwise.
- 1.3. The site details are:

Table 1.1: Site Details

Address	Redwither Central Area, off Abbey Road, Wrexham Industrial Estate, Wrexham
National Grid Reference	338540 350400
Local Authority	Wrexham County Borough Council (WCBC)
Site Area	~3.83 ha
Current Nature of Site	series of light to medium industrial units and workshops
Site Access	Elm Road off Abbey Road
Boundaries	southwest: trees / hedgerow to Abbey Road south: no defined boundary or fenceline east: trees and fence northwest: mound and trees
Adjoining Land	southwest: Abbey Road, Redwither Industrial Complex south: light industrial units on Tower Close southeast: trees east / northeast: Kellogs food production plant northwest: light industrial units on Abbey Close, small electricity sub-station

- 1.4. This following report describes the Stage 1 Preliminary Environmental Risk Assessment (desk study and site visit) undertaken by SGP to identify the previous and current uses of the site and surrounding area and the potential contaminants that may be present. The report methodology follows the framework described in the EA / DEFRA Contaminated Land Report 11: 'Model Procedures for the Management of Land Contamination 2004'.

Figure 1.1: Site Location



- 1.5. The assessment comprised a review of readily available information on the environmental setting and the historical development of the site and surrounding land, including a file of information provided by WCBC, along with a site inspection. This report contains a qualitative risk assessment and where appropriate makes recommendations for further investigations appropriate to the on-going industrial use of the site and potential future redevelopment.

2. Information Sources

- 2.1. The principle sources of information consulted in the preparation of this report include:

Table 2.1: Information Sources

date and reference	author and source	purpose and information content
Topography, geology, hydrogeology and hydrology		
Explorer Sheet 257, Crewe and Nantwich	Ordnance Survey (OS), Explorer Map, 1:25,000	general mapping information including topography, ground features, rights of way, communications, water features etc
Sheet 122, Drift Edition, Nantwich	British Geological Survey (BGS), 1:50,000	distribution of geological units at surface including drift and artificial deposits; faults and mineral outcrops; distribution of geological units at depths

date and reference	author and source	purpose and information content
Technical Report WA/91/A, 1991	British Geological Survey	applied geological mapping in the Wrexham area; geology and land-use planning
Google Earth (imagery dated March 2006)	aerial photography	site setting
HPA-RPD-033	Radon Atlas of England and Wales	mapping defining radon affected areas in England & Wales
BRE 211	Radon: Guidance on Protective Measures for New Buildings, 2007	mapping identifying required radon protective measures in England & Wales
Historical data		
EC26796695_1_1, dated 19 th November 2008	Envirocheck: Landmark Information Group	historical mapping at 1:10,560, 1:10,000 and 1:2,500 scales from 1849 onwards; site setting mapping
Information review		
www.environment – agency.gov.uk; December 2010	Environment Agency	general information on aquifer classifications, source protection zones, flood risk zones, pollution hazards, current and historical landfills, water quality information
EC26796695_1_1, dated 19 th November 2008	Envirocheck: Landmark Information Group	site setting information including industrial facilities, landfill sites, water abstractions and discharges, pollution incidents
www.magic.gov.uk ; December 2010		web-based interactive map containing information on nature conservation areas
00073421-08; 21 st November 2008	The Coal Authority	Information on coal mining entries and workings
2006 WAG Aerial Photograph	WCBC	Aerial photography
	WCBC	Series of maps, site plans and photographs provided by WCBC, including WCBC drainage plans, ROF plans

2.2. Site Inspection

2.2.1. A site inspection was undertaken by Katrina Hawkins, Partner, on the 6th January 2011. All external areas of the site were inspected other than part of the rear area to Unit 226. Internal areas were not inspected and a full review of existing tenant operations was not undertaken. Photographs were taken of salient features and are provided in Appendix A. Photograph locations are detailed on Drawing D11.

2.3. Previous Site Investigations

2.3.1. SGP has been provided with background information previously gathered by WCBC. SGP is not aware of any intrusive investigations having been undertaken on the site, and has not been provided with any such reports.

3. Development History and Current Status

3.1. Historical Development

3.1.1. A summary of significant features, developments and land uses shown on historical Ordnance Survey maps is provided in Table 3.1 below. Copies of selected maps are provided in Drawings D02-D08.

Table 3.1: Summary of Development History

map	site	surrounds
1873, 1:2,500 1879, 1:10,560 see Drawing D02	Site occupied by open fields and field boundaries; three ponds are located on the site, two in the east and one in the south. Site is crossed by an east-west trending track in the south.	Immediate surroundings comprise open fields with numerous small ponds. Nearest developments are Cacca Dutton Farm 300m to the west, Ridley Farm 200m to the north and Bryn Farm 430m to the southeast.
1881, 1:10,560	No significant changes to the site	No significant changes to the immediate environs
1899, 1:2,500 1900, 1:10,560	Two ponds in the east no longer present.	No significant changes to the immediate environs.
1911, 1:2,500 1914, 1:10,560 see Drawing D03	No significant changes to the site	No significant changes to the immediate environs.
1938, 1:10,560	No significant changes to the site	No significant changes to the immediate environs
1954, 1:10,560 (area to north of site only)	No map coverage	Some development of industrial estate to north indicated
1961, 1:2,500 1964, 1:10,000 see Drawing D04	Site is fully developed to series of works buildings located on Abbey Road, Elm Road, Priory Road and Brookfield Road. A mineral railway line bounds the site to the north and east and from which a number of branch lines enter the site in the north. A drain appears to pass west to east across the centre of the site emerging as an open drain to the east.	Surrounding land has been extensively developed to industrial / works facilities. A mineral railway bounds the site to the east with sidings present to the southeast. Ground to the east is shown as rough ground with a number of mineral railway lines and drains. A large works is present to the southwest across Abbey Road, and further works are present to the northwest. A small unidentified mound or shaft is marked 120m to the northwest. Large number of individual buildings located within bunkers present within 400m to the southeast, south and southwest typical of military explosive manufacture facilities.

map	site	surrounds
1968, 1:10,000	No significant changes to the site	No significant changes to the immediate environs.
1974, 1:2,500 see drawing D05	Mineral railway lines into the north of the site, and along eastern boundary, no longer present. No other changes and buildings on site retain similar footprints as previously.	No significant changes to the immediate environs other than removal of mineral railway lines and sidings to the southeast.
1982, 1:2,500 1983, 1:10,000 see Drawing D06	No significant changes to the site	No significant changes to the immediate environs. A large industrial facility has been constructed to 180m to the east with an associated electricity sub-station and 'tank' within 32m and 25m. Further development of the industrial estate has occurred to the northwest.
1987, 1:2,500	No significant changes to the site.	Extension of the factory to the east has occurred to within 100m of the site boundary. No other significant changes to the immediate environs.
1989, 1:2,500 see Drawing D07	Three buildings in the southern corner of the site no longer present, replaced by a single smaller building.	Further extension of the factory to the east has occurred with additional circular storage tanks 30m and 80m to the east.
1992, 1:2,500 1992, 1:10,000 see Drawing D08	A number of buildings no longer present in areas of the site; residual buildings retain original footprints.	Development of number of units to immediate northwest on previously vacant rough land. Small electricity sub-station present to the immediate northwest corner of the site.
1993, 1:2,500	No significant changes to the site	Changes to the ground layout to the west beyond Abbey Road shown alongside the Redwither Industrial Complex.
1995, 1:2,500	No significant changes to the site	Number of small industrial units present to the immediate south of the site. Further landscaping and creation of a number of ponds has occurred to the southwest beyond Abbey Road.
2000, 1: 10,000	No significant change	No significant changes
2006, 1:10,000	No significant change	A large recycling centre has been constructed 150m to the southeast.
2008; 1:2500	An additional single industrial unit is present in the northeast corner of the site	No significant changes.

3.2. Additional Information

3.2.1. The information outlined above from the historical maps is supplemented by the extensive in-house knowledge SGP holds on the historical development of the industrial estate and the additional mapping and aerial photography information provided by WCBC.

- 3.2.2. The site and immediate surrounding land originally comprised agricultural land until it was incorporated within the Wrexham Royal Ordnance Factory (ROF), development of which is understood to have commenced in 1939. The ROF occupied an area in excess of 2,000 acres and undertook the manufacture of cordite, a composition of nitro-glycerine and nitro-cellulose. The original buildings of the site were constructed as part of the ROF development and a copy of an original ROF plan is reproduced as Drawing D10. Buildings across the site typically are provided with the prefixes '36', '37' and '38'; the use of these buildings is not known but the structures and layout suggest general workshops. A large open area in the centre of the site is marked as 'B.W.D' and a second open area to the south of Priory Road is marked as a 'timber yard'. The railway sidings to the southeast are identified as 'Brookfield Station'.
- 3.2.3. Operations ceased at the ROF in 1945 and the area subsequently became utilised as an industrial estate for a wide variety of operations. Following the cessation of the ROF the site itself is understood to have formed part of the operations of British Celanese Ltd (BCL); mapping provided by WCBC indicating the site to have formed the general workshop area. BCL (later becoming Courtaulds) also occupied land to the west (now the Redwither Complex) and a former ROF plant power station 200m to the south. BCL undertook the manufacture of textiles, notably viscose rayon using large volumes of wood pulp, sodium hydroxide and carbon disulphide. The power station is understood to have been demolished in the mid 1980s; the area underwent investigation and some remediation in the 2000s.
- 3.2.4. The historical maps and aerial photographs indicate the majority of the structures on the site are the original buildings with footprints very similar to the 1940s. A number of small buildings in the north of the site were no longer present by the 1961 mapping and two buildings had undergone slight extensions.
- 3.2.5. The site was subsequently acquired by WCBC. The units on the site itself appear to have subsequently been used for a wide variety of light engineering / industrial activities. A series of undated photographs (indicated to be possibly from 1986 and potentially associated with the original acquisition of the site by WCBC) are provided in the WCBC files. The photos show a number of 205l metal drums and other storage containers scattered about the site, including in the proximity of Units 242, 236 and 231 (Units 236 and 231 are no longer present). A large number of 205l drums are shown to the rear of Unit 227. Information provided in the WCBC file suggests that this unit may have been previously occupied by Marcher Chemicals in the 1980s. An area of possible demolition rubble is shown to the rear of Unit 239 (no longer present; located in the eastern part of the site). Other small areas of deposited material are shown to the south of Unit 248 and near Unit 226D. No other particular features of note on the site are indicated. The photographs also show a former fuel dispensing area at Unit 214 / 215; this was

located to the immediate northwest of the site beyond the site boundary and has now been redeveloped to Abbey Close.

3.2.6. Part of the wider industrial estate about 350m distant from the site and beyond the former power station site was used for the manufacture of capacitors from about 1951. Widespread tipping occurred across areas of the estate and extensive contamination with PCBs was later found, particularly within the estate drainage system. Parts of the estate were subject to reclamation in the 1980s by the WDA (Welsh Development Agency) and the land redeveloped to industrial use, although some residual areas of contamination remain, particularly within the drainage network. There are no known areas of tipping within proximity of the site, the closest known area of PCB contamination being associated with a drainage system about 300m south of the site and beyond the former power station.

3.3. Present Land Condition

Table 3.2: Present Land Condition

Site Description	access to the majority of the site is gained from two entrances off Abbey Road. The northernmost unit on the site, Unit 226, is accessed via a separate entrance off Abbey Road. the site currently comprises a number of light to medium industrial units. The units are utilised for a wide range of activities including metal fabrication and light engineering. Details of current occupiers of the units as noted during the site walkover are listed in Appendix B. The northern most unit, Unit 226, forms the largest unit within the site and is occupied by LM Engineering Services Ltd and Wrexham General Engineering undertaking metal fabrication. All the units, other than Unit 245, appear to be of the original brick construction, and other than the northern end of Unit 226, are provided with flat felt roofs. Unit 226 is potentially provided with asbestos cement sheet roofing; no other potential asbestos containing materials were noted on the walkover to be within the external construction material, although a formal asbestos survey has not been undertaken. Unit 245, occupied by Dragon Hydraulics, is of modern sheet metal and brick construction. Although not marked as such, warnings of potential electricity and high surrounding fences suggest Unit 229 may be / have been an electricity sub-station. This unit itself is not marked on the original ROF plan (although a smaller building is shown to the immediate south); the unit appearing on the 1961 map. No external storage of fuel oils / oils / liquids were observed on the walkover (note: access was not gained to the full external area of Unit 226). A number (five) of disused 205l metal drums were present to the rear of Unit 230; these
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	were corroded with signs of rubbish having been burnt and the original contents unidentified. Elsewhere across the site are localised areas of general scrap, rubbish, pallets etc.
Services / Wayleaves	information regarding utility services has not been obtained as part of this study old British Celanese plans provided by WCBC (last updated 1985) show the site to be served by a series of foul drains which all flow southwestwards to a main sewer along Abbey Road / Bridge Road. Surface water run-off from the central and southern areas of the site are shown to be directed to a drain culverted from west to east across the site which emerges as an open channel and, which prior to the construction of the Kelloggs facility, flowed initially eastwards then north-westwards across open fields. It is assumed this channel has now been culverted across the Kelloggs site. Flows from the northern area are also shown to be directed eastwards to converge with the open channel.
Surfaces / Vegetation	The majority of the site is provided with a combination of hardstanding, much of which comprises tarmac and concrete generally of poor condition. No visual signs of significant staining or surface spills or leaks of oils / chemicals were observed in the external areas. A residual concrete base is present in the area of the former Unit 223; this is in good condition with no visual signs of contamination. A large partially vegetated mound is present to the rear of Unit 227 and appears to comprise made ground with some concrete and bricks visible. Areas of rough open partially vegetated ground are present in the northwest, west, east and southeast as marked on Drawing D09. No notifiable invasive weed species were noted on the walkover although a formal survey has not been undertaken.

3.4. Adequacy of Information

3.4.1. Whilst there are some gaps in the historical map coverage, it is considered that the available mapping and aerial photographs provides reasonable coverage of the site and immediate surroundings.

4. Site Characterisation

4.1. The environmental setting of the site is described in Table 4.1.

Table 4.1: Environmental Setting

Surrounding landuse	The site is located within a large industrial estate. Modern light industrial units are located to the immediate north and south on Abbey Close and Tower Close. Kelloggs is located to the east and holds an Environmental Permit for
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	the manufacture of food. Other major industrial facilities within 500m of the site include Sterile Technologies, operating a household waste incinerator 470m to the south. A waste recycling centre (civic amenity site) is located 150m to the southeast. A small relatively modern electricity sub-station is located to the immediate northwest of the site beyond the northern most access point.
Topography	The site is located at about 28m aod as indicated by a benchmark shown on OS mapping on the Redwither Industrial Complex beyond Abbey Road to the west. The site itself appears generally level. Locally small raised areas of ground are present in the northeastern and northwestern corners of the site.
Geology	BGS mapping and site observations indicate the following ground conditions: <u>made ground</u>: a thin veneer of made ground may be present in areas on the site associated with the original construction of the buildings and levelling of the site; however based on the local topography and historical development of the site substantial depths of made ground are not anticipated other than in any areas of backfilled drains and foundations. Pockets of deeper made ground may also exist in the areas of the three former ponds on the site. Locally small raised areas of made ground are present in the northeast and northwest corners of the site. <u>superficial deposits</u>: glacial till – heterogeneous deposits varying from structureless silty and sandy pebbly clays to claybound gravels; rockhead mapped at about -25m aod, providing in the order of 60m of drift deposit cover <u>bedrock</u> – Erbistock Formation of the Carboniferous Coal Measures
Drainage	Much of the site is provided with hardstanding and surface water drainage is likely to be towards drainage systems across the site. A surface water drain is believed to flow eastwards across the site and to be culverted across the Kelloggs facility and ultimately entering a network of ditches / streams that flow north-eastwards across open fields towards the River Dee 3km distant. In areas where paved hardstanding is absent drainage will be via infiltration and sub-surface flow. The site is not identified on the EA website as within an area potentially subject to flooding.
Hydrogeology	Site is classified as overlying a Secondary A aquifer associated with the Coal Measures present at depth; low permeability non-water bearing drift deposits occur at the surface and overlie the aquifer.

	Shallow groundwater may be present within any underlying made ground
Water Resources	Site is not located within a Source Protection Zone (SPZ)
Excavation and Landfilling	There are no indications from the site observations or the historical site development of any substantial excavation and subsequent landfilling activities having been undertaken on the site or in the immediate vicinity. A large vegetated screening mound is present in the northeastern corner of the site to the rear of Unit 226 which comprises made ground. No other significant raised areas are present on site. Elsewhere a thin veneer of made ground may be present, with localised areas of deeper made ground associated with infilled ponds and voids / drains and any demolition materials, particularly in open vegetated areas. Much of the surrounding industrial estate has been subject to the historical tipping and disposal of waste materials, substantial areas of which have undergone subsequent reclamation although areas are known to remain. However, there are no indications this has extended onto the site itself, the layout of the site remaining broadly similar from original development in the early 1940s to the present day. PCB contaminated soils from areas of the estate lying to the south were placed in the 1980s in a containment 'cell' 350m to the southeast of the site. The site is owned by WAG and is maintained under a waste management licence (ref: 37009 / 37011). A former landfill site, British Celanese, is located about 650m to the southwest of the site beyond Ash Road South. Available data suggests that industrial waste disposal occurred at the site from 1953 to 1974. No further information is available but it is noted the area is presently developed to an industrial unit. A second former landfill site has been identified 630m to the southeast. Available data indicates BICC Ltd deposited inert wastes and liquid sludges from 1968 to 1977.
Mining	The Coal Authority report states that the site is not within the zone of likely physical influence on the surface from past or present underground coal workings. No known mine entries are present within, or within 20m, of the boundary of the site.
Nature Conservation	No statutory nature conservations areas such as SSSIs, SPAs or Ramsar sites have been identified in the vicinity of the site Great crested newts are known to be present on areas of the Industrial Estate. No ponds are located on the site but areas of open space may act as foraging or corridor routes.

5. Preliminary Conceptual Site Model and Risk Assessment

5.1. Conceptual Site Model

5.1.1. The conceptual model for the site describes the potential contamination sources, pathways and receptors. Development of a conceptual model is required in order to evaluate potential risk to receptors, and the plausible sources, pathways and receptors are outlined below.

5.2. Sources of Contamination

5.2.1. The site is located within a large industrial estate which was originally developed from agricultural land to a Royal Ordnance Factory in the late 1930s. The ROF predominantly undertook the manufacture of cordite and the main manufacturing operations are believed to have been located to the south of the site. The site itself comprised a series of individual brick construction buildings, a number of which had mineral railway line access from the north. A 'timber yard' was located in the central area of the site and Brookfield Sidings adjoined the site to the southeast. Operations at the ROF ceased in 1945. The manufacture of cordite at the site may have resulted in contamination of the ground with a range of contaminants including acids and explosives residues. However, intrusive investigations undertaken elsewhere on the Estate by SGP have not found any evidence of explosive residues.

5.2.2. The site subsequently formed part of the British Celanese Ltd (later Courtaulds) plant undertaking the manufacture of viscose rayon. The site itself is indicated as being the 'general workshop area'. Principal contaminants specifically associated with viscose rayon manufacture are sodium hydroxide and carbon disulphide. Following acquisition of the site by WCBC in the 1980s the units have been used for a wide range of activities, including general engineering, steel fabrication and metal finishing. Potential contaminants as detailed in the DoE Industry Profiles for 'railway land' and 'engineering works' include metals, fuels, PCBs, asbestos, PAHs and solvents. Contamination associated with these activities is likely to be localised and associated with individual units and activities. Any foundations and drains of now demolished buildings may have been backfilled with demolition and waste materials.

5.2.3. The principal potential sources of contamination and associated contaminants are summarised below:

Table 5.1: Summary of Principal Sources of Contamination

landuse	activity	location	dates	potential contaminants
site				
former ponds	potentially infilled	east and south	2 infilled by late 1900s; 1 infilled by 1940s	metals / metalloids, PAHs
Royal Ordnance	possible workshop	across the site;	1939-1945	explosive residues,

landuse	activity	location	dates	potential contaminants
site				
Factory, mineral railway lines	area for factory manufacturing cordite	railway lines in north and to east / southeast		metals / metalloids, PAHs, hydrocarbons
British Celanese (Courthaulds); mineral railway lines	workshop area for factory manufacturing viscose rayon	across the site	1945 - ?1980s	pH, carbon disulphide, metals / metalloids, PAHs, hydrocarbons, solvents, degreasers, acids / alkalis, asbestos, paints, oils
industrial units	activities include engineering / steel fabrication, metal finishing, joinery, and	across the site; engineering in north and metal finishing in south	1980s- current	metals / metalloids, solvents, degreasers, oils, paints, acids / alkalis, asbestos,
	possible electrical sub-station	unit 229	?1961 – current	localised PCBs

5.3. Potential Receptors

5.3.1. The site is currently utilised for mixed commercial / industrial use. The principal receptors to any contamination are therefore the current site users; site maintenance workers; controlled waters (open drains and surface watercourse 350m to the east); and the built development on the site. In the event future redevelopment of the site is considered this is most likely to be retained as commercial / industrial use. There are no statutory conservation sites in the vicinity of the site although Great Crested Newts, a protected species, are known to be present on the estate. The underlying Secondary Aquifer is not considered a potential receptor due to the presence of overlying low-permeability superficial deposits.

5.4. Risk Assessment

5.4.1. The site is currently occupied as a series of industrial units undertaking a wide range of activities. The majority of the site is provided with hardstanding, apart from areas of open rough vegetated ground in the northwest, northeast and southeast. There is therefore limited potential for direct contact between the current users of the site and site soils; the presence of vegetation across open areas will serve to reduce the potential for windblow. Any soil contamination present is considered unlikely to pose a significant risk to the current users of the site.

5.4.2. Much of the site is provided with paved hardstanding with surface water run-off directed towards the local drainage network, and potentially ultimately towards the open drainage system to the east. No known surface water contamination incidents potentially associated with the site have been identified.

5.4.3. Drainage in the open un-surfaced areas of the site will be via infiltration, and likely via sub-surface flow at the interface of any shallow made ground and underlying clays, potentially

facilitating the off-site migration of any contamination. The presence of substantial thicknesses of glacial clay will serve to protect the underlying Secondary Aquifer within the deeper Coal Measures. Leaching of metals / metalloids within made ground and migration of any oils / liquids may have impacted any underlying shallow groundwater. Given the long industrial use of the general area significant risks to controlled waters from the site itself are not indicated, although localised areas of shallow groundwater contamination may be present.

5.4.4. Historical photographs and the current site inspection have revealed the presence of oil / chemical drums in the northeast part of the site. No evidence of substantial leaks or spills of contamination were observed and no significant risks are therefore identified with regard to the current use of the site and potential contaminated land. However, given the long industrial use of the site and wide range of activities undertaken intrusive investigation and risk assessment would be necessary to further inform the assessment, and such an investigation is advised prior to a future proposed sale of the site.

5.4.5. On the current available information the overall site is unlikely to present significant constraints to redevelopment. However there is potential for localised areas requiring remediation, depending on the nature of any such redevelopment, and particularly in the northern and northeastern areas of the site, such as hydrocarbon hot-spots, sumps and drainage systems. Relict foundations and structures may be present which would require breaking out and may contain waste / demolition materials requiring removal. Intrusive investigation and assessment would be necessary to determine the potential constraints and remedial requirements, and can be expected to be a condition of any future planning permission.

5.4.6. The potentially significant pollution linkages are summarised in Table 5.2 below:

Table 5.2: Preliminary Conceptual Site Model

Receptor	Source / Contaminant	Pathway	Risk	Notes
1. current site users	metals / metalloids, PAHs, asbestos, hydrocarbons	dermal contact / ingestion / inhalation	low	much of site provided with paved hardstanding; areas of open vegetated ground may pose a risk if subject to significant wind blow / disturbance
	ground gas, hydrocarbon vapours	accumulation within voids / service runs, inhalation	low / moderate	substantial depths of made ground unlikely to be present; localised hot-spots of hydrocarbon contamination may be present
2. future site users	metals / metalloids, PAHs, asbestos, hydrocarbons	dermal contact / ingestion / inhalation	low	future development likely to provide majority of site with paved hardstanding
	ground gas, hydrocarbon vapours	accumulation within voids / service runs, inhalation	low / moderate	substantial depths of made ground unlikely to be present; localised areas of hydrocarbon contamination may give rise to vapours
3. construction and maintenance workers	metals / metalloids, PAHs, asbestos, hydrocarbons	dermal contact / ingestion / inhalation	moderate	potential short term risk during excavations and removal of existing hardstanding
	ground gas, hydrocarbon vapours	accumulation within voids / service runs, inhalation	low	
4. property / services	sulphates / aggressive substances within made / natural ground	attack on subsurface concrete structures / water mains pipes	low / moderate	
5. vegetation / landscaping	leachable metals / metalloids / organics may be present within made / natural ground at shallow depth	plant uptake	moderate	any contamination present at shallow depth may pose risk to future landscaping
6. ecosystems / protected species and habitats	metals / metalloids, PAHs, hydrocarbons	ingestion	very low	Great Crested Newts are known to be present on the estate and may use parts of the site as corridors; no ponds on site
7. surface waters – off-site open ditches	leachable metals / metalloids / organics / liquid materials may be present within	migration via drainage systems, migration via	low / moderate	no known existing concerns; construction / redevelopment works may result in mobilisation

Receptor	Source / Contaminant	Pathway	Risk	Notes
8. groundwater – secondary aquifer within Coal Measures	made / natural ground leachable metals / metalloids / organics / liquid materials may be present within made / natural ground	permeable deposits migration via unsaturated zone	very low	of any contamination vertical migration towards deeper Coal Measures unlikely due to presence of extensive glacial till

6. Conclusions and Recommendations

- 6.1. The site was originally constructed as a number of individual units forming part of a Royal Ordnance Factory, later becoming the general workshop area for a British Celanese Ltd (later Courtaulds) facility. From the 1980s the site has been owned by WCBC and the units have been used for a wide variety of activities, including general engineering and metal finishing. Historical maps and the site walkover indicate that the majority of the existing units are as constructed in the late 1930s / early 1940s. A number of units have been demolished since the 1940s and in places the original concrete slabs remain. Open vegetated ground is present in areas across the site, and some residual demolition materials may be present in these areas and within a soil bund in the northeastern site corner.
- 6.2. Contamination may be present underlying the site associated with historical and current activities on the site and surrounding land. It is probable that any such contamination is generally localised and associated with individual units and external storage areas.
- 6.3. The significance of the potential contamination has been assessed as follows:
- **low risk** - it is considered unlikely that issues will arise as a liability / cost for the owner of the site;
 - **moderate risk** - it is possible but not certain that will arise as a liability / cost for the owner of the site;
 - **high risk** - there is a high potential that issues will arise as a liability / cost for the owner of the site.
- 6.4. It is considered that the environmental liability associated with the current and on-going continued use of the site with respect to land contamination is **low**. However, given the historical use of the site and in the absence of further information on the current status of the site, the likelihood of environmental liability issues affecting the future saleability and / or value of the site for its existing use is **moderate**. A future purchaser of the site is likely to require a Stage 2 intrusive investigation to obtain additional information on the contamination status of the site. If the site is operational at the time of the investigation this is likely to involve the drilling of a number of boreholes, installation of permanent ground gas / groundwater monitoring wells, excavation of trial pits, collection and analysis of soil and water samples and ground gas monitoring. In the event redevelopment of the site is proposed intrusive investigations to determine the requirements for remediation will be required. On that basis, the likelihood of environmental issues affecting the future saleability and / or value of the site for redevelopment is **high** (on the basis any redevelopment will be for industrial use).

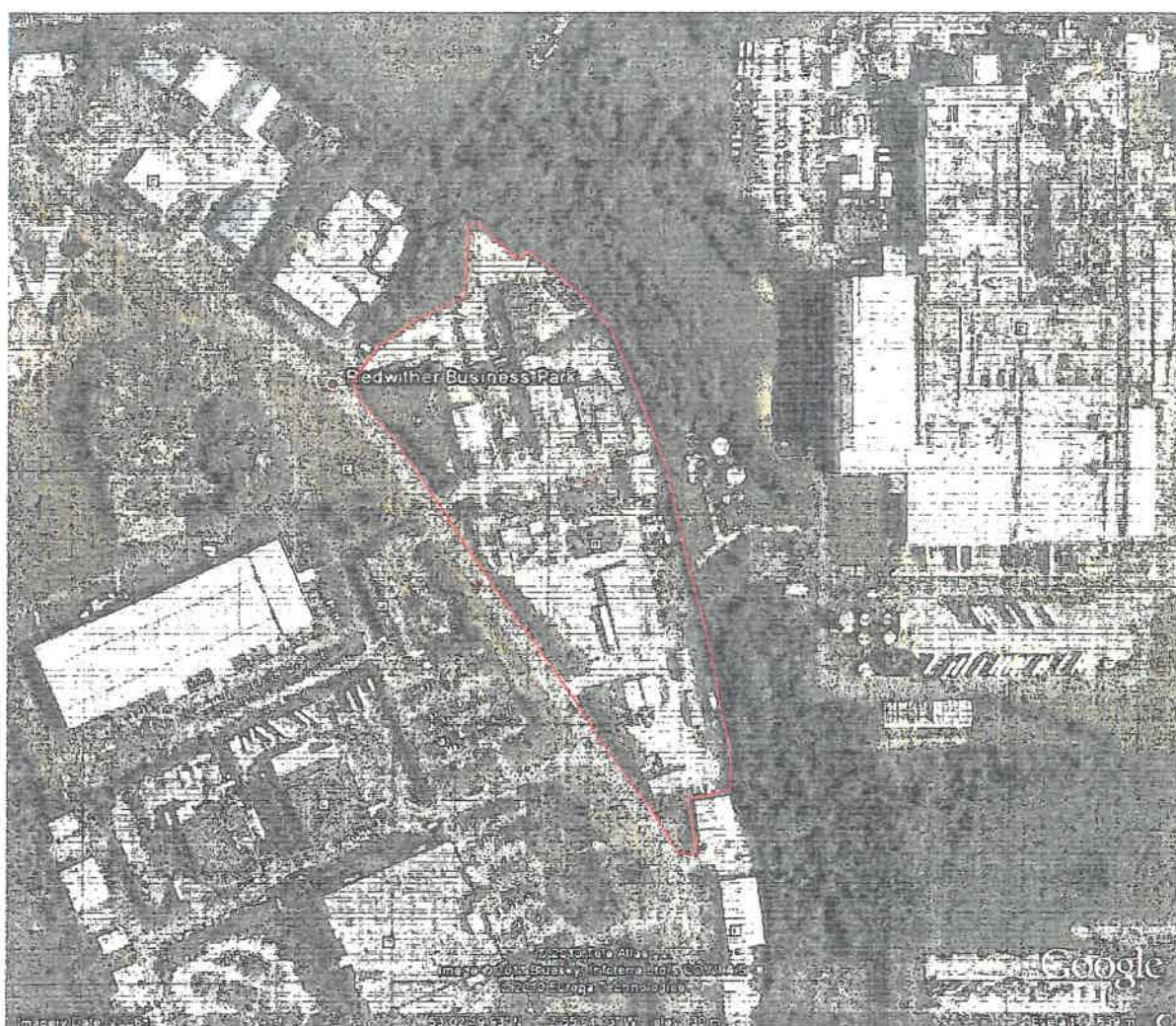
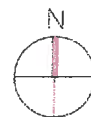
6.5. Other environmental aspects requiring assessment should redevelopment of the site be proposed include the potential for Great Crested Newts to be present along with potential asbestos containing materials (ACM) within the building structures, and notifiable invasive weeds.

6.6. Limitations

6.6.1. This report has been prepared by SGP for the sole and exclusive use of Wrexham County Borough Council. All reasonable skill, care and diligence has been exercised within the budget available, and in accordance with the technical requirements of the brief. Notwithstanding the efforts made by the professional team in undertaking the assessment and preparing this report, it is possible that other ground conditions and contamination as yet undetected may exist. Reliance on the findings of this report must therefore be limited accordingly. Such reliance must be based on the whole report and not on extracts which may lead to incomplete or incorrect conclusions when taken out of context.

6.6.2. SGP reserves the right to alter any of the foregoing information in the event of new information being disclosed or provided and in the light of changes to legislation, guidelines and responses by the statutory and regulatory authorities.

DRAWINGS



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photo dated 2006

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Project:
Redwither Central Area,
Wrexham Industrial Estate

Drawing:
Aerial Photograph

Drawn:
KEH

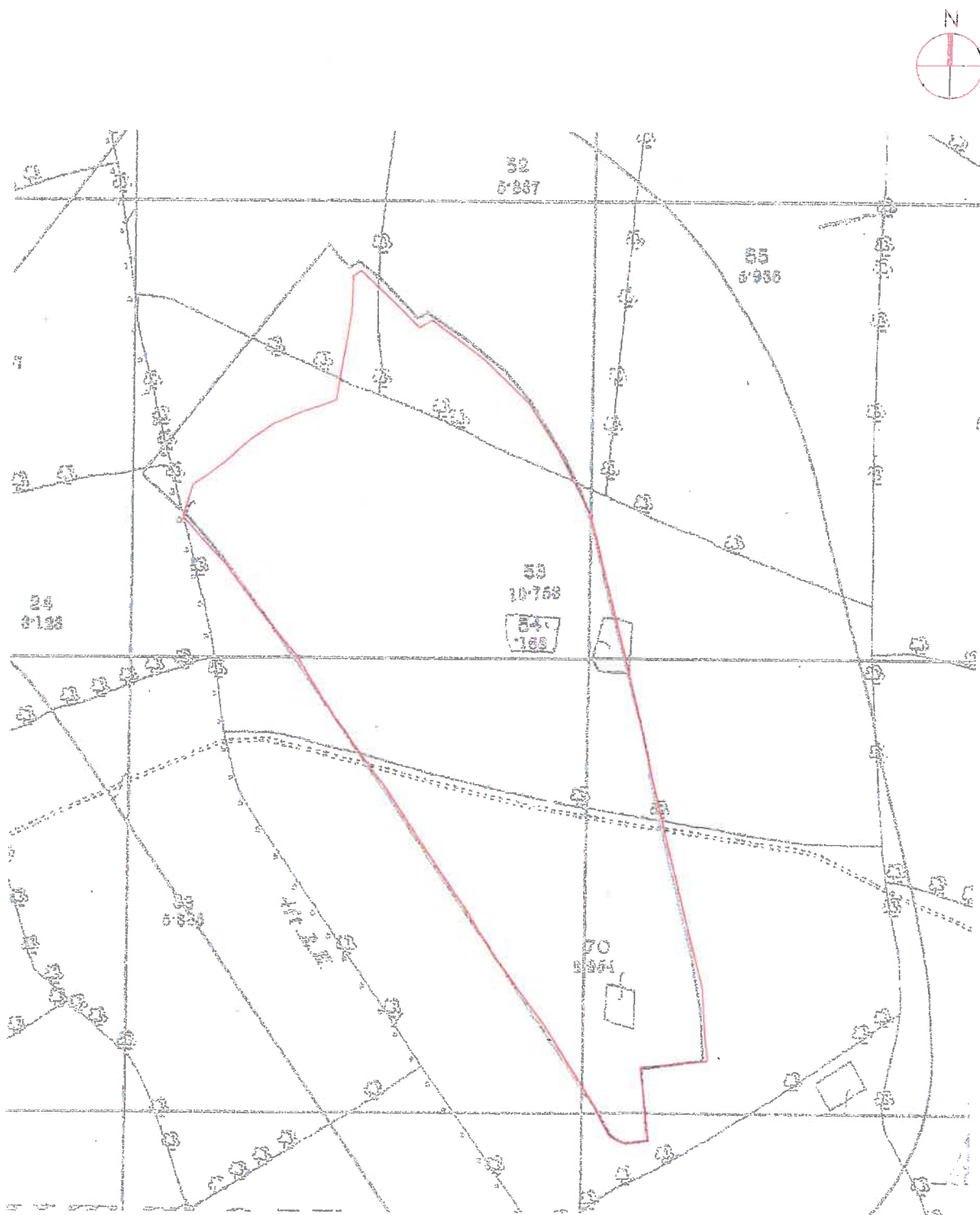
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Job No:
R1435

Checked:
AFS

Scale:
nts

Drg No:
D01



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Project: Redwither Central Area,
Wrexham Industrial Estate
Wrexham

Drawing: Historic Map 1873

Drawn: KEH

Date: 05.01.11

Job No: R1570

Checked: AFS

Scale: 1:2,500
@ A4

Drg No: D02



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Project: Redwither Central Area,
Wrexham Industrial Estate
Wrexham

Drawing: Historic Map 1961

Drawn: KEH

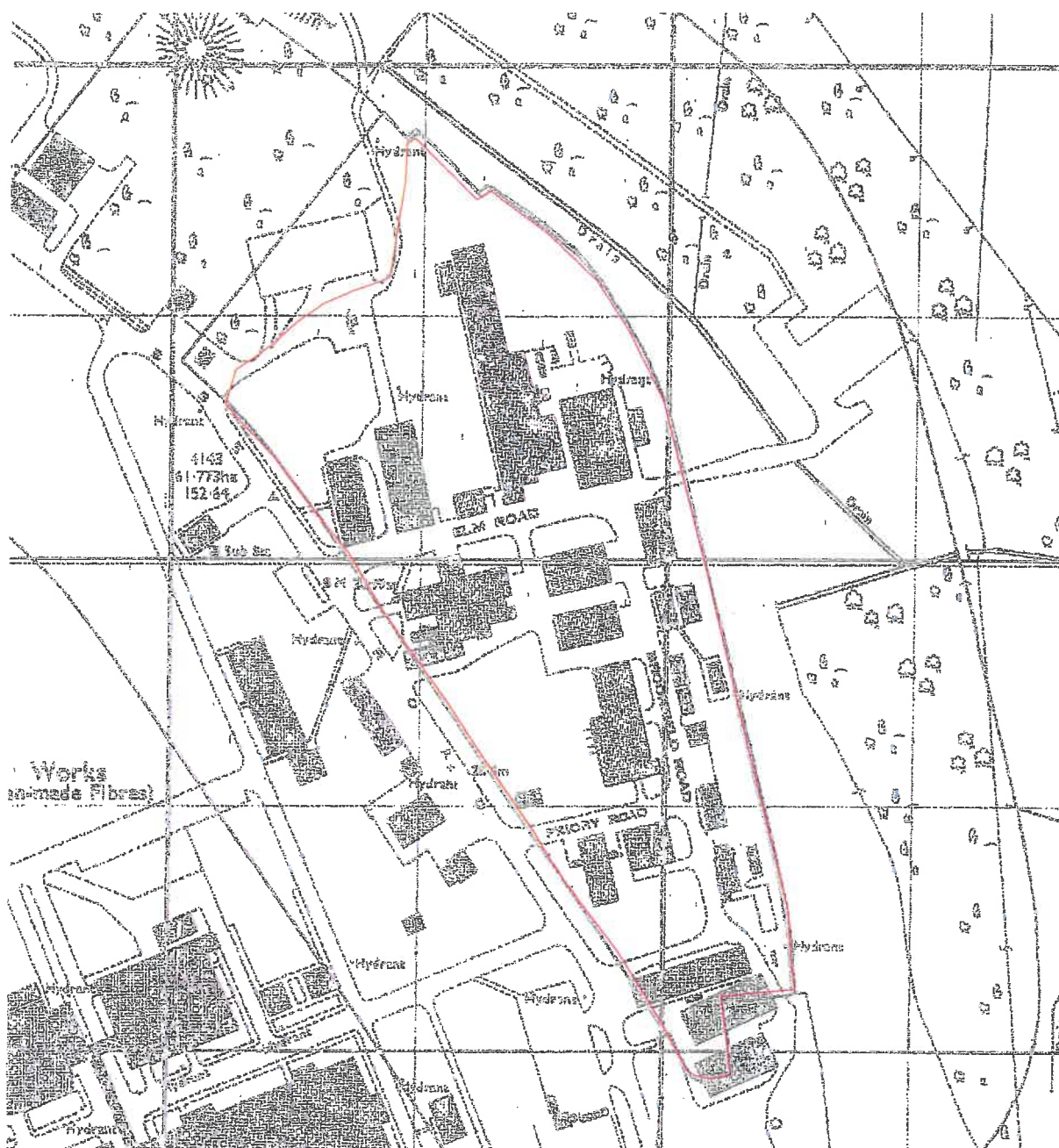
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Job No: R1570

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Drg No: D04



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Project: Redwither Central Area,
Wrexham Industrial Estate
Wrexham

Drawing: Historic Map 1974

Drawn: KEH

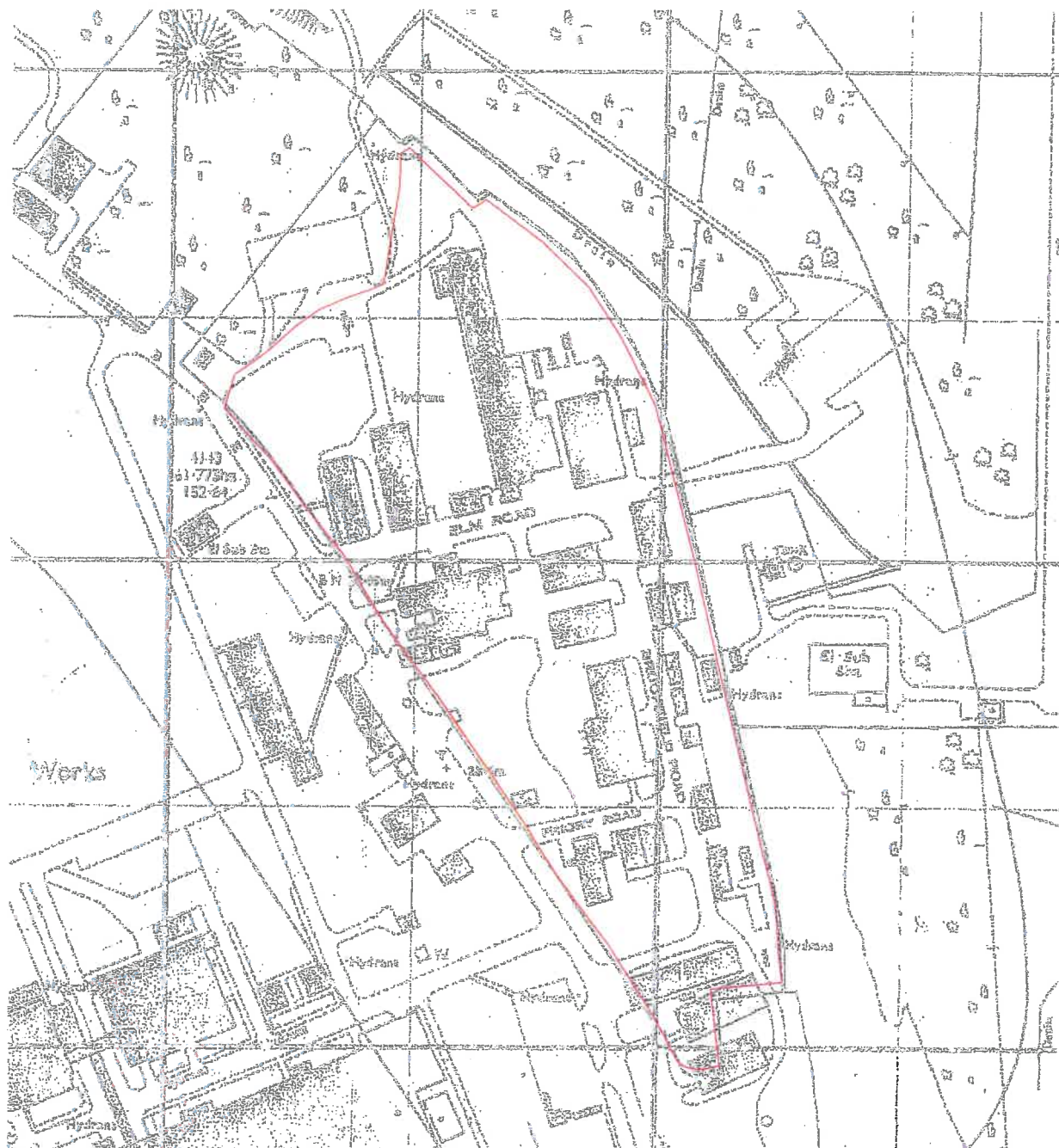
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Drg No: D05



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Project: Redwither Central Area,
Wrexham Industrial Estate
Wrexham

Drawing: Historic Map 1982

Drawn: KEH

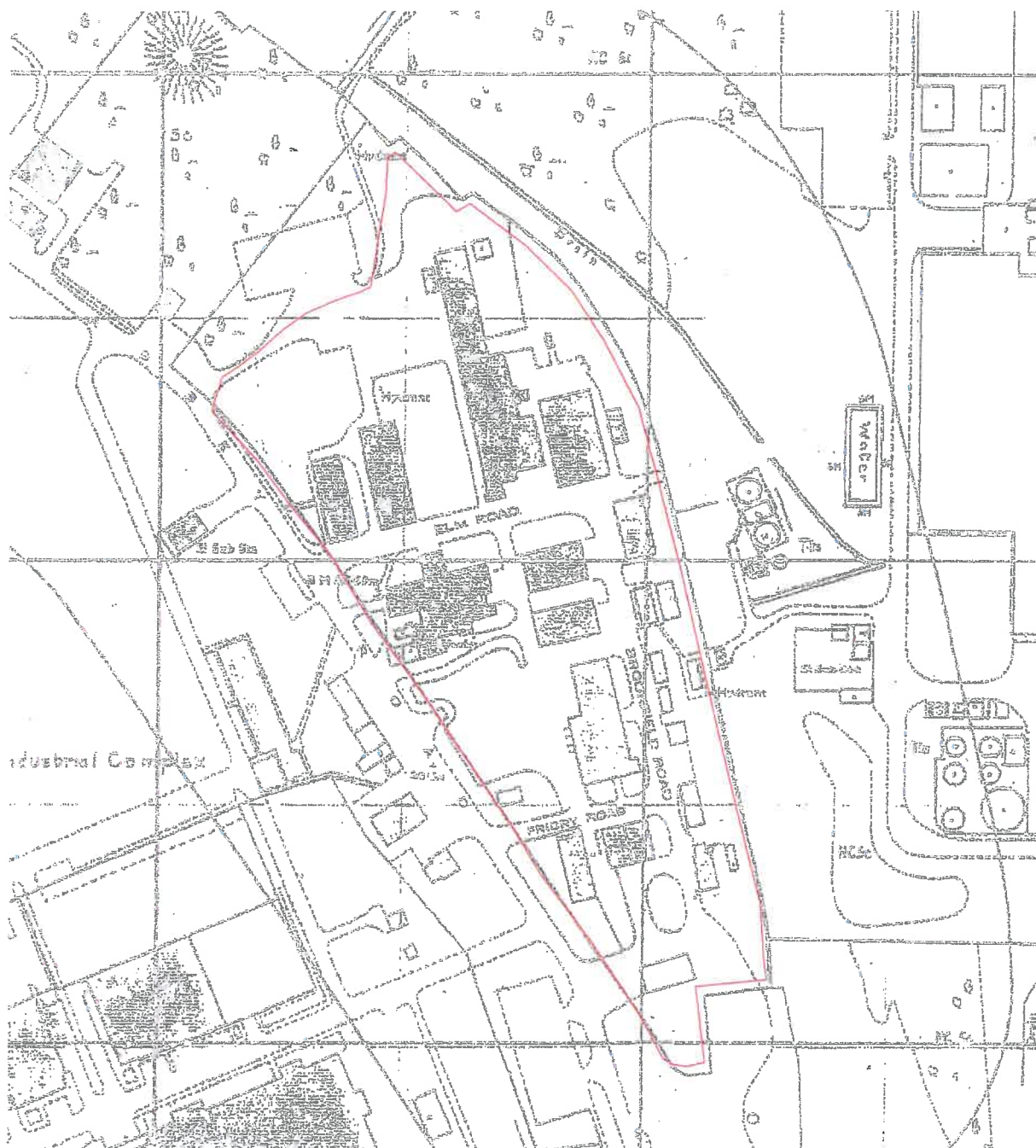
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Job No: R1570

Checked: AFS

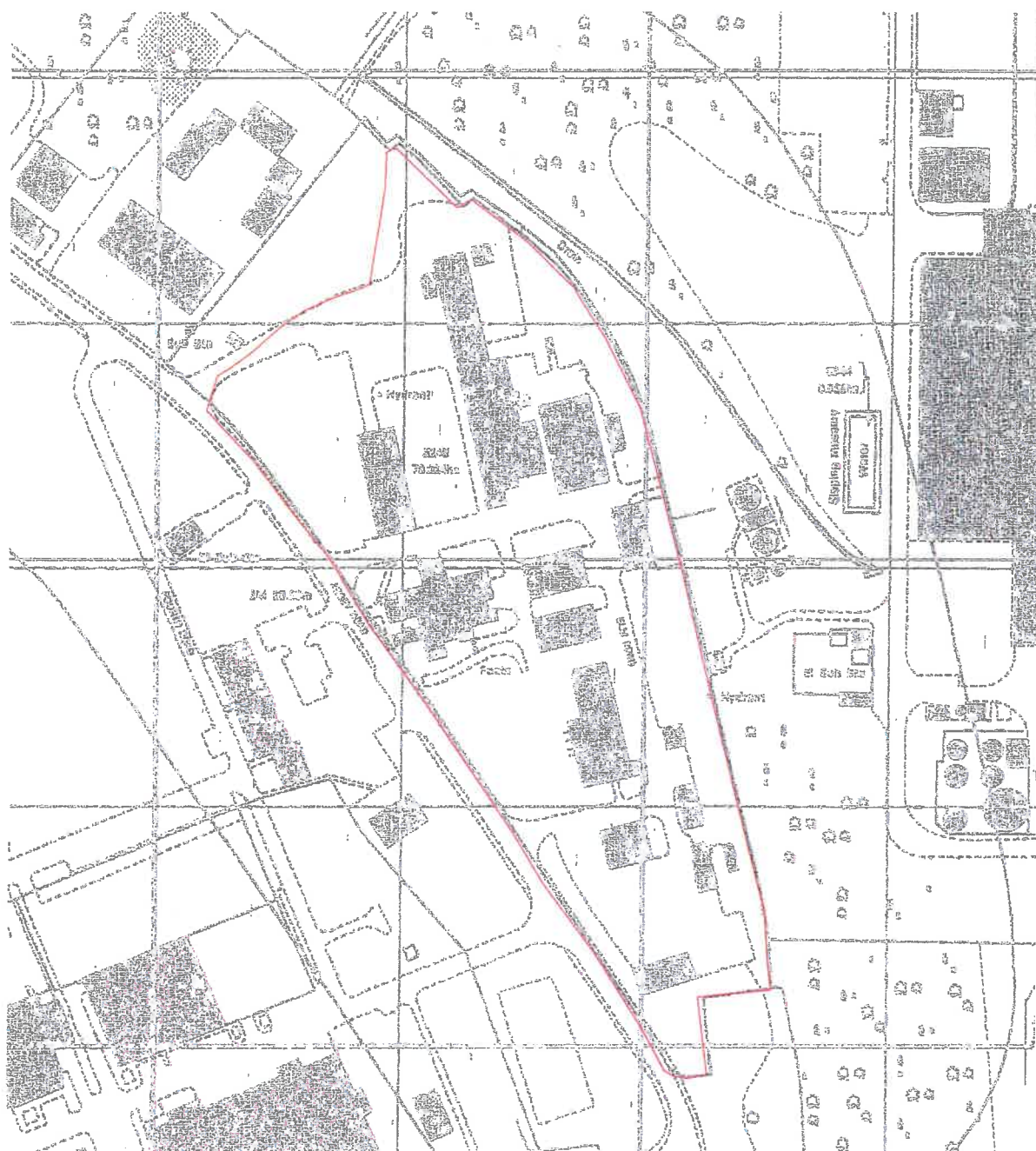
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Project: Redwither Central Area,
Wrexham Industrial Estate
Wrexham

Drawing: Historic Map 1992

Drawn: KEH

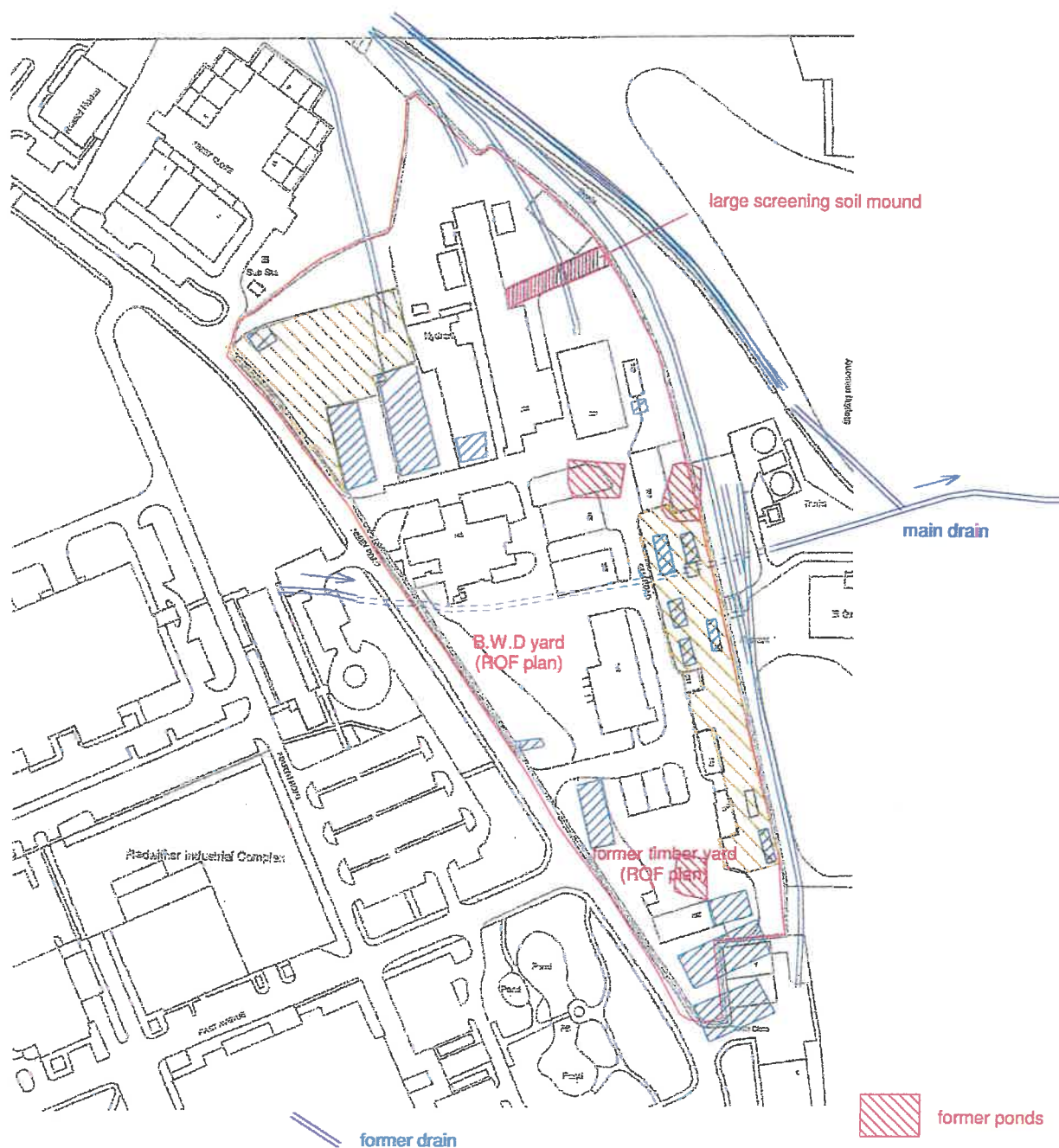
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Job No: R1570

Checked: AFS

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Drg No: D08



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Project: Redwither Central Area,
Wrexham Industrial Estate
Wrexham

Drawing: Current Site Layout
and Historical Features

Drawn: KEH

Date: 05.01.11

Job No: R1570

Checked: AFS

Scale: 1:2,500
@ A4

Drg No: D09



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Project:
Redwither Central Area,
Wrexham Industrial Estate,
Wrexham

Drawing:
Former ROF Plan
(1940s)

Drawn:
KEH

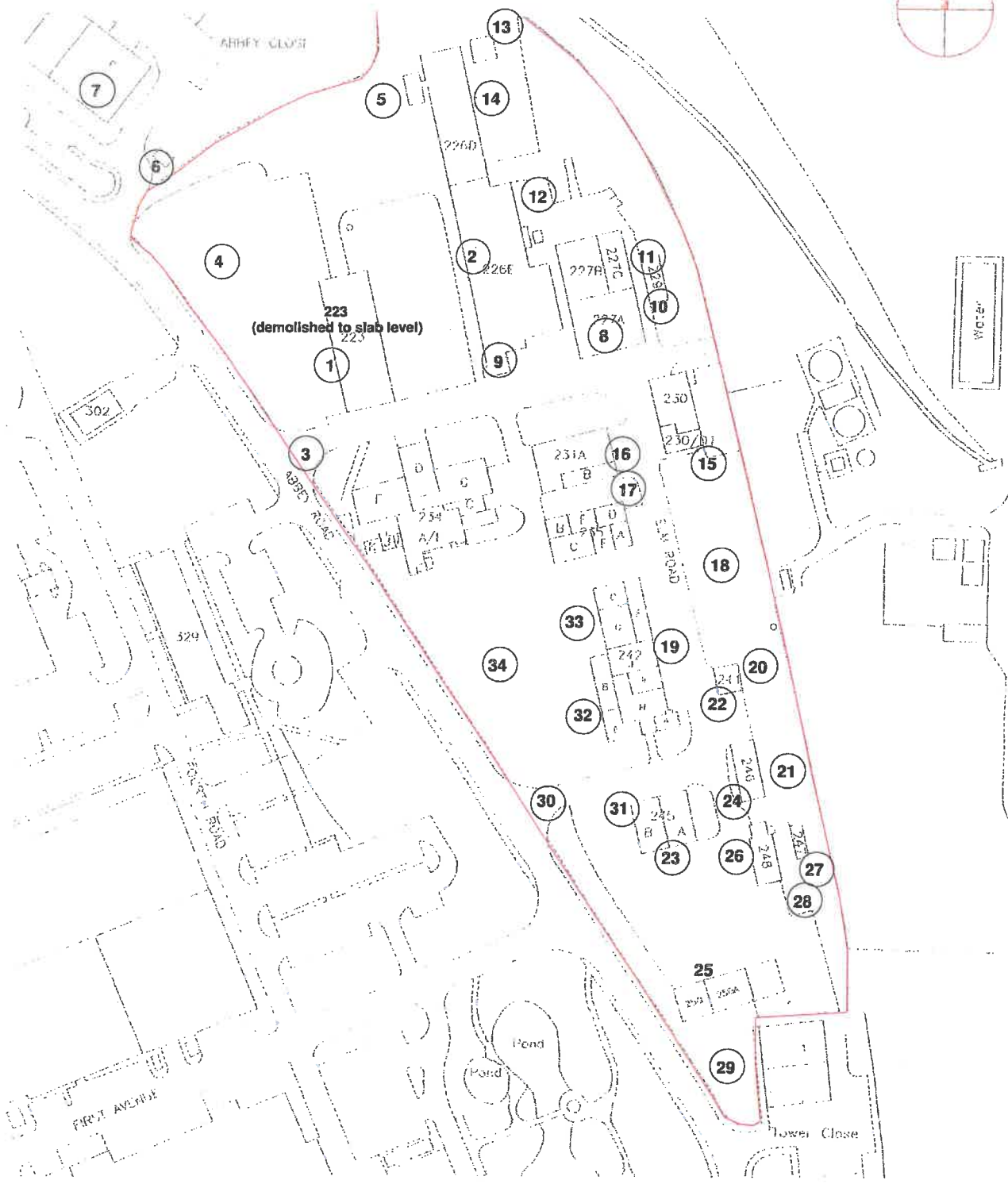
Date:
18.01.11

Job No:
R1570

Checked:
AFS

Scale:
nts

Drg No:
D10



Site Boundary

○ photograph locations

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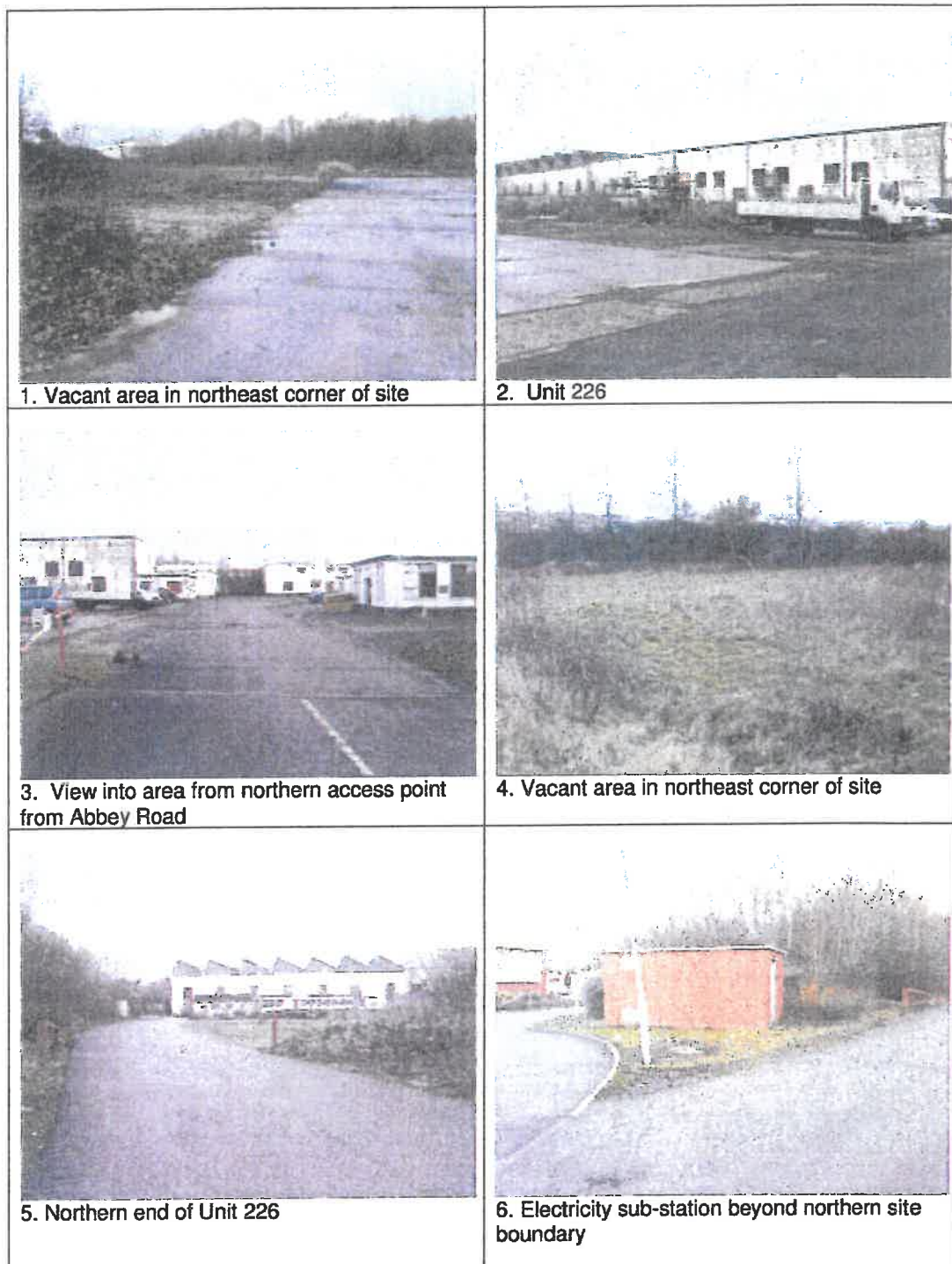
SMITH GRANT
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Project: Redwither Central Area, Wrexham Industrial Estate	
Drawing: Site Layout and Photograph Locations	
Drawn: KEH	Checked: AFS
Date: 17.01.11	Scale: 1:1,250 @ A3
Job No: R1435	Drg No: D11

APPENDIX A

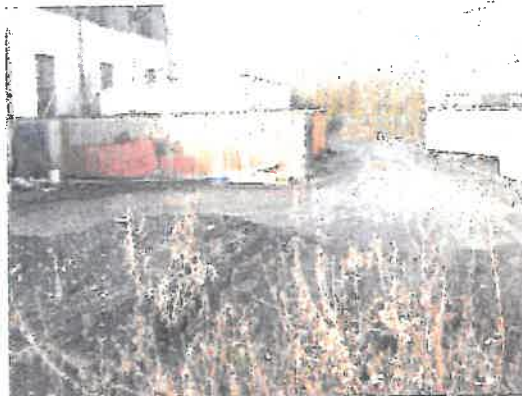
Photographs







13. Residual scaffolding to rear of Unit 226



14. Rear of Unit 226



15. Alongside Unit 230



16. Unit 231



17. Units 231 and 235



18. Vacant area south of Unit 230



19.



20. Southeastern edge of site



21. Rear of Unit 246



22.



23. Unit 245 – Dragon Hydraulics



24. Unit 246B



25. Unit 250



26. View looking northwards across site



27.



28. Southeastern edge of site



29. Southwestern corner of site



30. Southern access to site from Abbey Road



31. Unit 245 – Dragon Hydraulics



32. Unit 242



33. Unit 242



34. Looking across vacant area to Unit 245

Redwither Central Area, Wrexham Industrial Estate
Site walkover: Katrina Hawkins
6th January 2011

APPENDIX B

Unit Occupiers

Appendix B

List of Industrial Unit Occupiers

Unit No	Occupier	Comments
221		demolished – possibly late 1980s / early 1990s
223		demolished – possibly late 2000s; possibly used for engineering / metal fabrication
225		demolished
226D	L M Engineering Services Ltd	steelwork fabrication
226E	Wrexham General Engineering	
225		demolished; possibly late 1980s
227	Wrexham General Engineering	
229		vacant
230		disused metal drums and remains of burnt rubbish present
231		appears vacant; formally Parker Fabrications (steel fabrication)
234	Bicks Chicks	poultry wholesaler, processing and distribution
235	PPC Systems Ltd	computing and control systems
236		demolished; possibly late 1980s
237		demolished, possibly late 1980s
238		demolished
239		demolished; possibly late 1980s
240		demolished
241		appears vacant
242	Divided into number of individual units including Tecwyn Jones (harp and cabinet maker) and P&G Joiner	
243		demolished
244		demolished
245	Dragon Hydraulics (hydraulic and engineering supplies and sales)	New construction; sheet metal and brick; burning of rubbish being undertaken externally
246	Wrexham Metal Finishing	undertakes shot blasting, powder coating, bead blasting
247		
248		
249		demolished

Unit No	Occupier	Comments
250	Wrexham Metal Finishing Slakewood Joinery	shot blasting, powder coating and bead blasting

Notes:

The above list of current occupiers is not exhaustive but indicates units that have been demolished and those that remain in current use along with the predominant current activities.

Original Unit details taken from British Celanese Ltd, General Factory Layout, Workshop Section plan.
Current Unit occupiers identified from site visit undertaken on 6th January 2011