Providing Ground Solutions

South Downs National Park Authority

Shoreham Cement Works

Programme of Works Report for Land Contamination, Removal of Existing Buildings and Drainage Investigations

REDACTED VERSION

Revision 0

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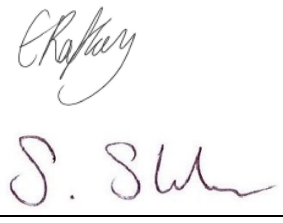
Authors	Emma Raftery, Engineer *MSc BSc (Hons)* Sam Stanton, Senior Engineer *MSc BSc (Hons) GMICE FGS*	
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EXECUTIVE SUMMARY MATRIX

Card Geotechnics Limited (CGL) has been commissioned by South Downs Nation Park Authority (SDNPA) "the Client" to provide a programme of works report for land contamination, removal of existing buildings and drainage investigations to support the four development scenarios being considered under the Area Action Plan (AAP) for the Shoreham Cement Works site in West Sussex.

Shoreham Cement Works is a 44-hectare site that includes an inactive chalk quarry and semi-derelict works. Some structures are vacant and appear derelict and may be unsafe to use, however some of the buildings remain in use. There are four proposed development concepts consisting of housing and employment, leisure, and offices. The site is split into 4 sub-areas named A-D as shown on the Site Layout Plan in Figure 2.

To support the findings of the report the following matrix has been developed to provide background Information on the four 4 sub-areas of the sites named A-D and for each of the use classes/quantum of development proposed set out in each of the development scenarios consideration of where in the site each use may be best located based on the constraints identified plus details of the extent of remediation/ budget costs.

Whilst varying development mixes of residential, employment, education, retail, sports and recreation and consumption food and drink are being considered for the mixed-use development they are generally either housing led with a degree of employment / leisure use or leisure led with a degree of employment / housing. All schemes include allocation for some public open space. The potential risks associated with potential contamination is related to the likelihood of exposure and this will vary depending on the specific development and land use planned. At this stage, the four principal exposure scenarios considered for the site are based on the "standard" land-uses likely present following development including residential (with or without gardens), commercial/industrial (including hotel / shop storage use etc) and recreational public open space. This is intended to highlight that these categories are representative of a range of generic site conditions, considering studies of social behaviour, but also incorporating the simplifying and precautionary assumptions necessary to derive a conclusion that is broadly applicable to a range of different circumstances.

Please note that this report has been redacted to obscure references to documents that are not in the public domain.

Matrix 1 – Background Information on the four 4 sub-areas of the sites named A-D (refer to Figure 2 and Figure 3)

	Area A	Area B	Area C	Area D
History	Area A is located in the western section of the site and was the original Cement works plus former offices for wider cement works with historical rail / tram infrastructure. The former cement works in Area A is now used as an industrial estate / industrial premises / vehicle maintenance area/workshop.	The former cement works buildings are still present. The site operated as a standard wet, water-based process with the kilns being coal-fired so there were no bulk use/storage of petroleum fuels in the process.	An historic inert landfill received waste by-products and materials from the cement works, and inert construction materials from the surrounding area. Some structures associated with the former cement works remain.	Area D is vacant and is unused. This area is the highest and most recently quarried and is enclosed to the north, east and west by old quarry walls.
Geology	Made Ground is up to 3.5m thick over the natural deposits of Head over Alluvium over Chalk.	Chalk was encountered close to the surface with Made Ground limited to hard cover and foundations associated with the cement works.	Substantial amount of Made Ground, [redacted]	Chalk close to or at the surface
Hydrogeology	Secondary (Undifferentiated) Aquifer in the Alluvium and Head deposits, and the Principal Aquifer in the chalk	Principal Aquifer in the chalk. An abstraction borehole is present in Area B licensed to the site owner for effluent/slurry dilution purposes.		
Sources of potential soil and groundwater contamination	There is potential for widespread diffuse contamination associated with the Made Ground plus specific point sources; including buried fuel tank adjacent to workshops, interceptor tank, waste water treatment plant, asbestos containing materials related to former cement works buildings and railway sidings, and a fire involving a building and multiple buses in 2017. Potential contaminants of concern included Made Ground such as ash, clinker, asbestos containing materials, heavy metals, fuels and oils, sulphates, solvents and polychlorinated biphenyls (PCBs).	There is potential for widespread diffuse contamination associated with the Made Ground plus specific point sources specific sources of potential contamination include; diesel storage and refuelling area, coal storage and usage, and clinker production and storage related to cement production, Pulverised Fly Ash (PFA) related to cement production, Polychlorinated biphenyls (PCBs) from the former 3kV substation and transformers, hydrocarbons related to historical and current machinery and vehicles, and asbestos containing materials related to the former cement works buildings;	Inert landfill used to dispose of [redacted] cement kiln dust (CKD) along with other by-products of the cement manufacturing process and general construction rubble. CKD is classified as a hazardous waste due to its elevated pH values. [redacted]	None

	Area A	Area B	Area C	Area D
Ground Gas / Vapour	The underlying geology includes Alluvium which has the potential to be a limited source of ground gas. As a minimum Characteristic Situation 2 ground gas protection measures are likely to be required.	Whilst Chalk will give rise to small volumes of carbon dioxide this, on its own, is not considered to be a credible source.	[redacted] Where the main source of gas is Made Ground with a low degradable content, it will likely be classified as Characteristic Situation 2 or 3 for gas protection.	As for Area B
Geotechnical Considerations	Design solutions for areas over deep Made Ground / Potential for an area of very soft ground associated with alluvium. New structures may require foundation solutions such as ground improvement or piled foundations. Route infrastructure, such as main drainage or major highways, may need to avoid areas of deep compressible or contaminated infill. New buildings in Area A would also need to consider proximity to the existing river.	The slope stability and risks of rock fall from the quarry walls surrounding the will need to be fully assessed. The potential to re-use existing foundation / slab should be assessed to save time cost and carbon on demolition / rebuild.	Foundation design solutions for areas over deep Made Ground / Potential for an area of very soft ground [redacted]. New structures may require foundation solutions such as ground improvement or piled foundations. Significant volume of earthworks is likely to be required. There are potential for buried obstructions in the fill. The slope stability and risks of rock fall from the quarry walls surrounding the will need to be fully assessed. Aggressivity of Cement Kiln Dust to buried concrete in the former inert fill area will need to be assessed. Groundwater flooding assessment required with mitigation measures related to natural cavities and fracture system. Route infrastructure, such as main drainage or major highways, may need to avoid areas of deep compressible or contaminated infill	Significant volume of earthworks is likely to be required to make the area accessible for development or even just to make it accessible and usable by the general public as an open space. The slope stability and risks of rock fall from the quarry walls surrounding the will need to be fully assessed.

	Area A	Area B	Area C	Area D
Demolition Considerations	Limited, however asbestos containing materials (ACM) may be present in the buildings and associated structures.	Large risk for the demolition is the extent/thickness of slabs and foundations; these are usually very thick in cement works, but breaking-out these foundations can be a large commercial risk. Another risk on this Project as far as Costs are concerned is the potential for Ferrous Scrap Metals Prices to fall in value. On this basis, to ensure the Budget Price is robust it suggested that a Contingency allowance of £500,000 is included in the budget in-case Scrap values decrease. Large volume of asbestos containing materials (ACM) may be present in the buildings and associated structures.	Limited – some structures associated with former cement works remain. Some ACMs may be present. Considered to be low risk.	None
Demolition Budgets (excluding £500k contingency allowance)	£399,955	£2,353,174	£43,824	None
Remediation Requirements	Likely to be less impacted by diffuse contamination and as such it is likely that hotspot (a specific area with high concentrations of contamination that may be present in soil), treatment / removal rather excavation / sorting and screening plus offsite disposal of all material may require in this area. The need for groundwater treatment cannot be ruled out. Any remediation required for groundwater is likely to be related to the potential limited point sources of mobile contamination.	Likely to be less impacted by diffuse contamination and as such it is likely that hotspot (a specific areas with high concentrations of contamination that may be present in soil), treatment / removal rather excavation / sorting and screening plus offsite disposal of all material may require in this area. The need for groundwater treatment cannot be ruled out. Any remediation required for groundwater is likely to be related to the potential limited point sources of mobile contamination.	Likely to require excavation / sorting and screening plus offsite disposal of all material in the top 300mm (commercial / residential without gardens)-600mm (residential with gardens) of the site area. Based on site history, groundwater remediation is unlikely to be required, however comprehensive investigation is required to assess potential risk.	Area D is vacant and is unused. This area is the highest and most recently quarried and is enclosed to the north, east and west by old quarry walls. Overall, this area is considered to present a low risk of contamination and remediation is unlikely to be required

	Area A	Area B	Area C	Area D
	Remedial approach likely to be similar regardless of end-use – however clean up criteria will differ depending on sensitivity and site layout. Remediation Criteria, and costs, for residential development (esp. with gardens) are greater than for commercial developments.	Remedial approach likely to be similar regardless of end-use – however clean up criteria will differ depending on sensitivity and site layout. Remediation Criteria, and costs, for residential development (esp. with gardens) are greater than for commercial developments.		
Remediation Budget Cost	Total Budget Range assume c.£2.25M-£5.39M. As noted areas of highest potential contamination risk are likely best suited to least sensitive land use. As such upper cost range would be reflective of the most sensitive land use (residential with gardens) reducing towards the lower end should it be utilised for a hard scaped industrial use. The need for groundwater treatment cannot be ruled out. Any remediation required for groundwater is likely to be related to the potential limited point sources of mobile contamination may pose to groundwater. As such it is likely that some form of appropriate in-situ treatment would be the most likely remedial option. If it is assumed that there is a single relatively limited source zone associated with potential impact and mass excavation and disposal is not required a reasonable estimate of potential cost to be in the region of £250-500K.	Total Budget Range assume c.£2.25M-£5.39M. As noted areas of highest potential contamination risk are likely best suited to least sensitive land use. As such upper cost range would be reflective of the most sensitive land use (residential with gardens) reducing towards the lower end should it be utilised for a hard scaped industrial use. The need for groundwater treatment cannot be ruled out. Any remediation required for groundwater is likely to be related to the potential limited point sources of mobile contamination may pose to groundwater. As such it is likely that some form of appropriate in-situ treatment would be the most likely remedial option. If it is assumed that there is a single relatively limited source zone associated with potential impact and mass excavation and disposal is not required a reasonable estimate of potential cost to be in the region of £250-500K.	**Worst Case** This is excluding any surface piles of material and assuming an area of 96,744m2. If the site was to be designated at commercial and say 300mm of the surface has to be removed to facilitate development / landscaping etc that gives a volume of material for disposal volume of 28943m3 at a bulking factor of 1.8 for disposal as Hazardous Waste (c. £195m3x 1.8 x 28943), the cost for transport and disposal alone would be alone would be c.£10.2M. This is exclusive of all prelims etc. If the site was to be designated at residential and say 600mm of the surface must be removed to facilitate development / landscaping etc the cost would double to c. £20.4M. **Reasonable Case** A more reasonable approach for making the infilled site suitable for use as industrial land, allowing for ground treatment/compaction is to maximise the processing and retention of as much material on-site, if at all possible. The major obstacles to this are the permitting regulations surrounding the use of this	None envisaged

	Area A	Area B	Area C	Area D
			(clearly waste) material on site. Setting those issues aside a broad-brush, high-level budget cost range for this approach would be: c.£7.13- 7.33M (say £7.01-7.3M) The need for groundwater treatment cannot be ruled out but is excluded. **Note** The need for disposal could be negated if any planning permissions required levels to be raised in this area. Raising the levels with material suitable for the land use being developed would effectively cap the material so the need to reduce levels / remove material from site may be limited. With this approach, development for residential may be possible, however additional costs would be incurred to achieve stricter land use criteria and mitigate geotechnical risks suitable for residential use.	
Drainage Considerations	Motion have suggested that the foul water drainage strategy for the site for all 4 development scenarios is that wastewater would drain by gravity from the high point in Area D, through areas C and B to the low point of the site in Area A by the River Adur. Then depending on which option is selected and is viable for the site, the site will either be connected to the existing sewer network by a new pumping station located on the site and a rising main, or a new Wastewater Treatment Works (WTW) would be constructed on the site that would discharge the treated effluent to the River Adur. Motion note that as the site lies in close proximity to the public foul water sewer network relative to the size of the development, the EA's binding rules state that a connection should be made to the existing public foul sewer Costs ranges provided by Motion from circa £6M to £8.7M			

	Area A	Area B	Area C	Area D
Likely Best Use Class: **NB: The geoenvironmental and geotechnical conditions discussed above may have implications on the site layout and land usage of a future development and the final restoration of other areas to suit the environmental status of the surrounding area**	Made Ground is present in this area, potentially ~3.5m thick, this needs to be confirmed through Ground Investigation. There is potential for contamination and potential for ground gas generation in this area, though overall the risk is low, except for local hotspots of contamination including buried fuel tanks. Building foundations are likely to require ground improvements or piling. Gas protection measures for buildings may be necessary depending on landfill gas regime. Ground Investigation is required to confirm details. It is likely that, treatment / removal rather excavation / sorting and screening plus offsite disposal of all material may require in this area. Remedial approach likely to be similar regardless of end-use – however clean up (remediation) criteria will differ depending on sensitivity and site layout. Current remediation estimates are based on a percentage area of hotspot removal. Outside of the above considerations, other potential issues such as access and ecological / river / flood constraints plus aesthetics with respect housing type and location. will need to be considered with respect to Area A. Based on the above, Area A is most likely suitable for housing (either with or without gardens) or commercial development.	Relatively thin Made Ground is likely to be present in this area, though this needs to be confirmed through Ground Investigation. There is potential for contamination though overall the risk is lower than in Area A, there is the potential for a number of local contamination hotspots such as the vehicle refuelling area (diesel) and the electrical substation. It is likely that, treatment / removal rather excavation / sorting and screening plus offsite disposal of all material may require in this area. Remedial approach likely to be similar regardless of end-use – however clean up criteria will differ depending on sensitivity and site layout. Current remediation estimates are based on a percentage area of hotspot removal. Foundations are likely to be of the shallow/spread foundation type unless buildings are to have significant structural loads. Consideration should be given to re-use of foundations. Development needs to consider slope stability around the quarry walls. Safe standoff distances from toes of slopes will need to be adopted. Slope stability issues could be more easily managed by an overarching management company managing the site. Based on the above, Area B is most likely suitable for a split of housing (either with or without gardens)	Deep and variable Made Ground is understood to be [redacted] Higher potential contamination and landfill gas risk with associated higher remediation requirements. Foundations likely to require ground treatment or piling, unless buildings can tolerate variable ground conditions. Development needs to consider slope stability around quarry walls. Safe standoff distances required from toes of slopes. Slope stability issues more easily managed by overarching management company. Based on the above, Area C is most likely suitable for commercial development.	Area D poses a low risk from contamination, however there are risks from the steep sided quarry walls. The potential levels of mitigation and engineering required for highly sensitive land uses (e.g. residential) in areas of chalk quarry faces are likely to be greater than those required for less sensitive land-uses, such as commercial end uses or public open space. As such, it may be more cost effective to locate land uses particularly sensitive to rock fall (residential) in areas outside of these zones and those land uses which are able to tolerate higher risk that can be mitigated by lower cost approaches (commercial / public open space) in areas proximal to the quarry faces. It is noted this is converse to the considerations for potential contamination and to a degree foundation and therefore a balance will be required. Outside of the above considerations, other potential issues such as access and ecological constraints will need to be considered with respect to Area D. Based on the above, Area D is most likely suitable for public open space / recreation.

	Area A	Area B	Area C	Area D
		and/or commercial development. In terms of layout, it is likely to be better to position more light industrial towards area C end as rockfall issues may require larger stand-off areas for higher footfall/traffic associated with some types of commercial land use.		

1. INTRODUCTION

1.1 Background

Card Geotechnics Limited (CGL) has been commissioned by South Downs Nation Park Authority (SDNPA) "the Client" to provide a programme of works report for land contamination, removal of existing buildings and drainage investigations to support the four development scenarios being considered for the Shoreham Cement Works site in West Sussex. As part of this report, CGL as a specialist geotechnical and geoenvironmental consultancy, provide the advice and design solutions to the ground-related issues. In addition, the Client has appointed Motion Consultants to deliver the drainage elements and Aver Decommissioning and Environmental (Aver) to support estimates for the surveying and removal of existing buildings; these reports have been provided under separate cover and the findings are summarised herein.

The programme of works report provides a review of the previous works undertaken on the site and augments this information where possible to provide a programme of works and associated cost estimates for site investigation and remediation. Additionally, a summary of the cost associated with surveying and removal of existing buildings and drainage investigations, provided by Aver and Motion that will be required to support the four development scenarios being considered, for the site at Shoreham Cement Works, Steyning Road, Upper Beeding, BN44 3TX is included.

The Report will inform the preparation of the Shoreham Cement Works Area Action Plan (AAP) currently being prepared by the SDNPA. The Report is one of several evidence-based studies for the AAP that have recently been commissioned and are now underway on transport, viability testing of development scenarios, landscape and industrial archaeology.

Shoreham Cement Works is a 44-hectare site that includes an inactive chalk quarry and semi-derelict works. Some structures are vacant and appear derelict and may be unsafe to use, however some of the buildings remain in use. There are four proposed development concepts consisting of housing and employment, leisure, and offices.

1.2 Aims and Objectives

The aim of this report is to evaluate potential human health, environmental and geotechnical risks and constraints associated with the proposed development.

The objectives of this report are to provide:

- Site description and summary of proposed development scenarios;

- Summary of historical development and planning history;
- Ground conditions information based upon published and unpublished geological and hydrogeological records, previous ground investigation reports and information provided by local authorities and the Environment Agency;
- Summary of the site environmental setting;
- Updated Conceptual Site Model and preliminary qualitative geo-environmental and geotechnical risk assessment;
- Recommendations for further investigation with outline costs to support the proposed development scenarios;
- Outline recommendations for remediation with outline costs to support the proposed development scenarios; and
- Provide a summary of the works and costing produced by Aver and Motion.

Please note that this report has been redacted to obscure references to documents that are not in the public domain.

1.3 Sources of Information

Information sources used for this Phase 1 Risk Assessment includes:

- British Geological Survey (BGS) 1:50,000 Geology Map, Bedrock and Superficial, Sheet 318/333, Brighton and Worthing (1996)[1]
- BGS (1988) Geology of the country around Brighton and Worthing Memoir for the 1:50,000 geological sheets 318 and 333 (England and Wales)[2].
- BGS GeoIndex (Onshore) https://www.bgs.ac.uk/map-viewers/geoindex-onshore/ [3]

[1] British Geological Survey (BGS) 1:50,000 Geology Map, Bedrock and Superficial, Sheet 318/333, Brighton and Worthing (1996)
[2] BGS (1988) Geology of the country around Brighton and Worthing Memoir for the 1:50,000 geological sheets 318 and 333 (England and Wales).
[3] BGS GeoIndex (Onshore) https://www.bgs.ac.uk/map-viewers/geoindex-onshore/

- [redacted]

- JBA Consulting - Shoreham Cement Works Area Action Plan - Evidence Base Studies - Preliminary Geotechnical and Geo-Environmental Assessment (2018)[5]

- The Geologists' Association Guide No. 74 - Rory Mortimore - The Chalk of the South Downs of Sussex and Hampshire and the North Downs of Kent (2021)[6]

- Environmental Information requests from Horsham Council, Adur & Worthing Council, West Sussex County Council, and the Environment Agency; and

- CGL site walkover survey on 19th November 2021.

- AVER Decommissioning & Environmental Ltd – Hazardous Materials (Chemical) and Demolition Costings Survey at Shoreham Cement Works Upper Bedding West Sussex BN443TX Issue One Ref: REP202-1 Rev 2.0 (Final) PROJECT NO: D202 dated: 3 March 2022.

- Motion Consultants - DRAFT V2 Shoreham Cement Works Area Action Plan Shoreham Road, Upper Beeding Foul Water Drainage Strategy Foul Water Drainage Strategy – 11 February 2022 South Downs National Park Authority Report Ref 1sdsho

Whilst key information has been summarised from the [redacted] JBA Consulting, Motion and Aver reports in the production of this report, it is recommended these reports are read in full in conjunction with this report.

[4] [redacted]

[5] JBA Consulting (2018) Shoreham Cement Works Area Action Plan - Evidence Base Studies - Preliminary Geotechnical and Geo-Environmental Assessment. Final Report. November 2018.

[6] Mortimore, R, N. (2021) The Chalk of the South Downs of Sussex and Hampshire and the North Downs of Kent (Volumes 1 and 2). The Geologists' Association Guide No. 74. 29 September 2021.

2. SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is located at Shoreham Cement Works, Steyning Road, Upper Beeding, BN44 3TX. The National Grid reference for the approximate centre of the site is TQ 20215 08715. The site is bounded to the west by the River Adur.

A site location plan is included as Figure 1.

2.2 Site Description and Walkover

The site occupies an area of approximately 44 ha. This section will describe the Shoreham cement works site summarising information from the previous reports by [redacted] and JBA Consulting[5], and a combined LiDAR and topographic survey from 2017 as well as observations made during a site walkover survey by CGL. This will include information on the topography, geology, and land-use.

2.2.1 Topography

At the time of writing, it is understood that no formal topographic survey of the entire site has been carried out. CGL have been provided with a 2017 combined survey drawing for the site utilising a combination of the following data sets:

- Site wide LiDAR data (assumed to be public access 1m tiles);
- Site wide Ordnance Survey (OS) Master map;
- Topographic survey of Area B; and
- Elevation contours derived from LiDAR data.

The ground elevation across Area A ranges from approximately 4 m Above Ordnance Datum (mOD) to 9mOD east to west, 5mOD to 12mOD east to west across Area B, 11mOD to 65mOD in Area C, and 44mOD to 113mOD in the far east across Area D. To the east of the A283 the site is within a hollow surrounded by the steep quarry sides to the north, south and east. A ridge of Chalk up to approximately 40mOD extends from the north and south quarry walls to the east of the cements works buildings in Area B and forms a partial enclosure of Area B moving through to Area C.

Prior to Chalk extraction, the site would have formed a ridge of high ground, falling in a westerly direction towards the river, separating dry valley features to the north and south.

2.2.2 Land use

The Shoreham Cement works site is located in West Sussex, 2.1km north of Shoreham by Sea and 1.2km to the south of Upper Beeding, adjacent to the River Adur. The site is split across the A283, Steyning Road, and the land use comprises a former cement works and associated chalk quarries which are currently not in operation.

The site is split into 4 sub-areas named A-D as follows:

2.2.2.1 Area A

Area A is located west of the A283, alongside the River Adur. This section is triangular in shape and approximately 7 hectares. In the northern and western portion of area A, there are hardstanding and buildings, whereas the south-eastern portion is occupied by an earth mound (understood to have been deposited as part of the A283 construction). It is understood that the southern buildings are the former workshops associated with the railway sidings and cements works, and that a buried fuel tank is located adjacent to these buildings. It is understood the earth mound was created from the A283 realignment works, with the original route of the A283 still evident in this area.

Area A is generally accessed via an underpass from Area B that runs beneath the A283. A private access gate is also present giving direct access to and from the A283 at the southernmost tip of Area A. The area is currently used as an industrial area predominantly associated with bus and commercial vehicle maintenance and storage, and commercial bin and skip storage associated with a waste management company. [redacted] the site owner gave anecdotal evidence of a waste water treatment plant being located in the northern part of Area A. The site owner provided information regarding the location of the waste water treatment plant which is located in the northern part of Area A. However the plant itself has not been inspected by CGL.

2.2.2.2 Area B

Area B is the first area to the east of the A283 and comprised of much of the old cement works buildings, kilns and processing areas, within a former chalk quarry. Some structures are vacant and appear derelict and may be unsafe to use, however some of the buildings remain in use. The quarry walls are present to the north and south of the main buildings, at approximately 25 to 35m in height. The yard area to the north of the buildings is currently used for storage purposes by the site owner. Chalk spines form the eastern boundary of Area B which are remnants of a former quarry wall penetrated by cement processing buildings, and provide access into Area C.

2.2.2.3 Area C

Area C is formed by a large, roughly circular chalk quarry. Within this circular area the floor level is variable having been infilled with material. There are also several mounds of material some associated with the current land use as an inert waste recycling facility, others appearing to be historical in nature. This area can be accessed between the chalk spines along the western boundary that also has some old processing plant and gantries connecting to the main works in Area B. The ground levels adjacent to the chalk spines are around 13.0mOD. The lowest floor levels are in the north-eastern corner at around 11mOD. The highest floor levels are in the north-western corner at around 25mOD. Chalk quarry walls of varying height form the southern and eastern boundaries, from 30m to 85mOD. There are three main quarry benches along the northern and north-eastern boundaries, elevations of each bench are approximately 26mOD, 38mOD and 48mOD with the quarry edge at approximately 65mOD on the northern area boundary. The quarry edge ascends in an easterly direction and descends in a westerly direction. These benches were formerly used, via switchbacks, as a haul route connecting to Area D to the east.

2.2.2.4 Area D

Area D is a rectangular quarry area located in the eastern portion of the site. Ground levels rise from approximately 44mOD at the western edge, ascending in a series of slopes and benches to approximately 73mOD adjacent to the eastern most quarry wall. Quarry edge levels are approximately 113mOD at the north-east corner, reducing to approximately 105mOD at the south-east corner and 82.5mOD at the south-west corner of this area. Quarry walls in this area are approximately 30 to 40m in height.

A site layout plan is included as Figure 2.

2.2.3 Site Walkover

A site walkover was carried out by CGL on 19th November 2021 accompanied by the site owner, Mr Steve Dudman. The site layout and usage appeared to be consistent with information and photographs provided within the [redacted] and JBA Consulting[5] reports.

2.2.3.1 Observations in addition to [redacted] and JBA Walkover notes

The following observations were noted in addition to the walkover notes provided within the [redacted] and JBA Consulting reports.

2.2.3.1.1 Area A

An interceptor used to collect run-off from the cleaning and maintenance of commercial vehicles and containers was located adjacent to the River Adur in the northern part of Area A. The current site owner confirmed to CGL during the site-walkover this is still in use. It is understood from the site owner that both the Waste Water plant and the interceptor discharge under consent into the River Adur.

2.2.3.1.2 Area B

From the observation point overlooking Area B from the former Chalk chute, the roofing sheets of the main cement works was observed to be significantly corroded with multiple holes present indicating the roofing to be constructed of corrugated metal sheets. The general absence of corrosion observed to the side panels of the main cement works buildings indicated these are constructed of a cement-based sheet material, assumed to contain asbestos based upon the age and site usage.

2.2.3.1.3 Area D

Two Peregrine Falcons were observed while in Area D. Anecdotal evidence was provided by Mr Steve Dudman that the site is home to more than one breeding pair.

Photographs from the site walkover are included as Appendix A.

2.3 Outline Land Use Scenarios

There are four principal redevelopment scenarios being considered for the site as set out in Table 1. It is understood that the outcome of this report and the outline proposals for further site investigation and remediation will be used as part of the AAP towards assessing the viability and associated implications for remediation required for each land use scenario.

Table 1. Outline land use scenarios being considered for proposed redevelopment

Current Use Class	*Former Use Class*	*Option 1* **Housing/ employment led**	*Option 2* **Housing/ employment led**	*Option 3* **Leisure led**	*Option 4* **Appeal scheme**
B2: General industrial	B2	16,200 m2	16,200 m2	0	13,250 m2
B8: Storage or distribution	B8	20,000 m2	20,000 m2	0	13,250 m2
C1: Hotel*	C1	7,500 m2	7,500 m2	7,500 m2	7,500 m2
E(a): Retail	A1	0	0	500 m2	0
E(b): Consumption of food & drink on premises	A3	0	0	1,500 m2	1,500 m2
E(d): Indoor sport, recreation & fitness**	D2	0	0	18,500 m2	0
E(g)(i): Offices	B1(a)	0	0	0	12,000 m2
E(g)(ii): Research & Development / E(g)(iii) Industrial processes	B1 (b/c)	32,000 m2	32,000 m2	32,000 m2	0
F1: Learning & non-residential institution	D1	2,000 m2	2,000 m2	10,000 m2	0
F2(a): Local shop	A1	280 m2	280 m2	280 m2	0
C3: Dwellings	C3	400 No.	240 No.	200 No.	84 No.
Total commercial floorspace		77,980 m2	77,980 m2	70,280	47,500
Total homes		400 No.	240 No.	200 No.	84 No.

Notes:

* Possibility of sui generis for hostel

* *Possibility of sui generis for live music venue

- Floorspace of hotel kept constant at 7,500 m2. This is approximately equivalent to a 116 bed hotel based on the TRICS database
- Floorspace of a local shop kept constant in first three scenarios. Floorspace of 280 m2 is the maximum allowed under this use class.
- The employment floorspace figure for the appeal scheme has been split equally between B2 and B8 The E(b): Consumption of food & drink on premises in scenario 3 is a pub/restaurant but is not sui generis drinking establishment

3. HISTORICAL DEVELOPMENT

3.1 Site History

Details of the site history and surrounding area are summarised in Table 2 and Table *3* (information taken from [redacted] and JBA Consulting[5] reports) with approximate distances taken from the boundary of the site.

Table 2. Summary of onsite development

Historical Feature	*Area of Site*	*First Date Mapped*	*Last Date Mapped*	*Comments*
Chalk workings	Areas A & B	1875	1990	"Beeding Lime Kiln", "Old Lime Kiln" and "Chalk Pits" are labelled in this area and in the northern part of Area A. The remaining parts of Area A are shown as rough grassland, with remaining parts of Area B, Area C and Area D shown as open land.
Railway line	Between A/B	1899	1975	The former road that ran through this area is shown as a track. A railway siding is shown from the railway line to the westernmost building in the cement works.
Cement works	Area B	1914	2016	Significant ground disturbance is evident by the markings shown on the historical map in this area and also in the northern part of Area A. Two buildings are shown in the western area of Area A labelled "Cement Works". In 2016, labelled as 'disused'
Demolished/ altered buildings	Area A/B	1947	2000	The cement works are still shown in Area A with one of the main buildings in the central section partly demolished or altered. The quarry boundary in Area B has extended in an easterly direction to cover most of this area.
Industrial development	Area B/C	1961	2016	Extensive industrial development is shown in Area B with a large building labelled "Works" and ancillary structures and circular tanks shown to the north of this building. These buildings and structures appear to be confined within the former quarry in this area. Substantial new workings are evident to the north-east of this quarry, forming the northern and central parts of Area C. Access to these workings appear to be to the north of the main development in Area B. Structures, rail sidings and tramlines are still shown in Area A. The road through the site is labelled as "A283".
Chalk Pit	Area B/C/D	1984/90	2000	A "Chalk Pit" is labelled in Area D. A narrow connection is shown between the eastern quarry wall in Area B and the western quarry wall in Area C.
Site labelled 'disused'	All	2000	2016	The buildings within Area A and Area B are labelled as "Cement Works (Disused)". The connecting structure between Area A and Area B is no longer shown. Steyning Road (A283) is shown bisecting Area A and Area B.

Table 3. Summary of pertinent offsite development.

Historical Feature	*Distance/Direction from Site*	*First Date Mapped*	*Last Date Mapped*	*Comments*
River/ Railway	Western boundary Area A/ Between area A/B	1875	1990	The surrounding area is shown as open land at this time with the River Adur present along part of the western site boundary. The Horsham-Shoreham railway line (1861-1966) with spurs running off the main line into the site is shown running broadly north-west to south-east and formed the south-western boundary of Area A.
Buildings	100m north of Area B	1914	present	A row of buildings, presumably houses, bordering the road.
A283 alteration	Bisecting areas A / B	1984	present	A283 appears to have been realigned south of the site to reduce the angle of a former bend. Early earthworks associated with this realignment work is evident on the previous map edition.

3.1.1 Site Development and Planning History

A full and detailed history of the site is given in the Industrial Archaeology Study produced by WSP[7] in November 2021. In summary the history of the site dates back to at least the 18th century when the location was in use as a chalk quarry and contained lime kiln/s. A cement works was constructed at the end of the 19th century and production of Portland cement on an industrial scale commenced. The complex was built in the area comprised between the River Arun and Steyning Road (Area A), and raw materials were extracted from the quarry to the east of the road (Area C).

In 1850, it was reported that the site was operated by the Steel Bank Lime and Cement Company. By 1890, the site was owned by Shoreham Portland Cement Company and there were six chamber kilns producing 150 tons a week. In 1896 the site was expanded the operations considerably as the Sussex Portland Cement Company took ownership, so further kilns were constructed, and outputs increased. Cement was conveyed to Shoreham initially by barge and then by steam-wagon. British Portland Cement Company took over the works in 1912.

During World War 2, the site was closed. The plant was reconstructed immediately after the Second World War on the east side of the road (Area B), partly concealed within the existing chalk quarry. Designed by cement industry leader Oscar Faber, the new plant was much larger than the previous one

[7] WSP (2021). Shoreham Cement Works, West Sussex - Industrial Archaeology Study (confidential). November 2021. Ref. No. 70087636-IAS

and was provided with state-of the-art machinery, most notably two large rotary kilns for processing the cement.

New quarries were opened on top of the hill. There were twelve cement storage silos, two overhead travelling cranes and an overhead gantry that conveyed cement from the works to the packing plant and railway sidings on the other side of the road. In 1967 passenger services on the train network were ceased, and freight operation ceased in 1972. Area C was used as an inert landfill site between 1948 and 1991, primarily to dispose of by-products of the cement manufacturing process such as cement kiln dust (CKD).

In the early 1980s, in an attempt to make the then outdated complex more productive, the cement production processes were transitioned from 'wet process' to 'semi-wet process' which was much more energy efficient. Despite the changes, the plant closed down in 1991 due to decrease in demand and competition from overseas. The site continued to operate as a cement distribution facility until April 1993. The site was vacated by the then owner Blue Circle Group which left all the present buildings and machinery on the site.

In 1989, temporary planning permission was granted by Adur District Council for the use of the workshops in Area A as a separate commercial vehicle workshop. In 2000, temporary permission was granted for the use of the workshops and hardstanding in Area A for storage, maintenance and repair of vehicles, including buses. Subsequent renewals of this temporary permission were granted to 2015. The extant permission for the extraction of chalk at the site runs to 2042, after which time a basic restoration scheme would have to be implemented.

3.1.2 Landfill

A historical landfill site is noted within Area C. The licence holder is given as Blue Circle Industries Plc and the waste input date is recorded as between 31 December 1960 and 31 December 1993. The specified waste is recorded as unknown material. The authorised wastes are recorded as general works rubbish, kiln bricks, other similar inert material, partly burned clinker, precipitator dust, stones, solids from aggregate washing and top/subsoils. The number of authorised wastes was increased on the latest version of the licence, dated 1988, believed to allow the disposal of inert construction material from the surrounding area. The status of the licence is given in the previous reports as lapsed/cancelled/defunct/not applicable/surrendered/cancelled.

West Sussex County Council (WSCC) have provided the following confirmation regarding the status of the Landfill:

The license issued for the historic landfill site (1960-1993) would have been issued by WSCC (planning) and would also have had planning from the district council (Horsham). We won't have any records from our department. Regardless, the license will have been surrendered, so the legislation that applies to the site is via the Contaminated Land regime (EPA part 2) which is via the [Horsham] *district council.*

4. GROUND CONDITIONS

4.1 Published Geology

With reference to the British Geological Survey (BGS)[8] website, the Groundsure GeoInsight report[4] and the JBA report[5] the site is underlain by superficial deposits of Head, River Terrace Deposits and Alluvium. The underlying bedrock geology is upper cretaceous chalk. Table 4 summarises the geology of the local area.

Table 4. Geology of the local area

Age	*Group*	*Formation/ Member*	*Description*	*Thickness*
Quaternary		Head	Clay, silt, sand and gravel	
		River Terrace Deposits	Sand and gravel	
		Alluvium	Clay, silt, sand and peat	
Upper Cretaceous	White Chalk Subgroup	Seaford Chalk Formation	Chalk	60-80m
		Lewes Nodular Chalk Formation		45-60m
		New Pit Chalk Formation		40-50m
		Holywell Nodular Chalk Formation		25-35m
	Grey Chalk Subgroup	Zig Zag Chalk Formation		45-75m
		West Melbury Marly Chalk Formation		30-35m

The geological map (BGS, 2006) Sheet 318/333 shows the site to be underlain by the Seaford Chalk Formation and Lewes Nodular Chalk Formation of the White Chalk Subgroup. The Seaford Chalk Formation is described as pure white, soft to firm chalk with regular seams of nodular and seams of semi-tabular flints. The Lewes Nodular Chalk Formation is described as off-white hard nodular chalk with regular seams of large nodular flints. It appears that the boundary between the Seaford Chalk and

[8] British Geological Survey (BGS), www.bgs.ac.uk

Lewes Nodular Chalk has not been implied over the site area, presumably due to the former quarrying activity. In the BGS geological memoir[2], the cement works quarry (Areas C and D) is taken as the type locality for the contact between the Lewes Nodular Chalk and overlying Seaford Chalk. Area C, the lowest part of the quarry, is mainly within the Lewes Nodular Chalk, with the highest part of the quarry (Area D) in the Seaford Chalk. Marl bands and hardgrounds in the Lewes Nodular Chalk as exposed in the quarry faces in Area C are indicated on site plans. Many of these exposures have subsequently been covered up by filling activity. A plan of the quarry presented in the memoir indicates the presence of a fault with solution cavities in the eastern wall of Area C. This fault is recorded to have carried great volumes of water in winter which used to flood the quarry (Mortimore et al, 1990[9]).

In the western part of the site, Area A, the chalk is shown to be overlain by Superficial Deposits of Head (variable sandy, silty clay, locally gravelly) and Alluvium (clay, silt and sand, locally organic, with gravel). "Worked ground" is evident through a zone of hatching on the geological map in Area A. There may be up to 4 metres of Made Ground present in this area, overlaying the natural soils, made-up as part of the original cement works construction to raise the area out of the flood plain.

4.2 Unpublished Geology

Unpublished geological information refers to publicly available records, such as borehole logs, that are not officially published documents such as the geological maps and memoirs. With reference to the BGS website[8], 10 borehole records (dated from pre-1947 to 2011) show intrusive investigations located within or close to the site boundary of Areas A and B. Water-well borehole records, with limited information, indicate the presence of up to 41m of chalk beneath Area A.

In one borehole in Area A, approximately 0.75m of Made Ground, described as concrete and ash, was encountered above Head.

A summary of these borehole records is presented in Table with borehole logs and a borehole location plan presented in Appendix B.

Table 5. Summary of BGS borehole records

BGS Reference (year)	*Grid Reference*	*Proximity to site (m)*	*Base of Borehole (m bgl) [mOD]*	*Depth to Top of Stratum (m bgl) [mOD]*				
				Made Ground	*Topsoil*	*Alluvium*	*Clay with Chalk*	*Chalk*
TQ10NE2 (1968)	519900, 108670	Area B western boundary/A283	6.10 [-0.5]	-	-	-	1.07 [4.53]	3.35 [2.25]

[9] Mortimore, R. N., Roberts, L. D., & Jones, D. L. (1990). Logging of chalk for engineering purposes. In Chalk (pp. 133-152). Thomas Telford Publishing.

BGS Reference (year)	*Grid Reference*	*Proximity to site (m)*	*Base of Borehole (m bgl) [mOD]*	*Depth to Top of Stratum (m bgl) [mOD]*				
				Made Ground	*Topsoil*	*Alluvium*	*Clay with Chalk*	*Chalk*
TQ10NE3 (1968)	519890, 10865	Area A eastern boundary/A283	6.10 [-0.16]	0 [5.94]	0 [6.86]	-	0.76 [5.18]	3.66 [2.28]
TQ10NE4 (1968)	519880, 108620	Area A eastern boundary/A283	6.10 [0.76]	-	-	-	-	0.61 [6.25]
TQ10NE30/A (unknown)	519780, 108580	Area A Approx. centre	41.14	-	-	-	-	0
TQ10NE30/B (1933)	519880, 108580	Area A eastern boundary/A283	30.48 [-22.86]	-	-	-	-	0 [7.62]
TQ10NE30/C (pre-1947)	519960, 108680	Area B north of main buildings	9.14	-	-	-	-	0
TQ20NW203 (unknown)	520100, 108600	Area B within main building footprint	unknown	-	-	-	-	-
TQ10NE119 (2011)	519725, 108550	West of Area A	6.0	0.05	0	4.30	-	-
TQ10NE120 (2011)	519800, 108417	West of Area A	6.0	-	0	2.90	-	-
TQ10NE122 (2011)	519692, 108591	West of Area A	6.0	0.05	0	2.30	-	-

It is noted that the Made Ground recorded in TQ10NE3 located in Area A eastern boundary/A283 comprised of concrete and ash indicating a potential risk of contamination in this location.

Area C was licensed as an inert landfill during the latter half of the 20th Century to dispose of [redacted] cement kiln dust (CKD). CKD is a significant by-product material of the cement manufacturing process and is characterised to have a very high sulphate and alkaline pH. Fill depth is understood to be up to circa 21.5 metres below ground level at its deepest point.

[redacted]

4.4 Hydrogeology and Hydrology

The Environment Agency has produced an aquifer designation system consistent with the requirements of the Water Framework Directive. The designations have been set for superficial and bedrock geologies and are based on the importance of aquifers for potable water supply and their role in supporting surface water bodies and wetland ecosystems.

The chalk formations are classified as a Principal Aquifer by the Environment Agency. These are layers of rock that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. Superficial Deposits- The Head deposits and Alluvium are classified as Secondary Undifferentiated aquifers by the Environment Agency. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

An abstraction borehole is indicated on the site on the 1:100,000 scale Hydrogeological Map of the South Downs and Adjacent Parts of the Weald[10] (BGS, 1978) and is also referred to in the Envirocheck report[5]. The abstraction is currently licensed to the site owner for effluent/slurry dilution purposes. From the Envirocheck report it is known that the site does not lie within an Environment Agency groundwater abstraction Source Protection Zone (SPZ).

The main watercourse within close proximity to the site is the River Adur that partly borders Area A. The watercourse is designated a Primary River. This watercourse flows in a southerly direction beyond the western boundary of the site, discharging into the English Channel at Shoreham-by-Sea.

4.4.1 Water Quality

The Environment Agency's River Catchment Data Explorer[11] indicates that the quality of the River Adur with respect to ecological status is poor to moderate and with respect to chemical status is good. It is understood the long-term intention is to improve the ecological status of the river to good by 2027.

The Envirocheck report states that two discharge consents are nearby, both recorded to the north of the site boundary at Dacre Gardens. The first relates to effluent discharges from a sewage treatment works serving 13-18 Dacre Gardens. The receiving watercourse is recorded as "freshwater stream or river" the River Adur. The second is a revoked consent for similar effluent discharges at a group of properties. According to the previous reports[4,5], it was understood that the site originally discharged to the small sewage treatment works to the north of Dacre Gardens. However, it was noted in the reports that there is a possible discharge to the river from a sewage treatment plant in the northern part of Area A.

The Hydrogeological Map of the South Downs and Adjacent Parts of the Weald[10] indicates that the predominant groundwater flow direction in the chalk formations in this area is to the south. However, localised groundwater flow may be influenced by solution widened faults and fissures in the Chalk that

[10] Hydrogeological map of the South Downs and adjacent part of Weald including parts of hydrometric areas 39,40, 41 and 42. Scale: 1:100 000 (1978)
[11] https://environment.data.gov.uk/catchment-planning/ accessed December 2021

occur perpendicular to the prevalent groundwater flow direction. Groundwater level on the map in the area of the site is shown to be around 5m OD. [redacted] Local groundwater level variations may occur as the River Adur is a tidally affected river.

4.5 Ground Hazards

The risks associated with potential geological hazards have been assessed using [redacted] and JBA Consulting[5] reports, The Geologists' Association Guide No. 74[6], and observations from the CGL site walkover survey. Table 6 summarises the geological hazard potential for the site.

Table 6. Geological Hazards

Hazard	***Risk***	***Comments***
Shrink-swell clays	No Hazard	None anticipated on site
Landslides/Rockfall/slope stability	Moderate to Low	The site is predominantly located within old chalk quarries, with former quarry faces surrounding areas B,C and D. These provide concern for hazard through spalling and rock fall from these faces rather than landslide.
Ground Dissolution	Moderate to Low	There are historical records suggesting natural dissolution of chalk in some locations surrounding the quarry edge. Naturally infilled solution features were observed in the cliff face of Area C to D. Most near surface features are likely to have been removed from quarried areas however karstic features may still be present beneath some areas. Open access LiDAR data indicates low likelihood of near surface sinkholes to be present across the lower levels of the quarried areas B, C & D. However, LiDAR and geological survey does show several sinkholes and karstic features around the perimeter of the site which are either infilled or linked to multiple large open fractures and cavernous dissolution features along and within the cliff lines. A plan of the quarry presented in the BGS Geological memoir[2] indicates the presence of a fault with solution cavities in the eastern wall of Area C. This fault is recorded to have carried great volumes of water in winter which used to flood the quarry (Mortimore et al, 1990).
Compressible Deposits	Moderate to Low	Majority of Area C, a former quarry area is an inert landfill area, [redacted] In area A, Made Ground present is likely to be associated with historical raising of ground levels. Further ground investigation required to confirm compressible deposit hazards.

Hazard	*Risk*	*Comments*
Collapsible Deposits	Low	CKD has a hardened and cemented nature, so the collapsibility of the inert fill material in Area C is generally considered low.
Running Sands	No hazard	None anticipated on site.

Based on the above generic assessment, typical geological hazards are considered to present a moderate to low risk to the proposed development.

4.5.1 Natural Cavity Records

[redacted]

4.6 Previous Ground Investigations

[redacted]

[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

4.6.6 Rory Mortimore – The Geologists' Association Guide No. 74 (2021)

In association with the Geological Society, Rory Mortimore carried out a comprehensive geological survey of the site in 2020 to assess and document the Chalk rock mass properties and quality. The survey focused upon the Chalk exposures within Areas B, C & D. The survey documents eight areas of karstic features with both open and infilled cavernous systems around cliff lines and within the quarry:

- Three infilled sinkholes and solution features are exposed along the northern face of the quarry above areas C & D;
- Two are present within Area C; one on the lower haul road with several infilled and open cavernous fractures with sediments indicating a continuation with the features up on

northern face. The second is located on the east quarry wall and exposes a cave system along a prominent fault from which it is understood groundwater flooding would originate when the site was an active quarry;

- Four sinkholes along the cliff line on the southern and eastern faces of Areas C & D that connect to solution features and fractured chalk into Area C. These belong to the remnants of a line of sinkholes that were present prior to excavation of the quarry; and
- A fault with caves in the far eastern cliff face of Area D.

The approximate location of these features are shown on the site risks plan provided in Figure 3.

Mortimore summarises the value of Chalk exposures at the quarry as:

"*There is no other exposure anywhere in the North or South Downs (or southern England) that contains such a variety of landscape features including dissolution cavities, caves and collapse caverns…*

[With regards to] *Future plans must consider the value of the geology exposed here to Cretaceous global studies, Quaternary landscape processes and how groundwater moves and is stored in the Chalk aquifer. All these aspects of the geology remain to be adequately researched."*

5. ENVIRONMENTAL SETTING

5.1 Summary of Potential Contamination and Environmental Sensitivity

[redacted] and the JBA Consulting report[5] provide information on the environmental setting of the site and identify potential sources of ground contamination. A summary of the pertinent points is set out below:

- Areas A and B are considered to comprise brownfield land due to the former and existing industrial uses of this section of the site, primarily related to cement manufacture;
- Area A specific sources of potential contamination include; buried fuel tank adjacent to workshops, interceptor tank, waste water treatment plant, asbestos containing materials related to former cement works buildings and railway sidings, and a fire involving a building and multiple buses in 2017;
- Area B specific sources of potential contamination include; diesel storage and refuelling area, coal storage and usage, and clinker production and storage related to cement production, Pulverised Fly Ash (PFA) related to cement production, Polychlorinated biphenyls (PCBs) from the former 3kV substation and transformers, hydrocarbons related to historical and current machinery and vehicles, and asbestos containing materials related to the former cement works buildings;
- Area C has been used historically as an inert landfill accepting waste by-products and materials from the cement works, and inert construction materials from the surrounding area;
- Cement Kiln Dust (CKD) [redacted] CKD is an irritant to skin and to the respiratory system if inhaled. [redacted] The material is considered hazardous by the Environment Agency and is therefore unsuitable for use in areas where future users may be exposed to it without appropriate capping thickness or hardstanding or in areas that may pose a potential risk to controlled waters.
- [redacted]
- The River Adur (a controlled water body) passes alongside the site and there is potential for lateral migration of contaminants from the site into the river;

- A former sewer works was located within 500m of the site;
- The site is within an environmentally Sensitive Area, the South Downs National Park;
- The Beeding Hill to Newtimber Hill Site of Special Scientific Interest (SSSI) is located immediately north of the site;
- There are areas of priority habitat around the site including coastal floodplain and grazing marshes adjacent to Area A, deciduous woodland to the north and south of Area B and lowland calcareous grassland north of Areas C and D. The main site area (areas B, C and D) is designated as a priority habitat for good quality semi-improved grassland;
- The south-eastern section of area A is included in the national forest inventory for broadleaved trees;
- The site is a Regional Important Geological Site (RIGS) due to the exposures of chalk within the quarry; and
- Protected bird species have been observed and are understood to be nesting within the former quarry.

5.2 Regulatory Enquiries

5.2.1 Environment Agency

The Environment Agency was contacted for information regarding potentially contaminated land across the site and in the surrounding area. The correspondence is enclosed in Appendix D and the pertinent information outlined below.

1. General background information relating to the site, to include dates of operation;

Your enquiry relates to a historic landfill. We are unable to provide any information as we no longer hold the records for these sites. We recommend that you contact the Environmental Health / Environmental Protection Department at your local authority for further advice and information. They are the lead regulator for these sites and are responsible for the inspection of contaminated land in their area, which includes historic landfill sites.

2. Part 2A designations within 500m of the site;

Please liaise with the relevant local authority.

3. Records of historical industrial uses on site (other than the cement works);

Your enquiry relates to a historic landfill. We are unable to provide any information as we no longer hold the records for these sites. We recommend that you contact the Environmental Health / Environmental Protection Department at your local authority for further advice and information. They are the lead regulator for these sites and are responsible for the inspection of contaminated land in their area, which includes historic landfill sites.

4. Records of ground gas, groundwater and surface water monitoring data for the site;

Please liaise with the relevant local authority.

Most of our groundwater quality data is now available online, in our Water quality data archive. The archive includes data from across England for surface, coastal and groundwaters dating from 2000 and can be downloaded direct to your computer.

A proximity search has not identified any groundwater monitoring sites meeting your specification.

Please note that water company quality data may not be public register and should be requested directly from the relevant water company.

5. Information on groundwater / surface water abstractions on site and within 500m of the site;

Two boreholes on site 10/41/311002

1966 onwards South end of site by road Shoreham Cement Works Point 1

Same license – 2017 onwards North end of site Shoreham Cement Works Point 2. Please see attached licence details. No other licences within 500 metres of the site.

Copies of the abstraction licences are provided in Appendix D. It is noted the licence permits up to 763,743m^3 of water per year with a daily permit of 2577m^3. This information is considered to be pertinent to the future development of the site in consideration of water neutrality.

6. Information on discharge consents within 250m of the site; and

Please review the following weblink and provide the permit number(s) for the site(s) you wish to see information for: Public registers (data.gov.uk)

A copy of the discharge consent permit as shown on the above database is provided in Plate 1 below.

Plate 1. Discharge consent Permit for Beeding Cement Works

Permit AB3303ZN/A001 – Dudman Waste And Environmental Limited

Permit number	AB3303ZN/A001
Waste Management Licence No.	400523
Licence Holder Name	Dudman Waste And Environmental Limited

Site

Site name	Shoreham Recycling Centre
Site type	A16 : Physical Treatment Facility
Site Address	Beeding Cement Works, A283 Beeding Road, Shoreham, West Sussex, BN44 3TX
Site Postcode	BN44 3TX
Site Grid Reference	TQ2025408603
Easting	520254
Northing	108603
Local Authority	Horsham

Status

Status Description	Issued
Issued Date	23/09/2013

7. Environmental incidents within 250m of the site;

Please review the following weblink for your requested information: *Defra Data Services Platform*

No environmental incidents were listed on the above database link.

5.2.2 Adur & Worthing Council

Adur & Worthing Council was contacted for information regarding potentially contaminated land across the site and in the surrounding area. The correspondence is enclosed in Appendix E and the pertinent information outlined below.

Request:

CGL has been appointed as a consultant for contaminated land and remediation for the Shoreham Cement Works AAP. Would you be able to provide copies of any records under a contaminated land search and historical development of the Shoreham Cement works site located at:

Steyning Road
Upper Beeding
BN44 3TX

It would be much appreciated if you could provide supporting information where relevant.

Response:

Please be advised the majority of the land you refer to lies within the boundary of Horsham District Council (HDC). Some of the southern edge is within the boundary of Adur District Council (ADC) and since the creation of the South Downs National Park Authority (SDNPA) in 2011 the site is now under SDNPA Planning jurisdiction.

You may wish to contact HDC and SDNPA for records of recorded information they hold in relation to your request.

ADC holds records of the following information in relation to your request:

Planning historic cards for the site to 2011.

Regarding your request for "General background information relating to the site, to include dates of operation", we do not hold this information.

The Council holds documents relating to a planning application to Horsham District Council in 2002, which contains information about the site.

It is noted that the outline application in 2002 for a mixed use redevelopment of the site 'comprising houses office industrial storage/distribution hotel & other uses landscaping open space & highways' was refused with an objection noted being received by the Secretary of State.

Regarding your request for "Information on groundwater / surface water abstractions on site and within 500m of the site; Information on waste facilities within 250m of the site; and Information on discharge consents within 250m of the site" - would all be for the Environment Agency to answer.

We don't hold current information. It should be borne in mind the application site lies within Horsham DC so they could be approached for this information.

It is noted the records provided on the planning information cards (Appendix E) corroborate the information gathered from previous reports regarding the historical development of the site since 1938 up to an including the current use of the site. Maps provided for the site (Appendix E) include a site plan for [redacted] from 1999 detailing Ground Investigation Points and Sample Positions. The plan shows approximate locations for:

- 10 no. boreholes by Geotechnical Services in 1997;

- 14 no. trial pits by PBA in 1999; and
- 24 no. sampling positions by ACS in 1999.

No other information regarding the ground investigations was provided.

5.2.3 Horsham District Council

Horsham District Council was contacted for information regarding potentially contaminated land across the site and in the surrounding area. The correspondence is enclosed in Appendix F and the pertinent information outlined below.

1. **General background information relating to the site, to include dates of operation;**

   No detailed records held. Information on the operational history of the site can be found at the following link:

   https://www.bcd-urbex.com/shoreham-cement-works-west-sussex/

   The website shows recent photographs from around and with the main cement works buildings within Area B, focusing on the rotary kilns. A brief history of the cement works is also provided.

2. **Part 2A designations within 500m of the site;**

   No sites designated with Horsham District Council's area

3. **Records of historical industrial uses on site (other than the cement works);**

   No records held

4. **Records of ground gas, groundwater and surface water monitoring data for the site**;

   Records may be available through planning files but not available electronically

5. **Information on groundwater / surface water abstractions on site and within 500m of the site;**

   Records held by Environment Agency. No private water supplies known to this authority

6. **Information on waste facilities within 250m of the site;**

   Records held by Environment Agency. West Sussex County Council is the waste planning authority

7. **Information on discharge consents within 250m of the site; and**

   Records held by Environment Agency

8. **Environmental incidents within 250m of the site;**

   Records held by Environment Agency

A copy of the planning records for the site held by Horsham District Council are provided in Appendix F.

5.2.4 West Sussex County Council

West Sussex County Council was contacted for information regarding the status of the landfill on site. The correspondence is enclosed in Appendix G and the pertinent information outlined below.

The license issued for the historic landfill site (1960-1993) would have been issued by WSCC (planning) and would also have had planning from the district council (Horsham). We won't have any records from our department. Regardless, the license will have been surrendered, so the legislation that applies to the site is via the Contaminated Land regime (EPA part 2) which is via the district council.

6. PRELIMINARY RISK ASSESSMENT

6.1 Introduction

Historical contamination of land may present harm to human health and the environment. Current UK legislation stipulates that the risk associated with potential land contamination is assessed and remediated, if necessary. Under the Town and Country Planning Act 1990 (as amended), potential land contamination is a "material planning consideration" together with the National Planning Policy Framework ((revised in July 2021, to replace the 2012 version further revised in 2018 and 2019), which means that a planning authority must consider contamination when they prepare development plans or consider individual applications for planning permission. It is the responsibility of the developer to carry out the remediation where it is required and satisfy the Local Authority that the remediation has been carried out as agreed.

Additionally, Part 2A of the Environmental Protection Act 1990 requires that a significant source-pathway-receptor linkage exists to determine a site as contaminated land. This means that there has to be a contaminant present, a receptor that could be harmed by this contaminant, and a pathway linking the two. Part 2A deals with the contamination risk from a site in its current use, however, the planning system requires that the proposed use is considered. Where remediation is carried out under the planning system, it should be ensured that the site is in such a condition that it would still not meet the definition of contaminated land under Part 2A.

6.2 Preliminary Conceptual Site Model (CSM)

A preliminary conceptual model has been compiled for the site with respect to the proposed development options to identify the potential sources of contamination and the associated potential contaminant linkages. The CSM is described below and tabulated along with the preliminary risk assessment in Table 9. The CSM also informs the potential need for further investigation at the site.

6.2.1 Potential Sources

Potential contamination sources can include both current and historical activities on site and in the surrounding area. The following potential sources have been identified at the site.

- *On-site sources –*

  Area A is located in the western section of the site and was the original Cement works plus former offices for wider cement works with historical rail / tram infrastructure. The former cement works in Area A is now used as an industrial estate / industrial premises / vehicle

maintenance area/workshop. There is potential for widespread diffuse contamination associated with the Made Ground plus specific point sources. Additionally, the underlying geology includes Alluvium which has the potential to be a limited source of ground gas. Potential contaminants of concern included Made Ground such as ash, clinker, asbestos containing materials, heavy metals, fuels and oils, sulphates, solvents, polychlorinated biphenyls (PCBs), and ground gas.

An earth mound in this area is understood to be remnant of the A283 realignment works and is likely to present a low risk of contamination.

Area B – The former cement works buildings are still present. The site operated as a standard wet, water-based process with the kilns being coal-fired so there were no bulk use/storage of petroleum fuels in the process. - There is potential for widespread diffuse contamination associated with the Made Ground plus specific point sources.

Area C was licensed as an inert landfill during the latter half of the 20th Century to dispose of [redacted] cement kiln dust (CKD). CKD is a significant by-product material of the cement manufacturing process and is characterised to have a very high sulphate and alkaline pH. [redacted]

Although the analytical results to date indicate that the CKD is relatively benign, it is known that CKD can be an irritant to skin and to the respiratory system if inhaled. [redacted] It is understood that CKD is classified as a hazardous waste by Environment Agency due to its elevated pH values.

- *Off-site sources*- current use of the main road A283 could be a source of total petroleum hydrocarbons (TPH), and polycyclic aromatic hydrocarbons (PAH).

- *Ground gas/vapours* – Made Ground and Alluvium deposits can be a source of ground gas where an appreciable depth / organic content is present. If present, degradation of hydrocarbons/organic chemicals can also produce organic vapours and ground gases. [redacted] Further ground gas monitoring would be required to determine the gas screening value for this area and the requirement for gas protection measures for new buildings.

With respect to Area A Alluvial soils can quite often give high concentrations of methane and carbon dioxide in monitoring wells, often methane concentrations can reach up to 90%. This is because the gas has been generated historically and is trapped in the pores due to limited transport (at low diffusion rates). The methane accumulates at increasing depth in peat columns, but this does not indicate high rates of production (Clymo and Bryant, 2008; Fritz et al., 2011). Often there is no, or very little, current gas generation and the carbon dioxide has dissolved out of the gas trapped in the soil pores which causes a higher percentage of methane to be recorded. Experience on many dockland and similar sites has shown that sites on Alluvial soils do not generate sufficient hazardous gas flows to exceed Characteristic Situation 2 as defined in BS 8485: 2007 (this has been demonstrated by monitoring under floor venting systems - Wilson and Card, 1999).

Whilst there is Chalk present which will give rise to small volumes of carbon dioxide this, on its own, is not considered to be a credible source see *Appendix 2 - Card G, Wilson S, Mortimer S. 2012. A Pragmatic Approach to Ground Gas Risk Assessment. CL:AIRE Research Bulletin RB17.*

Area C was used as an inert landfill during the latter half of the 20th Century to dispose of [redacted] CKD which is understood to have a low content of degradable organic material [redacted]

As noted by Card G, Wilson S, Mortimer S. 2012, where the main source of gas is Made Ground with a low degradable content, will likely be classified as Characteristic Situation (CS) 2 or 3. Categories CS2 and above require additional ground gas mitigation measures such as gas resistant membranes and/or ventilation as a minimum.

[redacted] Groundwater – the groundwater has the potential to become both a source and receptor a of contamination resulting from impacts from the cement works. Potential contaminants in the groundwater would be similar to those present in the soils, as discussed above. [redacted]

[redacted]

6.2.2 Potential Pathways

The potential migration pathways that may be present at the site include:

- *Ingestion and inhalation* - contamination within the Made Ground/shallow natural soils can result in the ingestion or inhalation of contaminated soils (and asbestos fibres if present) and inhalation of ground gases/vapours;
- *Direct/dermal contact* - direct/dermal contact with contaminated soils or groundwater can result in the permeation of contaminants through building material or the uptake of contaminants through the skin;
- *Root uptake* – uptake of phytotoxic contaminants by plants and vegetation;
- *Groundwater migration* - leaching or partitioning of contaminants into groundwater followed by migration of contaminants both vertically and laterally within groundwater to controlled waters.
- *Migration of ground gases and vapours such as permanent gases, landfill gas and volatile hydrocarbons* – Migration through the soil matrix could lead to accumulation within building, posing a risk of asphyxiation or explosion; and
- Direct contact with underground structures and services.

6.2.3 Potential Receptors

There are four principal redevelopment scenarios being considered for the site as outlined in Table 1. Whilst there are varying use classes being consider for the mixed use development, they are generally either housing led with a degree of employment / leisure use or leisure led with a degree of employment / housing. All scheme included for some public open space. The potential risk associated with potential contamination is related to the likelihood of exposure and this with vary depending on the specific development planned. At this stage the four principal human health receptor scenarios being considered for the site are based on the "standard" land-uses likely present following development including residential (with and without gardens), commercial/industrial (including hotel / shop storage use etc) and recreational public open space. This is intended to highlight that these categories are representative of a range of generic site conditions, taking into account studies of social behaviour, but also incorporating the simplifying and precautionary assumptions necessary to derive a CSM that is broadly applicable to a range of different circumstances. The standard land-uses are not intended to reflect accurately either the conditions of the specific site or the behaviour of a particular individual. There is a wide range of different types of housing / business and site layouts that could be covered by the AAP. However, for a conceptual model to be effective, boundary assumptions must be used to limit the possibilities and as such based on the likely standard land uses the main receptors at the site are considered to be:

- *Future site occupants/users* – considered to be at risk from possible contamination associated with the identified sources on site and ground gas/vapour accumulation within buildings. Site intended for domestic dwellings as well as commercial land use; Areas of highest potential contamination risk are likely best suited to least sensitive land use.

- *Construction workers* – could be affected by potential contamination within soils and groundwater during ground works. Such persons are likely to be in close contact with potentially contaminated materials, which may include asbestos;

- *Off-site residents* – potential contamination risks are likely to be low assuming appropriate practices during construction;

- *Controlled waters* – the surrounding aquifers including the Secondary (Undifferentiated) Aquifer in the Alluvium and Head deposits, and the Principal Aquifer in the chalk and local surface waters are potentially at risk from the leaching of contaminants such as heavy metals from potentially contaminated soils. The River Adur is adjacent to Area A to the west of the site.

- *On and off-site buildings and infrastructure* – could be at risk from ground gas migration, aggressive ground conditions and contaminants may permeate through underground services such as water supply pipes; and

- *Plants and vegetation* – primarily at risk from phototoxic contaminants such as copper, nickel and zinc.

- *Ecology* – The site is within the South Downs National Park and adjacent to a SSSI and the River Adur.

6.3 Preliminary Qualitative Risk Assessment

A preliminary qualitative risk assessment has been undertaken and is included in the CSM detailed in Table 9 based on the findings of the conceptual site model and the potential contaminant linkages that may exist at the site in accordance with Land Contamination Risk Management (LCRM). Using criteria broadly based on those presented in CIRIA Report C552[12], the magnitude of the risk associated with potential pollutant linkages has then been assessed and is summarised below in Table 9. The risk assessment methodology is presented in Appendix H.

[12] CIRIA (2001) Contaminated Land Risk Assessment. A guide to good practice. C552.

Table 9. Preliminary CSM and Qualitative Risk Assessment

Potential Source/Medium	*Potential Exposure Route*	*Potential Receptor*	*Severity*	*Probability*	*Risk Rating*	*Comments*
Explosive/ asphyxiating gases/vapours from underlying soils (Made Ground, if present) and potential on and off-site sources	Migration of gases and vapours through the surface via permeable soils and drainage & services	Internal building spaces & future occupiers	medium	likely	Moderate	On site sources of gases and vapours are likely from the Alluvium and Made Ground in Area A, Made Ground in Area B and Landfill/ [redacted] They are anticipated to be laterally pervasive. However, distance to off-site buildings significantly reduces this risk to off-site buildings.
		Off-site internal buildings spaces and residents	medium	Unlikely	Low	
Organic/ inorganic contaminants such as hydrocarbons, CKD, PAH, PCBs, metals and asbestos within underlying soils (based on potential on site sources)	Direct/indirect ingestion of soil contaminants and dust, inhalation of particle vapours and asbestos fibres and dermal contact	Construction workers	severe	likely	High	Based on historical mapping, historical site use and previous investigations there is likely to be contamination within the soils on site from on-site sources. Risk to buried concrete and services, [redacted].; Areas of highest potential contamination risk are likely best suited to least sensitive land use.
		Future site users	severe	likely	High	
	Direct contact with underground structures and services	Buildings and structures	medium	Likely	Moderate	
	Root uptake	Plants and vegetation	Mild	likely	Moderate/ Low	
	Leaching or partitioning of contaminants into groundwater followed by migration of contaminants both vertically and laterally with groundwater	Secondary (Undifferentiated) Aquifer in the Alluvium and Head deposits, and the Principal Aquifer in the chalk	Medium	Likely	Moderate	
		The River Adur is adjacent to Area A to the west of the site	Medium	Likely	Moderate	
Organic/inorganic contaminants within groundwater (Chalk aquifer, Head deposits, Alluvium)	Direct contact and ingestion of contaminated groundwater	Future site users	Medium	Low likelihood	Moderate/Low	Historical site use indicates a low risk of groundwater contamination however this requires investigation and monitoring.
		Off-site residents	Medium	Unlikely	Low	
	Inhalation of vapours	Future site users	Medium	Low likelihood	Moderate/Low	
	Vertical migration	Principal Aquifer (Chalk)	Medium	Low Likelihood	Moderate/Low	

Potential Source/Medium	*Potential Exposure Route*	*Potential Receptor*	*Severity*	*Probability*	*Risk Rating*	*Comments*
	Direct contact and ingestion of contaminated groundwater	Construction workers	Medium	Low Likelihood	Moderate/ Low	
	Direct contact with underground structures and services	Off-site and on-site buildings and structures	Mild	Unlikely	Very Low	
	Lateral migration in shallow groundwater	The River Adur is adjacent to Area A to the west of the site	Medium	Likely	Moderate	
Off-site sources	Migration of contaminants from off-site sources onto underlying site	Future site users	Medium	Unlikely	Low	Although the underlying Chalk is highly permeable, it is considered unlikely that contaminants may migrate horizontally on site due to the distance from possible nearby sources.
		Construction workers	Medium	Unlikely	Low	
		Controlled waters	Medium	Unlikely	Low	
		On-site buildings and structures	Mild	Unlikely	Very Low	

7. POTENTIAL GEOENVIRONMENTAL AND GEOTECHNICAL DEVELOPMENT CONDITIONS CONSTRAINTS AND ABNORMAL CONSIDERATIONS

7.1 General

The site is a semi-derelict cement works, inactive chalk quarry, inert recycling facility and mix of temporary business uses.

The site is largely situated within old chalk quarries and the location of a former cement works. The history of the site is predominantly industrial, with initially small-scale lime kilns and quarries located in Area A and the western part of Area B growing into industrial-scale quarrying and cement manufacture over the whole site with progressive development during the late 19th and 20th Century.

7.1.1 Area A

Area A is located in the western section of the site and was the original Cement works plus former offices for wider cement works with historical rail / tram infrastructure. The former cement works in Area A is now used as an industrial estate / industrial premises / vehicle maintenance area/workshop. There is potential for widespread diffuse contamination associated with the Made Ground plus specific point sources. Additionally, the underlying geology includes Alluvium which has the potential to be a limited source of ground gas. Overall, this area is considered to present a medium risk of contamination.

An earth mound in this area is understood to be remnant of the A283 realignment works and is likely to present a low risk of contamination.

7.1.2 Area B

Area B – The former cement works buildings are still present. The site operated as a standard wet, water-based process with the kilns being coal-fired so there were no bulk use/storage of petroleum fuels in the process. There is potential for widespread diffuse contamination associated with the Made Ground plus specific point sources. Overall, this area is considered to present a medium risk of contamination.

The slope stability and risks of rock fall from the quarry walls surrounding Area B will need to be fully assessed to determine what remedial measures may be required and the constraints that may be imposed upon adjacent development and or future use scenarios.

7.1.3 Area C

Area C was licensed as an inert landfill during the latter half of the 20th Century to dispose of [redacted] cement kiln dust (CKD). CKD is a significant by-product material of the cement manufacturing process and is characterised to have a very high sulphate and alkaline pH. [redacted]

[redacted] records one historical landfill site on the site within Area C. The licence holder is given as Blue Circle Industries Plc and the waste input date is recorded as between 31st December 1960 and 31st December 1993. The specified waste is recorded as unknown material. The authorised wastes are recorded as general works rubbish, kiln bricks, other similar inert material, partly burned clinker, precipitator dust, stones, solids from aggregate washing and top/subsoils. The number of authorised wastes was increased on the latest version of the licence, dated 1988, believed to allow the disposal of inert construction material from the surrounding area. The status of the licence is given as lapsed/cancelled/defunct/not applicable/surrendered/cancelled. [redacted] Cement kiln dust (CKD) is the fine-grained, solid, highly alkaline waste removed from cement kiln exhaust gas by air pollution control devices. CKD consists of four major components: unreacted raw feed, partially calcined feed and clinker dust, free lime, and enriched salts of alkali sulphates, halides, and other volatile compounds.

Due to the licensed nature of this historic landfills, whether or not the permit has been surrendered, consideration will need to be given to how this area may be regulated via the implementation of current waste legislation. Currently there is an increasing degree of inconsistency in how these sites are regulated via the implementation of current waste legislation. As such it may not be possible to reuse the material from Area C using the Definition of Waste: Development Industry Code of Practice (Contaminated Land: Applications in Real Environments (CL:AIRE), V2, 2011) as it is a historic landfill. As such works in this area may be seen as a waste recovery operation and an Environmental Permit may be required.

[redacted]

[redacted] it is known that CKD can be an irritant to skin and to the respiratory system if inhaled. [redacted] It is understood that CKD is classified as a hazardous waste due to its elevated pH values. Therefore, the material is unlikely to be suitable for re-use in areas where future users may be exposed to it e.g. public open spaces or where it may pose a risk to controlled waters , without capping or treatment to lower the pH of the CKD materials to an acceptable level and stabilises the wastes, creating in the process a product which can subsequently be used as a secondary aggregate, engineered fill, or within specialist construction materials.

[redacted]

[redacted]

[redacted] Further ground gas monitoring would be required to determine the gas screening value for this area and the requirement for gas protection measures for new buildings.

Overall, this area is considered to present a medium risk of contamination. [redacted]

The slope stability and risks of rock fall from the quarry walls surrounding Area C will need to be fully assessed to determine what remedial measures may be required and the constraints that may be imposed upon adjacent development and or future use scenarios.

7.1.4 Area D

Area D is vacant and is unused. This area is the highest and most recently quarried and is enclosed to the north, east and west by old quarry walls. Overall, this area is considered to present a low risk of contamination and remediation is unlikely to be required.

7.2 Ground Gas Risk

With respect to ground gas in Areas A and B, the assessment has not identified a significant source of gas below these areas or a pathway for gas to migrate from external sources (such as a nearby Landfill with waste including a high content of degradable organic material).

For Area A, Alluvial soils can quite often give high concentrations of methane and carbon dioxide in monitoring wells, often methane concentrations can reach up to 90%. This is because the gas has been generated historically and is trapped in the pores due to limited transport (at low diffusion rates). The methane accumulates at increasing depth in peat columns, but this does not indicate high rates of production (Clymo and Bryant, 2008; Fritz et al., 2011). Often there is no, or very little, current gas generation and the carbon dioxide has dissolved out of the gas trapped in the soil pores which causes a higher percentage of methane to be recorded. Experience on many dockland and similar sites has shown that sites on Alluvial soils do not generate sufficient hazardous gas flows to exceed Characteristic Situation 2 as defined in BS 8485: 2007 (this has been demonstrated by monitoring under floor venting systems - Wilson and Card, 1999). Therefore, if gas monitoring is not undertaken it is acceptable to simply install Characteristic Situation 2 protection on sites where Alluvial soils are present such as Area A.

Whilst Chalk will give rise to small volumes of carbon dioxide this, on its own, is not considered to be a credible source (refer to Card G, Wilson S, Mortimer S. 2012. A Pragmatic Approach to Ground Gas Risk Assessment. CL:AIRE Research Bulletin RB17[13] - Appendix 2).

Area C was used as an inert landfill during the latter half of the 20th Century to dispose of [redacted] CKD which is understood to have a low content of degradable organic material [redacted]

As noted by Card G, Wilson S, Mortimer S. 2012[13], where the main source of gas is Made Ground with a low degradable content, it will likely be classified as Characteristic Situation 2 or 3. If the requirements

[13] Card G, Wilson S, Mortimer S. (2012). A Pragmatic Approach to Ground Gas Risk Assessment. CL:AIRE Research Bulletin RB17

for Characteristic Situation 3 are exceeded gas monitoring will be required to define the protection measures for a site.

7.3 Principal Geo-Environmental Setting Considerations

The site is situated in a relatively high sensitivity geoenvironmental setting for the following reasons:

a) The majority of the site (Areas A, B and C) has had an historical industrial land use.

b) The solid geology underlying the site is a Principal Aquifer (Seaford Chalk and Lewes Nodular Chalk Formations) with respect to groundwater and can provide water supplies at a strategic level.

c) The River Adur is adjacent to the western boundary of the site and it is likely shallow groundwater is present beneath the site, particularly in the western area.

d) The Environment Agency consider the site to be at very low risk of flooding from rivers and the sea with all but the western fringes of Area A in Flood Zone 1.

Outside of the above considerations, other potential issues such as access and ecological constraints will need to be considered in the overall master planning / viability but these are excluded for this assessment. Additionally, a plan of the quarry presented in the memoir[2] indicates the presence of a fault with solution cavities in the eastern wall of Area C. This fault is recorded to have carried great volumes of water in winter which used to flood the quarry (Mortimore et al, 1990[6]).

The geoenvironmental and geotechnical conditions discussed above may have implications on the site layout and land usage of a future development and the final restoration of other areas to suit the environmental status of the surrounding area.

The potential levels of remediation and engineering required for highly sensitive land uses (e.g. residential) on brownfield and former inert fill areas of the site are likely to be greater than those required for less sensitive land-uses, such as commercial end uses or public open space.

Therefore, to reduce development costs it would likely be beneficial to locate more sensitive elements of the development on low risk areas of the site (Area D) and use the brownfield areas for less sensitive land uses such as commercial / Public Open Space (POS).

7.4 Principal Geotechnical Considerations

Consideration of the following principal geotechnical issues in certain areas is required;

- The presence of deep Made Ground, particular over the former inert fill area within Area C and to a lesser extent in Area A, with variable physical properties.
- Foundation design solutions for areas over deep Made Ground
- Potential for an area of very soft ground, possibly a former settling lagoon.
- Potential for buried obstructions.
- Stability of former quarry faces / slopes.
- Groundwater flood risk related to Chalk cavities, faults and fracture system.
- Aggressivity of Cement Kiln Dust to buried concrete in the former inert fill area.
- Potential for reuse of chalk, CKD and earth mound material and other suitable materials (soils / crush materials from demolitions) in earthworks operations. Will require them to be suitable for reuse both chemically and geotechnically. Plus, in the case of the CKD consideration will need to be given to how this area may be regulated via the implementation of current waste legislation
- Potential to re-use existing foundation / slab.
- Route infrastructure, such as main drainage or major highways, to avoid areas of deep compressible or contaminated infill.
- Unsuitable areas for infiltration drainage.

Foundation solutions for buildings which will lie either wholly or partly on filled ground are likely to be more complex (noting that some areas of Made Ground are very deep) and therefore more expensive than those which lie directly on chalk. Made Ground is inherently variable, with possible varying degrees of compressibility. Consequently, building structures and infrastructure on Made Ground may be at risk from high total and/or differential settlements. As such in Area A / C new structures may require foundation solutions such as ground improvement or piled foundations.

Additionally, the potential presence of buried obstructions should not be overlooked as these may cause “hard” spots below foundations, slabs and pavements or prevent the penetration of piles or obstruct ground improvement techniques. New buildings in Area A would also need to consider proximity to the existing river

In Area C [redacted] building rubble and some pockets of organic material. [redacted] it is noted that the CKD is likely to be particularly aggressive to buried concrete and as such significant concrete costs may be incurred to ensure protection against chemical attack. In addition, the Environment Agency may raise concerns about the potential for contaminant migration along pile shafts to the underlying aquifer. In this area, the most appropriate foundation solutions may be the use of structural rafts (typically a reinforced concrete ground bearing floor across the entire building footprint) to distribute loads over a wide area or to employ conventional shallow concrete strip or pad foundations for lightly loaded structures. Pre-loading of the former inert fill area using excavated material may also be a possibility to reduce the risk from differential settlement. Generally, it would be recommended that any structures located in this area are best restricted to those that are relatively lightly loaded and insensitive to differential settlement and would be subject to detailed settlement analysis and modelling.

As such, it may be more cost effective to locate structures particularly sensitive to differential settlement (subsidence) such as masonry buildings in areas where chalk is present at shallow depth and those structures which are able to tolerate larger movements, such as lightweight steel frames, in areas where fill is present in Area C. Alternatively, any areas of public open space may best be located on areas of fill.

It may be necessary to route infrastructure, such as main drainage or major highways, to avoid areas of deep compressible ground due to the potential for settlement, or contaminated infill, if encountered. The construction programme could be delayed when developing over brownfield and fill areas if buried obstructions or unexpected hot spots of heavy contamination are encountered. Foundation costs could be higher than anticipated where particularly weak ground is encountered or deep Made Ground with highly variable geotechnical properties.

Former chalk quarry faces are present around Areas B, C and D. The quarry faces have been cut near vertical with a number of benches being present. The appropriate method of mitigation of quarry face stability for development within the quarry will be a risk based exercise dependent on the sensitivity of the proposed land use below the quarry face and a geotechnical assessment of the quarry face itself. In addition, the site is a Regional Important Geological Site (RIGS) due to the exposures of chalk within the quarry and also has protected bird species nesting within the former quarry. As such there may also be a requirement for ecological enhancement given the environmentally sensitive nature of the

surrounding area. Possible methods of improving stability, in approximate decreasing cost could include:

- Complete removal of the chalk spines and replacement with reinforced earth embankments if required for visual purposes. This would involve a significant cost and is considered unlikely to be viable.
- Benching the internal quarry faces where possible to reduce the overall slope height.
- Netting to restrain chalk spalling or for containment to falling rock fragments using steel mesh.
- Catch ditch and fences to control spalling chalk. The sizing and construction of the catch ditch and fence will be dependent on an assessment on the likely size and bounce distance of a falling block, and this will impact on the land available for development.
- Shotcreting (sprayed concrete) of particular sections of the quarry face is a possible option as a short term protective measure. In the long term, debonding of the shotcrete may be expected.

As part of our research, we have identified that The Chalk of the South Downs of Sussex and Hampshire and the North Downs of Kent (Volumes 1 and 2) has a very detailed section in Volume 2 on the cement works. The information contained within this will be on benefit in the future consideration of this aspect and may reduce the overall need for extensive further investigations.

The potential levels of mitigation and engineering required for highly sensitive land uses (e.g. residential) in areas of chalk quarry faces are likely to be greater than those required for less sensitive land-uses, such as commercial end uses or public open space. As such, it may be more cost effective to locate land uses particularly sensitive to rock fall (residential) in areas outside of these zones and those land uses which are able to tolerate higher risk that can be mitigated by lower cost approaches (commercial / public open space) in areas proximal to the quarry faces. It is noted this is converse to the considerations for potential contamination and to a degree foundation and therefore a balance will be required.

8. CONCLUSIONS

It is understood that it is proposed to redevelop the site into a mix of residential and commercial land use scenarios – Options 1 to 4 in Section 2.3. This Phase 1 report has been produced to evaluate potential environmental risks associated with the proposed development.

The results of the Phase 1 assessment indicate that the long-term risks associated with the proposed redevelopment of the site are generally considered to be moderate. Depending on the specific land use and design layout, they could be high with regards to ingestion of soil contaminants and dust, inhalation of particle vapours and asbestos fibres and dermal contact. Due to the site's industrial history and use, there are areas of contaminated ground which may pose a risk to human health, buildings and the environment.

The known principal risk areas of concern are Areas B and C as these were the industrial epicentre of the cement works site. [redacted] Areas B & C are known to contain made ground and may contain significantly contaminated soils. Area D poses low risks from contamination, however there are risks from the steep sided quarry walls, as with the quarry walls of Area C and these will need to be investigated further for stability which may affect land usage and design layout.

Area A, once part of the cement works [redacted] whilst some BGS boreholes are available for this area, they do not provide any geotechnical or environmental data on the ground conditions. Due to the potential on-site sources of contamination, and geotechnical variability, this area requires comprehensive investigation and assessment to establish risks.

9. RECOMMENDATIONS FOR FURTHER INVESTIGATION

Based on the findings of this Phase 1 assessment, the following recommendations are made with regards to ground investigation and assessment to refine the ground model, further define the associated risks and inform the redevelopment / master planning design and ultimately to support the planning application process.

- Comprehensive investigation is needed in the form of soil sampling for geoenvironmental analysis and risk assessment. The extent and composition of the Made Ground needs to be understood fully in order to create a remediation plan and method statement and consider the risks and quantities involved in waste characterisation and materials management. There should be a targeted strategic sampling method across Areas A, B and C;

- Comprehensive geotechnical investigation with soil samples for geotechnical laboratory analysis is required to inform potential land use scenarios across all areas. This will enable risk assessment and design of elements influenced by geotechnics and engineering geology such as potential settlement, ground improvement, foundation design, roads and pavements, earthworks, and slope stability;

- CKD is hazardous to human health and poses a potentially significant risk to buried concrete and services. Capping or hardstanding across this material will be required to mitigate risks to future site users. It is unlikely to be a suitable medium for plants and vegetation therefore a growth medium (e.g. Topsoil) is likely to be needed to sustain them if intended where it is present. CKD is a hazardous waste and therefore thorough investigation is required to determine its extent and chemical composition. Informed decisions can then be drawn with regards to waste disposal of CKD from site, if required, as result of different land usage scenarios, foundation design, excavations, pile arisings etc;

- Groundwater and Ground gas monitoring to assess risks to/from groundwater and from ground gases for future land use scenarios. [redacted] Further ground gas monitoring would be required to determine the gas screening value for the areas and the requirement for gas protection measures for new buildings; and

- Provision of a comprehensive site wide Geoenvironmental and Geotechnical Interpretative Report.

9.1.1 Outline Scope for Ground Investigation

The following outline scope is recommended for a comprehensive site wide geo-environmental and geotechnical ground investigation to establish the risks and associated costs to inform the land use scenarios being considered and support onward design for planning and construction purposes.

As with any proposed development of this size, an intrusive investigation will be required in the future as part of the planning process. The timing of the investigation will depend upon the overall development strategy and/or the opinion of the Local Authorities involved. The purpose of the investigation would be to clarify the anticipated ground conditions and refine the Conceptual Site Model for the site. This investigation should focus on areas of particularly uncertain ground conditions, i.e. the former inert fill area and former/existing industrial areas, rather than on undeveloped land, although baseline conditions within these undeveloped areas will also need to be determined.

The ground investigations have been designed for each of the area of the site with the investigation techniques defined and optimised based on current knowledge of the likely ground conditions that will be encountered. The below costs are reflective of each of Area A and B being investigated separately (with the exception of the Drone (UAV) survey of Areas A, B, C & D) with Areas C and D treated as one phase and as such does not reflect any economy of scale savings that could be realised from letting the works in one phase. Provisional items are included where we see there may be areas where cost savings could be realised without impacting the quality of data produced.

9.1.1.1 Area A

- Drone (UAV) HD photogrammetry and LiDAR survey. Data can be used by ground investigation consultant for contamination risk assessment, geotechnical assessment and mapping, and volumetric analysis to determine quantities for remediation, earthworks and disposal. Survey data will support multiple collaborators in AAP including master planning and ecology;

- Circa 10 no. Cable Percussion (CP) Boreholes with in-situ testing and geotechnical and geo-environmental sampling. Depths ranging from 15m to 35m depending upon preliminary structural load requirements. Includes installation of groundwater and ground gas monitoring standpipes.

- 4 days Windowless Sampling (WS) boreholes in-situ testing and geotechnical and geoenvironmental sampling. Target depths 5m-6m. Positions to target areas of known/anticipated contamination sources. Includes installation of groundwater and ground gas monitoring standpipes.

- 5 days excavation of foundation inspection pits to investigate existing structures and potential for contaminated ground adjacent to structures.
- 4 days machine excavated trial pitting to supplement window sampling investigation of shallow ground conditions adjacent to anticipated sources of contamination and assist with foundation inspection pits as required.
- 3 days soakaway testing of targeted shallow trial pit locations and/or deep borehole falling head tests.
- Geoenvironmental laboratory chemical testing to include total soils analysis with asbestos screening and quantification, leachate and water analysis for human health risk assessment and Waste Acceptance criteria testing for characterisation and disposal cost estimates.
- Geotechnical laboratory testing of samples to establish material properties for geotechnical design and earthworks specification.
- Minimum of 6 rounds of fortnightly groundwater and ground gas monitoring with groundwater sampling. Based upon 2 days per round of sampling and monitoring.
- Production of Geo-Environmental and Geotechnical Interpretative Report for Area A.

9.1.1.2 Area B

- Drone (UAV) HD photogrammetry and LiDAR survey as per Area A.
- Circa 12 no. Rotary Core (RC) Boreholes with in-situ testing and geotechnical and geoenvironmental sampling. Depths ranging from 10m to 35m depending upon preliminary structural load requirements. Includes installation of groundwater and ground gas monitoring standpipes.
- 5 days excavation of foundation inspection pits to investigate existing structures and potential for contaminated ground adjacent to structures.
- 4 days machine excavated trial pitting for investigation of shallow ground conditions adjacent to anticipated sources of contamination and assist with foundation inspection pits as required.
- 4 days plate load testing (PLT) to establish bearing capacity and CBR values for road and pavement design.

- 3 days soakaway testing of targeted shallow trial pit locations and/or deep borehole falling head tests.
- Geoenvironmental and geotechnical laboratory testing as per Area A.
- Minimum 6 rounds of fortnightly groundwater and ground gas monitoring with groundwater sampling.
- Production of Geo-Environmental and Geotechnical Interpretative Report for Area B.

9.1.1.3 Areas C & D

- Drone (UAV) HD photogrammetry and LiDAR survey
- Circa 10 no. Rotary Core (RC) Boreholes with in-situ testing and geotechnical and geoenvironmental sampling. Depths ranging from 20m to 35m depending upon preliminary structural load requirements. Includes installation of groundwater and ground gas monitoring standpipes.
- 4 days machine excavated trial pitting for investigation of shallow ground conditions.
- 4 days plate load testing (PLT) to establish bearing capacity and CBR values for road and pavement design.
- 3 days soakaway testing of targeted shallow trial pit locations and/or deep borehole falling head tests.
- Minimum 6 rounds of fortnightly groundwater and ground gas monitoring with groundwater sampling.
- Production of Geo-Environmental and Geotechnical Interpretative Report for Areas C & D.

9.1.2 Potential Further Works

Following completion of the Ground investigation it is anticipated that a number of further assessments will be required, such as detailed quantitative risk assessments, remediation strategies, slope stability assessments, settlement assessments etc. It is not feasible to calculate costs at this stage, but a budgetary cost range has been provided.

Following completion of the ground investigation and assessments, it may be necessary to undertaker further investigation works, but the extend will be dependent on the findings of the ground investigation and proposed development plans so these cannot be defined at this stage.

9.1.3 Indicative Cost Estimates for Ground investigation

Table 10. Summary of outline costs for site investigation

Site Area	Estimated Investigation Costs (exc. VAT)
Area A Site Investigation Total	~£160,000
Area B Site Investigation Total	~£150,000
Areas C & D Site Investigation Total	~£140,000
All Areas Site Investigation Total	**~£450,000**
Contingency 20%	**~£90,000**
Total Estimated Cost Range for Ground Investigation	**£450,000 to £540,000**
Potential further assessments and investigation	
Budget Cost Estimate for modelling and assessment	£30,000 to £60,000
Supplementary Ground Investigation	Dependent on findings of ground investigation and development proposals

10. PRELIMINARY REMEDIATION REQUIREMENTS

It should be noted that the remedial measures are broadly based on the worst case need and most likely development suggestion (residential / commercial industrial use). The costs are based on remediating to a formation level and exclude costs to install a 300mm or 600mm capping layer in soft landscaped areas (depth to be dependent on development type).

It is strongly suggested that at this Stage a contingency of at least 20% is included in any budgetary considerations. All cost were based on rates available at the time of initial drafting in January 2022.

Following the completion of the additional site investigation as described in Section 9 the need for, scope and cost the remedial works can be better defined and these figures should be treated as ball park estimates only.

It should be noted that the best case is that investigation shows that no remediation is required and the on-site material can be re-used and is also suitable for forming all gardens / landscaping although this is considered unlikely especially with respect to Areas A, B and C. Whilst it may be feasible for the scheme to be neutral with respect to material balance, some import of material to form gardens, soft landscaping, etc is likely as it is unlikely that there will be sufficient acceptable material on site, but this has not been considered further as this is not considered an abnormal for development of Brownfield Land.

The current data set is not sufficiently robust to be definitive but does suggest a potential moderate risk to human health or controlled waters from contamination in Areas A, B and C. The industrial areas (Area A and B) are likely to be less impacted by diffuse contamination and as such it is likely that specific areas with high concentrations of contaminants (hotspots) that may be present in soil, or water may require remediation in these areas. However, ground investigations are required to confirm this.

In general terms there is a likely need for large scale/complex remediation, coupled with slope stabilisation and ground improvement works or excavation, screening and compaction. However, as noted above, further investigatory works are required to confirm both geo-environmental and geotechnical conditions of the site, to determine abnormal costs associated with remediation and ground engineering requirements to address the issues identified within the deposits above the Chalk Formation.

All budget estimates exclude any and all consultancy / management costs.

The possible unlikely worst case strategy for the infilled areas (Area C) is likely to require excavation / sorting and screening plus offsite disposal of all material in the top 300mm (commercial)-600mm (residential) of the site area. The need for ground gas protection in buildings and groundwater treatment cannot be ruled out. However potential ground gas protection is excluded from the figures provided below as what might be required cannot be quantified at this time and the development, once defined may incorporate some inherent gas protection in the building construction.

Whilst the need for total removal cannot be excluded, we would suggest that this is unlikely to be appropriate on the basis of either cost or environmental benefit grounds. As noted previously, early dialogue with the Environment Agency is recommended to ensure the permit position associated with the site is known, together with any potential flow down of this and consequent clean up requirements when considering the potential costs.

For any future-built re-development of the site, it is assumed that the existing buildings and concrete hardstanding's will be appropriately demolished / broken up and crushed as a recycled aggregate for either re-use on-site or sale to off-site. However, we note there is a large risk for the demolition regarding the extent/thickness of slabs and foundations as these are likely to be very thick in cement works and breaking-out these foundations can be a large commercial risk. We would note that considerable savings on further foundations in this area may be feasible if the considerable foundations can be re-use in the development. This should be considered further at the earliest opportunity.

10.1.1 Outline Budget Remediation Costs for Area A and Area B

Areas are both c6Ha in size when the 1ha soils bund in Area A is excluded. The industrial area is considered likely to be less impacted by diffuse contamination and as such it is likely that hotspot treatment may be require in these areas, but ground investigations are required to confirm this.

For the former industrial area the likely reasonable worst case may be:

- Reasonable Lower Range Budget for hotspots strip etc. Based on 5Ha, 25% of the area 2m deep – all requiring onsite treatment @ £75/m3 = £2,250,000
- Extra Over (E/O) Budget - Disposal of untreatable hotspots (bulking at 1.8) from Area A – given 25% @ £195/m3 (assumes haz waste inc transport)= £2,632,500
- E/O Budget - The need for groundwater treatment cannot be ruled out. Any remediation required for groundwater is likely to be related to the potential limited point sources of mobile contamination may pose to groundwater. As such it is likely that some form of appropriate in-situ treatment would be the most likely remedial option. If it is assumed that there is a single

relatively limited source zone associated with potential impact and mass excavation and disposal is not required a reasonable estimate of potential cost to be in the region of £250-500K.

- No cost for making up levels in areas of any deficit of material following treatment / disposal is included.

Total Budget Range for Areas A and B assume c.£2.25M- £5.39M per area. As noted, areas of highest potential contamination risk are likely best suited to least sensitive land use. As such, upper cost range would be reflective of the most sensitive land use (residential with gardens) reducing towards the lower end should it be utilised for a hard scaped industrial use.

10.1.2 Outline Budget Remediation Costs for Area C

10.1.2.1 Worst Case

This is excluding any surface piles of material and assuming an area of 96,744m^2.

If the site was to be designated for commercial land use and say 300mm of the surface has to be removed to facilitate development / landscaping etc that gives a volume of material for disposal of 28943m^3. At a bulking factor of 1.8 for disposal as Hazardous Waste (c. £195m^{3}x 1.8 x 28943), the cost for transport and disposal alone would be c.£10.2M. This is exclusive of all prelims etc. Capping would then be required for any areas where soft landscaping is present.

If the site was to be designated at residential and say 600mm of the surface must be removed to facilitate development / landscaping etc the cost would double to c. £20.4M.

These costs are exclusive of VAT and based on the assumption of removal only and relevelling (excluding any final growth medium). Any service diversions or the installation of surface drainage is not included.

The need for disposal could be negated if the planning permissions require levels to be raised in this area. Raising the levels with material suitable for the land use being developed would effectively cap the material and as such the need to reduce levels and/or remove material from site may be limited.

10.1.2.2 Reasonable Case

A more reasonable approach for making the infilled site suitable for use as industrial land, allowing for ground treatment/compaction is to maximise the processing and retention of as much material on-site, if at all possible. This could significantly reduce costs associated with off-set disposal. The major obstacles to this are the permitting regulations surrounding the use of this (clearly waste) material on site. Setting those issues aside a broad-brush, high-level budget cost range for this approach would be:

- Budget for 25% hot-spots strip etc. Based on 9.67Ha, 25% of the area 2m deep – all requiring onsite treatment @ £75/m3 = £3.63M
- Process remaining c.70000m3 @ £15/m3 (this would be dig, screen / sort etc.). Recover 40% (28000m3) as fines, 20% as hard (14000m3). = £1.05M
- Stabilise the fines @ £25/m3 = £700k
- Crush hard @ £5/m3 = £70k
- Place and compact fines and c/c @ £4/m3 = £280K
- Dispose of say 5 % as hazardous 3500 x 1.8 x 195 = 1.23M.
- Prelims (say £7.5k per week for 30 weeks) = £225k
- Liaison / Health & Safety / Management / Preparatory Works (Inc. Permits and consents) £40-50K
- Laboratory Analysis / Verification Reporting / Regulatory Sign Off £40-50K

Total Budget Range for Areas C = c.£7.013- 7.033M (say £7.01-7.3M)

The need for groundwater treatment cannot be ruled out but is excluded.

Abnormal costs for foundations for heavier/sensitive structures may also apply, e.g. rafts or piling, but are not included (pending details of possible future uses).

10.1.3 Area D

Area D is vacant and is unused. This area is the highest and most recently quarried and is enclosed to the north, east and west by old quarry walls. Overall, this area is considered to present a low risk of contamination and remediation is unlikely to be required.

10.2 Assumptions

To provide the above budget prices the following assumptions have been made:

- Actual cost estimates will depend on the type (hazardous vs non-hazardous) and volume of material that requires disposal.

- The costs are based on remediating to a formation level and exclude costs to install a 300mm or 600mm capping layer in soft landscaped areas (depth to be dependent on development type).
- The main risk driver for the site is the deposited waste and a number of assumptions related to volume of soils, tax status, bulk density of soils etc. have been noted as described in the narrative above.
- Groundwater Remediation is not required, except for some localised treatment in Areas A and B.
- No allowance has been made for archaeology or ecology constraints.
- No consultancy / monument fees are included.
- No allowance for dewatering of excavations.
- Abnormal costs associated with geotechnical conditions (e.g. foundations, ground treatment), Ground Gas Protection and remediation of the quarry walls etc are not included in above and assumed to be covered elsewhere within build cost.
- If material requires offsite disposal, further assessment will be required to reduce uncertainty in relation to the classification of waste (Hazardous or Non-Hazardous), export (waste disposal) and import volumes and costs.
- Final assessment of the remediation cost can only be confirmed once a site layout design / levels has been agreed.
- The costs for the site presented above are based on the assumption of level reduction only and does not include for level make up; any service diversions or the installation of surface drainage.
- No costs are included for decommissioning the existing abstraction well.

10.3 Longer Term – Ground Improvement

If a future land use is proposed where development is proposed, post-remediation, (Reasonable Case), it is anticipated that some form of ground improvement will be required to provide a suitable development platform; this has not been included in the costs above. A feasibility assessment will be required following the supplementary ground investigation to enable an appropriate strategy to be defined.

10.3.1 Next Steps

[redacted] To find the most cost-effective solution it is recommended that a more holistic approach is taken across the scheme with options to enable an integrated solution is achieved, where possible. It is recommended that some further technical work is undertaken, such that the most feasible options can then be costed.

Steps should include:

- Early discussion with the Environment Agency is recommended to ensure the permitting position associated with the site and any potential impacts of this and its requirements are known.

- Additional site investigations to inform the geotechnical design and better inform remedial measures and close out whether groundwater / ground gas remediation is required. Such investigations would also be used to obtain information on the engineering properties of the sub-surface profile for geotechnical design purposes and to inform both short and long-term ground treatment. This could be phased over that outline in section 8 to minimise the upfront costs whilst providing additional information to support robust decision making / master planning.

11. ESTIMATES FOR THE SURVEYING AND REMOVAL OF EXISTING BUILDINGS

Taken from AVER Decommissioning & Environmental Ltd - HAZARDOUS MATERIALS (CHEMICAL) and DEMOLITION COSTINGS SURVEY At SHOREHAM CEMENT WORKS UPPER BEDDING WEST SUSSEX BN44 3TX ISSUE: ONE REFERENCE: REP202-1 Rev 1.0 PROJECT NO: D202 DATE OF ISSUE: 7 FEBRUARY 2022).

Areas A and B of the Shoreham Cement Works Site contains a variety of buildings associated with the cement works and associated operations. AVER Decommissioning & Environmental Ltd were commissioned to prepare budget estimates for the demolition of these buildings which includes the recovery and removal of hazardous chemical materials (non-asbestos) that may/are likely to be in these facilities.

To support their budget estimate, AVER undertook the evaluation of the buildings in Areas A and B in two parts.

Firstly a site survey was undertaken by a Technical Specialist, experienced in undertaking hazardous chemical materials survey works to quantify and inventory of the materials. This survey work did not include sampling and analysis of materials. Following the survey appropriate techniques and costs for the removal and disposal of the materials identified from site were evaluated.

Next a site survey was undertaken by a Demolition Estimator. Outline methodologies for demolishing the buildings/facilities in each area were also assessed and, on this basis, the resources required, and budget estimates for demolition were derived.

Overall Aver note that the sums allocated for the Chemical Haz Waste materials are minor compared to the building demolition costs. The standalone budget estimates for recovery and disposal of the noted Chemical Haz wastes are:

- Area A is £6,000.
- Area B is £25,000.

Aver also identified that there are many different tyres present, ranging from car tyres through to 25-tonne dumper tyres that will require disposal. An allowance of £10,000 has been suggested for tyre disposal.

The Demolition Costs provide by Aver are based on a breakdown of the resources required to undertake the works required quantities of materials and also including for scrap credit.

Table 11. Demolition cost summary

	Area A	Area A Slab & Foundations	Area B	Area B Slab & Foundations	Area C	Area C Slab & Foundations	
Costs	310,275	160,800	2,449,365	818,680	65,345	15,250	
O/head and Profit @ 20%	62,055	32,160	489,873	163,736	13,069	3,050	
Total Cost	372,330	192,960	2,939,238	982,416	78,414	18,300	
Less total Credits (Scrap value)	(82,775)	(82,560)	(1,186,640)	(381,840)	(47,730)	(5,160)	
Net Charge	289,555	110,400	1,752,598	600,576	30,684	13,140	**2,796,953 Total**

A large risk for the demolition is the extent/thickness of slabs and foundations; these are usually very thick in cement works, but breaking-out these foundations can be a large commercial risk.

The Demolition Cost, and the Slab/Foundation Removal costs have been provided separately to enable an appreciation of costs for carrying out the demolition of above ground buildings/structures, and separately for the slabs and foundations. Aver note that if the slab removal were to commence in advance of all Demolition being completed, this may result in some small cost savings and reduction in overall completion time.

Aver note the major Risk on this Project as far as Costs are concerned is the potential for Ferrous Scrap Metals Prices to fall in value. On this basis, to ensure the Budget Price is robust it suggested that a Contingency allowance of £500,000 is included in the budget in-case Scrap values decrease.

Overall Aver suggest a budget of £2,796,953 plus a £500,000 for scrap decrease contingency giving an overall budget estimate of **£3,296,953** for the demolition of these buildings which includes the recovery and removal of hazardous chemical materials.

12. DRAINAGE

Motion Consultants were commissioned to prepare a Foul Water Drainage Strategy in support of support the four development scenarios being considered for the site.

The Shoreham Cement Works site is not connected to the southern water clean water mains or wastewater sewerage network. There is an existing private system of foul and surface water drains, including outfalls to the River Adur and two existing discharges of treated effluent to the ground and surface water.

Motion noted that development Scenario 1 has the highest quantity of development and results in the highest flows, the quantity of the development and flows reduces to Scenario 4 which has the lowest.

Motion have suggested that the foul water drainage strategy for the site for all 4 development scenarios is that wastewater would drain by gravity from the high point in Area D, through areas C and B to the low point of the site in Area A by the River Adur. Then depending on which option is selected and is viable for the site, the site will either be connected to the existing sewer network by a new pumping station located on the site and a rising main, or a new Wastewater Treatment Works (WTW) would be constructed on the site that would discharge the treated effluent to the River Adur.

A new WTW and discharge would require a consent and bespoke permit from the Environment Agency (EA). Motion note that as the site lies in close proximity to the public foul water sewer network relative to the size of the development, the EA's binding rules state that a connection should be made to the existing public foul sewer. The Shoreham Cement Works site also lies within 500m of the Beeding Hill to Newtimber SSSI. As such there could also be Environmental reasons why regulators may not favour a new WTW on the site. However, it is recommended that a consultation is undertaken with the EA to determine their requirements.

The nearest adopted foul sewer networks to the site are located in Upper Beeding to the north in the Steyning Catchment area and at the western extent of the Shoreham on Sea built up area by Steyning Road in the Shoreham Catchment area. The Upper Beeding foul sewer network is located approximately 1.9 km from The Site and the Shoreham foul sewer network is located approximately 2.96 km from the site.

Ballpark budget cost estimates have been prepared for the foul drainage infrastructure that would be required to serve the site, based on the two foul water drainage strategies for the four development scenarios being considered. Beeding would be shorter, however due to the size of catchment area and

extent of the existing infrastructure we considered that a connection to the Shoreham catchment would be the more likely to be acceptable based on the current available information.

Costs ranges provided by Motion from circa £6M to £8.7M

13. GLOSSARY

Aquifer - subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater. There are 4 aquifer types: principal aquifers, secondary aquifers; secondary undifferentiated, unproductive strata.

Conceptual Site Model (CSM) - A representation of the characteristics of the site in diagrammatic or written form that shows the possible relationships between contaminants, pathways and receptors.

Contaminant - A substance that is in, on or under the land and that has the potential to cause harm or to cause pollution of controlled waters.

Contaminated land - Defined in s78A(2) of EPA 1990 as "any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that (a) significant harm is being caused or there is a significant possibility of such harm being caused, or;(b) pollution of controlled waters is being, or is likely to be caused."

Controlled waters - Defined by Water Resources Act 1991, Part III, section 104, which includes all groundwater, inland waters, estuaries and coastal water to three nautical miles from the shore.

Desk study - Interpretation of historical, archival and current information to establish where previous activities were located, and where areas or zones that contain distinct and different types of contamination may be expected to occur, and to understand the environmental setting of the site in terms of pathways and receptors.

Detailed quantitative risk assessment (DQRA)- Risk assessment carried out using detailed site-specific information to estimate risk or to develop site-specific assessment criteria.

Detailed site investigation - Main stage of intrusive site investigation, which involves the collection and analysis of soil, surface water, groundwater, soil gas and other media as a means of further informing the conceptual model and the risk assessment. This investigation may be undertaken in a single or a number of successive stages.

Ex-situ - Where contaminated material is removed from the ground prior to above-ground treatment or encapsulation and/or disposal on or off site.

Generic assessment criteria - Criteria derived using generic assumptions about the characteristics and behaviour of sources, pathways and receptors. These assumptions will be protective in a range of defined conditions.

Generic quantitative assessment - Risk assessment carried out using generic assumptions to estimate risk or to develop generic assessment criteria.

Groundwater - All water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.

Harm - Adverse effects on the health of living organisms or other interference with the ecological systems of which they form a part. In the case of humans the definition includes harm to property. Hazard A property or situation that in particular circumstances could lead to harm or pollution

Hotspot - specific areas with high concentrations of contaminants may be present in soil, or water.

In-situ - Where contaminated material is treated without prior excavation (of solids) or abstraction (of liquids) from the ground.

Land affected by contamination - Land that might have contamination present which may, or may not, meet the statutory definition of contaminated land.

Management objectives - Site-specific objectives defined by stakeholders that relate to regulatory, financial and commercial matters and the desired outcome of remediation.

Monitoring - A continuous or regular periodic check to determine the ongoing nature and performance of remediation, which includes measurements undertaken for compliance purposes and those undertaken to assess performance.

Pathway - A route or means by which a receptor could be, or is exposed to, or affected by a contaminant.

Permeability - A measure of the ability of a medium to allow a fluid (gas or liquid) to pass through it.

Pollutant / Contaminant linkage - The relationship between a contaminant, pathway and receptor.

Preliminary risk assessment - First tier of risk assessment that develops the initial conceptual model of the site and establishes whether or not there are any potentially unacceptable risks.

Principal and secondary aquifers – aquifers that provide significant quantities of drinking water, and water for business needs. They may also support rivers, lakes and wetlands.

Receptor - In general terms, something that could be adversely affected by a contaminant, such as people, an ecological system, property or a water body.

Remediation - Action taken to prevent or minimise or remedy or mitigate the effects of any identified unacceptable risks.

Remediation criteria - Measures (usually, but not necessarily, expressed in quantitative terms) against which compliance with remediation objectives will be assessed.

Remediation option - A means of reducing or controlling the risks associated with a particular pollutant linkage to a defined level.

Remediation strategy - A plan that involves one or more remediation options to reduce or control the risks from all the relevant pollutant linkages associated with the site.

Risk - A combination of the probability, or frequency of occurrence of a defined hazard and the magnitude of the consequences of the occurrence.

Risk assessment - The formal process of identifying, assessing and evaluating the health and environmental risks that may be associated with a hazard.

Risk estimation - Predicting the magnitude and probability of the possible consequences that may arise as a result of a hazard.

Risk evaluation - Deciding whether a risk is unacceptable.

Risk management - The processes involved in identifying, assessing and determining risks, and the implementation of actions to mitigate the consequences or probabilities of occurrence.

Secondary aquifers - Secondary aquifers are split into 2 groups; Secondary A aquifers comprise permeable layers that can support local water supplies, and may form an important source of base flow to rivers. Secondary B aquifers are mainly lower permeability layers that may store and yield limited amounts of groundwater through characteristics like thin cracks (called fissures) and openings or eroded layers.

Secondary undifferentiated aquifers - Secondary undifferentiated are aquifers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. These have only a minor value.

Site reconnaissance - A walk-over survey of the site.

Site specific assessment criteria - Values for concentrations of contaminants that have been derived using detailed site-specific information on the characteristics and behaviour of contaminants, pathways and receptors and that correspond to relevant criteria in relation to harm or pollution for deciding whether there is an unacceptable risk.

Source - A hazardous substance or agent (for example a contaminant) which is capable of causing harm.

Stakeholders - Individuals or organisations with an interest in the scope, conduct and outcome of a risk management project.

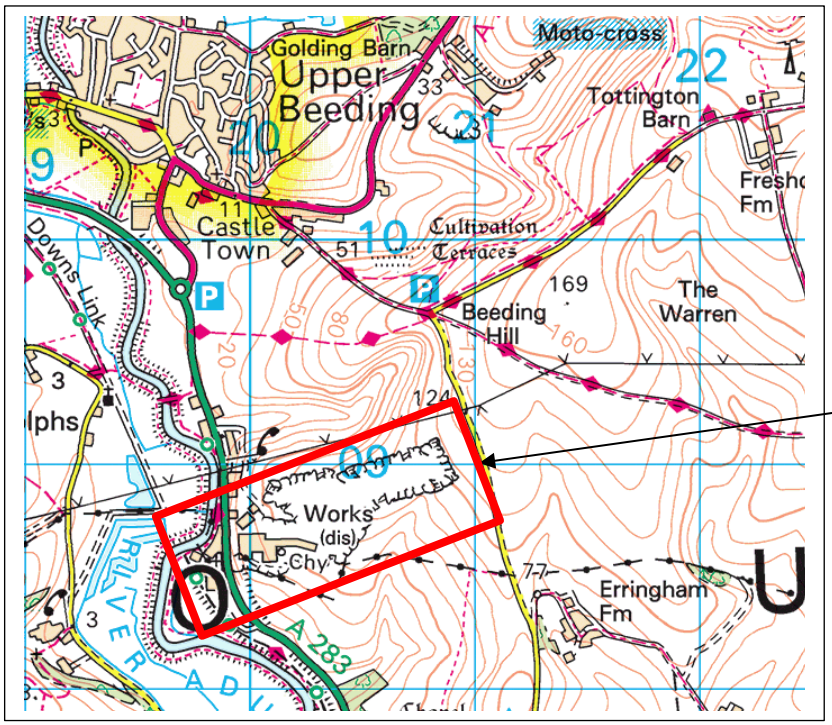
Uncertainty - A lack of knowledge about specific factors in a risk or exposure assessment including parameter uncertainty, model uncertainty and scenario uncertainty.

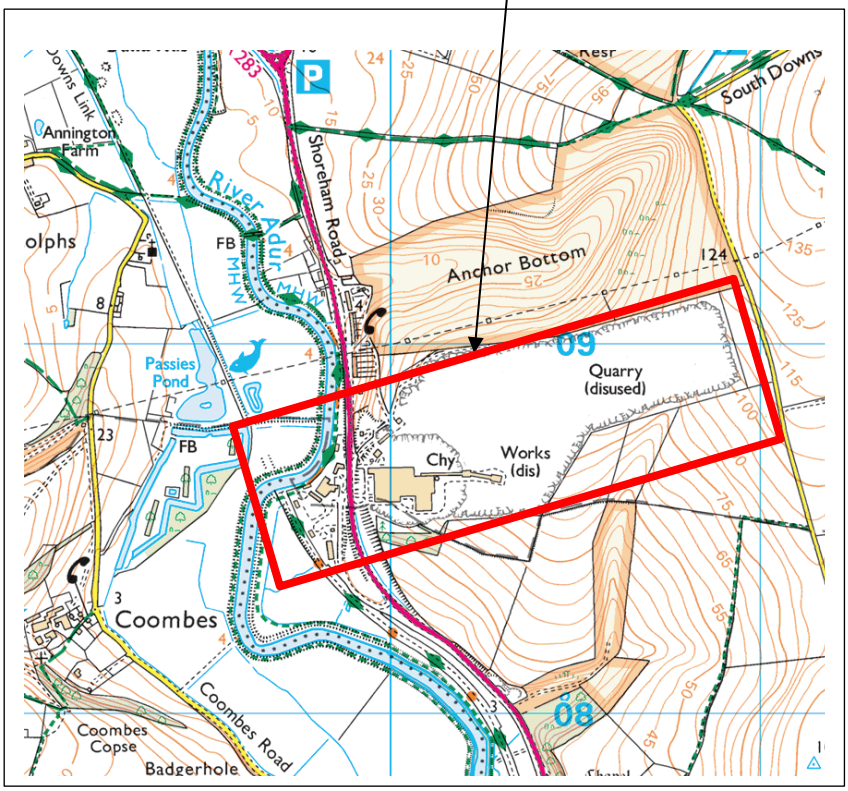
Unproductive strata - largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them.

Verification - The process of demonstrating that the risk has been reduced to meet remediation criteria and objectives based on a quantitative assessment of remediation performance.

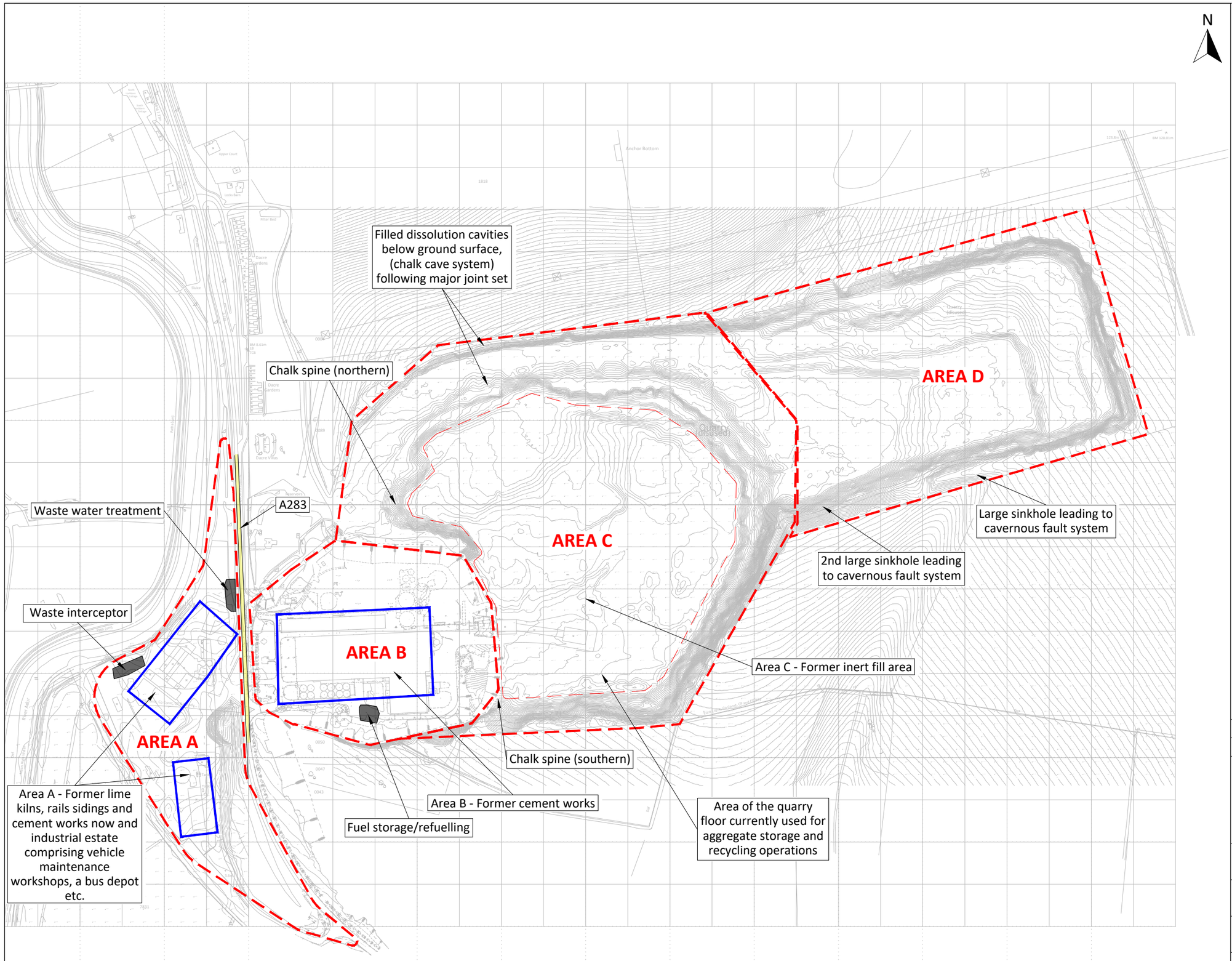
Zoning - The process of delineating one or more parts of a site that justify different or specific approaches to sampling on the basis of existing or future conditions.

FIGURES





Client	Project	Job No
South Downs National Park Authority	**Shoreham Cement Works**	**CG/39033**
CGL	Title: **Site Location Plan**	**Figure 1**



KEY

Area boundaries

Cement works buildings and workshops - impacted soils - risk to aquifer and controller waters. ACM's risk to construction workers and future site users

Notes

1. Do not scale from this drawing.
2. Topographical survey taken from Maltby Land Survey Ltd drawing '10/705/01 to 05' (May 2010).

Rev	Date	Comments
0	31/03/2022	

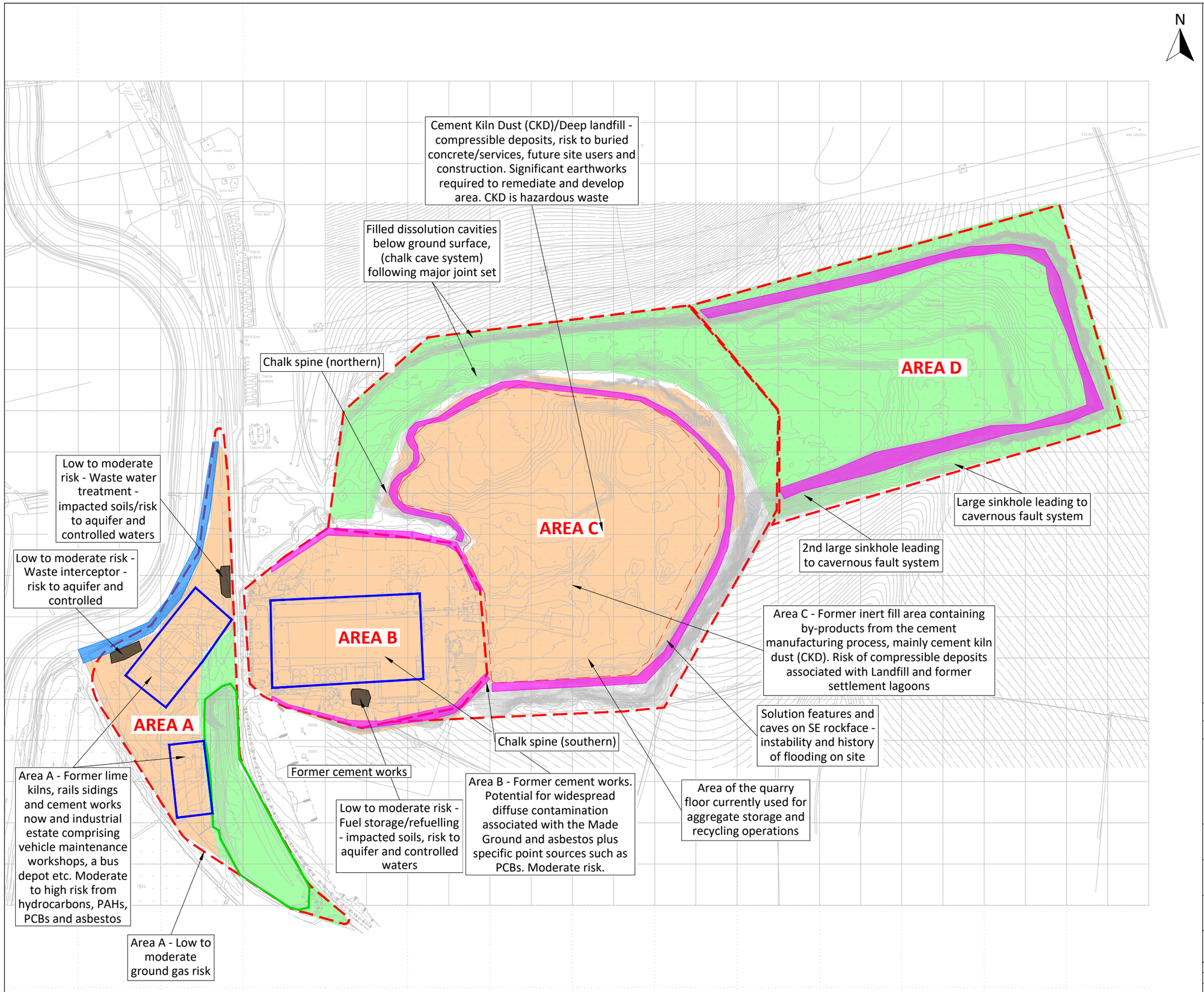
Card Geotechnics Ltd
4 Godalming Business Centre
Woolsack Way
Godalming
Surrey
GU7 1XW
T: 01483 310600

Project
Shoreham Cement Works

Client
South Downs National Park Authority

Drawing title
Figure 2 - Site Layout Plan

Scale(s)	Job No.	
NTS	**CG/39033**	
Drawn TSB 31/03/2022	Dwg No. **CG/39033-004**	Rev. **0**
Checked		
Approved		



KEY

- Area boundaries
- Slope stability & rockfall risk
- River Wall Assessment/Risks to controlled waters
- Earthworks mound from A283 works. Potential for impacted soils
- Cement works buildings and workshops - impacted soils - risk to aquifer and controller waters. ACM's risk to construction workers and future site users

RISK AREAS

- Low Risk - Undeveloped land and undeveloped former mineral excavation areas
- Moderate Risk - Known or suspected areas of Made Ground, former industrial processing areas, former inert fill area

Notes

1. Do not scale from this drawing.
2. Topographical survey taken from Maltby Land Survey Ltd drawing '10/705/01 to 05' (May 2010).

Rev	Date	Comments
0	25/03/2022	

Card Geotechnics Ltd
4 Godalming Business Centre
Woolsack Way
Godalming
Surrey
GU7 1XW
T: 01483 310600

Project: **Shoreham Cement Works**

Client: **South Downs National Park Authority**

Drawing title: **Figure 3 - Site Risks Plan**

Scale(s)	Job No.
NTS	CG/39033

Drawn	TSB	25/03/2022
Checked		
Approved		

Dwg No. **CG/39033-003** Rev. **0**

APPENDIX A

Site Walkover Photographs

PHOTO SHEET

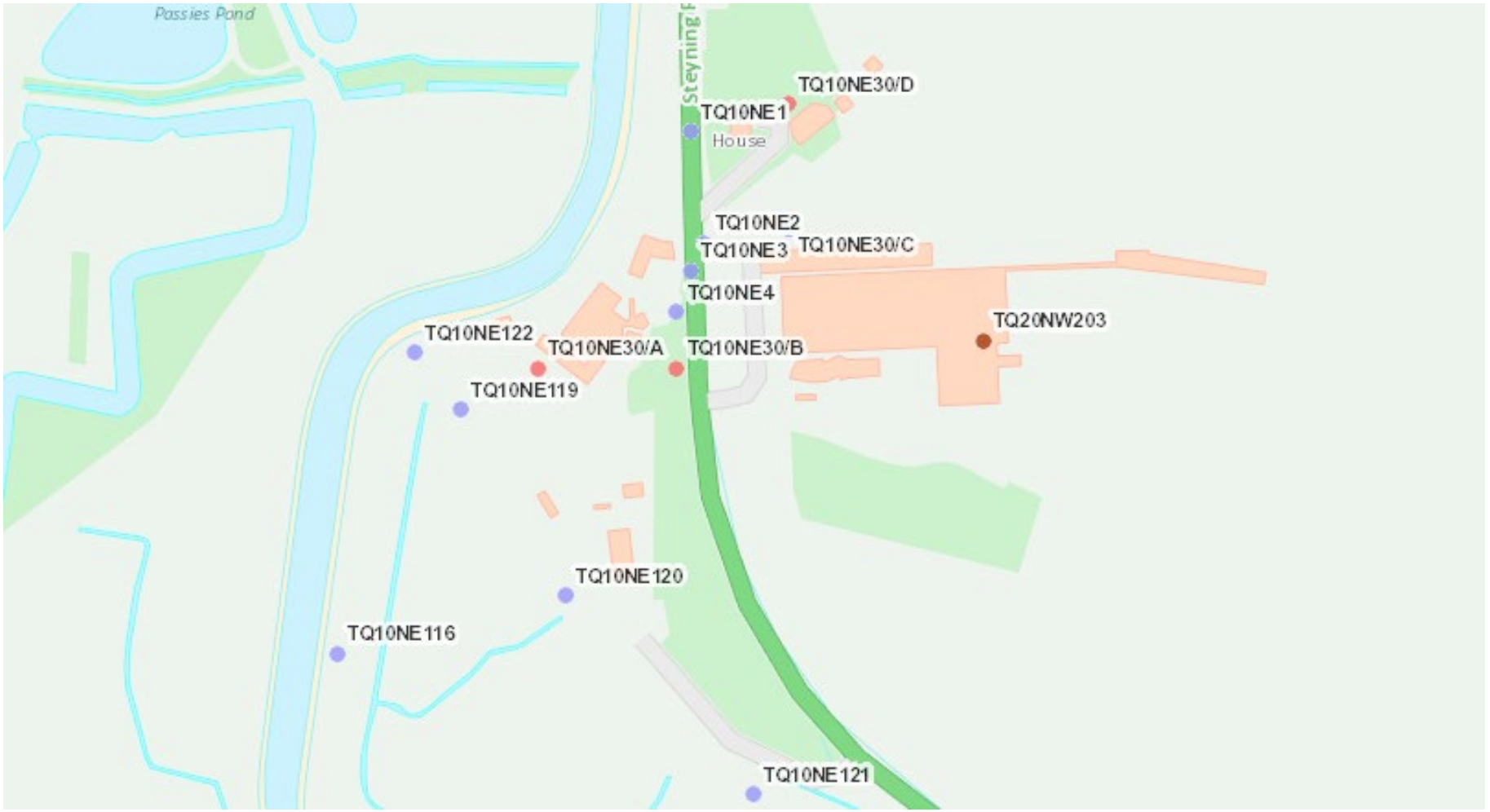
Client	Project	Job No
South Downs National Park Authority	**Shoreham Cement Works**	**CG/39033**
CGL	Title **Site Walkover Photographs**	**Appendix A**

PHOTO SHEET

Client	Project	Job No
South Downs National Park Authority	**Shoreham Cement Works**	**CG/39033**
CGL	Title **Site Walkover Photographs**	**Appendix A**

APPENDIX B

BGS Borehole Records



Client	Project	Job No
South Downs National Park Authority	**Shoreham Cement Works**	**CG/39033**
CGL	Title **BGS Boreholes Location Plan**	**Appendix B**

GROUND EXPLORATIONS LTD.

BOREHOLE NO. 2 TQ 10 NE /2

Contract Name Reading Cement Works. Report No. 4107/SJB.

Client County Surveyor & Engineer, West Sussex County Council,

Address County Hall, Tower Street, Chichester, Sussex.

Site Address Reading Cement Works, near Rhoreham, Sussex.

1990 - 0867

Standing Water Level None. Method of Boring Shell/auger.

Water Struck None. Diameter 8 ins.

Ground Level 18·4 Start 7.6.68. Finish 7.6.68.

Remarks

JARS	CORES	BULK
681 1' 6" 682 4' 0" 684 8' 0" 685 11' 6" 686 14' 0" 687 17' 0" 688 20' 0"	683 5' 0"	

Description	Thickness	Depth
Topsoil & chalk	3' 6"	3' 6" (1·07)
Clay with lumps of chalk	7' 6"	11' 0" (3·35)
Hard chalk	9' 0"	20' 0" (6·10)
TOTALS	20' 0"	20' 0"

Notes 1. Descriptions are in accordance with B.S. Code of Practice C.P. 2001
Clients are requested to compare with samples submitted.

2. Core samples are nominally 4 ins. diameter and 18 ins. long.
Depths are to the top of sample.

GROUND EXPLORATIONS LTD.

BOREHOLE NO. 3 TQ 10 NE/3

Contract Name BEEDING CEMENT WORKS. Report No. 4407/SJB.

Client County Surveyor and Engineer, West Sussex County Council,

Address County Hall, Tower Street, Chichester, Sussex.

Site Address Beeding Cement Works, near Shoreham, Sussex.

1929 - 0865

Standing Water Level None. Method of Boring shell/auger.

Water Struck None. Diameter 8 ins.

Ground Level 19·5 Start 8.6.68. Finish 10.6.68.

Remarks

JARS	CORES	BULK
689 1' 6" 690 4' 0" 691 7' 0" 692 10' 0" 693 12' 6" 694 15' 0" 695 17' 0" 696 20' 0"		

Description	Thickness	Depth (M)
Made ground (concrete and ash)	2' 6"	2' 6" (0·76)
Brown clay with lumps of chalk	9' 6"	12' 0" (3·66)
Hard chalk	8' 0"	20' 0" (6·10)
TOTALS	20' 0"	20' 0"

Notes 1. Descriptions are in accordance with B.S. Code of Practice C.P. 2001
Clients are requested to compare with samples submitted.

2. Core samples are nominally 4 ins. diameter and 18 ins. long.
Depths shown are to top of sample.

GROUND EXPLORATIONS LTD.

BOREHOLE NO. 4 TQ10NE/4

Contract Name BEEDING CEMENT WORKS. Report No. 4407/SJB.

Client County Surveyor & Engineer, West Sussex County Council,
Address County Hall, Tower Street, Chichester, Sussex.

Site Address Beeding Cement Works, near Shoreham, Sussex.

1928 · 0862

Standing Water Level None. Method of Boring shell/auger.

Water Struck None. Diameter 8 ins.

Ground Level 22.6 Start 10. 6. 68. Finish 11. 6. 68.

Remarks

JARS	CORES	BULK
697 1' 6" 698 3' 6" 699 6' 0" 700 8' 0" 2501 12' 0" 2502 15' 0" 2503 18' 0" 2504 20' 0"		

Description	Thickness	Depth
Topsoil and chalk	2' 0"	2' 0" (0.61)
Chalk	18' 0"	20' 0" (6.10)
TOTALS	20' 0"	20' 0"

Notes 1. Descriptions are in accordance with B.S. Code of Practice C.P. 2001
Clients are requested to compare with samples submitted.
2. Core samples are nominally 4 ins. diameter and 18 ins. long.
Depths shown are to top of sample.

3 TQ10/10B Survey No. 434 318

RECORD of WELL or BORING

1" N.S. 318 / C.S. 318 / Six-inch map / Popular Edition of one-inch map (Sheet / Square) 148B

at (house or farm) Cement Works
Town, Village, &c. Upper Beeding County Sussex
Exact site (unless a tracing from a map is supplied, give distance and direction from parish church, cross-roads, or other object shown on maps).

Surface level of ground 25 ft. above Ordnance Datum. Well or Bore commenced at 0 ft. below surface level of ground.
Sunk ... ft., diameter ... ft. Bored 100 ft.; diameter of boring: at top 12" in., at bottom ...
Details of lining tubes (internal diameters preferred) lined 12" tube 4 36 ft.

Water struck at depths of (feet)
Rest-level of water below ~~above~~ top of well or bore 17 ft. Pumping level 23-24 ft. Time of recovery ... hours.
Suction at ... ft. depth. Yield: (i) on test ~~7500~~ 9000 galls. per ~~hour~~, (ii) normal 7500-9000 galls. per hr.
Quality (attach copy of analysis if available)
Made by Duke Ockenden for Mr. Assoc. Portland Cement Date of boring 1933
Information from Do

(For Survey use only). GEOLOGICAL CLASSIFICATION.	NATURE OF STRATA. (and any additional remarks)	THICKNESS. Feet.	Inches.	DEPTH. Feet.	Inches.
Middle Ck	Hard Chalk flints	70		70	
	Hard chalk	30		100	

Ref. 8509/30, 8th March 1940
Site plan obtained. O.D. ~~+1~~ ~~HIBID~~. 6 inch Sussex 52 S.W. (W)
Rest level 23 ft. down. Yield 8000 g.p.h.
WRP

Visited & sited on Sussex 52 S.W./W
Three wells on the premises.

Surface	
OD + c 15.	a). Disused 6" Bore 135' deep. Contaminated water.
OD + c 20.	b) R.W.L. + 4.8 O.D. date? Yield 10,000 g.p.h 1947.
OD + c 20	c) Shallow 30' deep. - Only working intermittently.

(c) Filled in D.A.G.

FR 15.7.58.

Analysis (b) August 1946
Hardness: P. 3.0 T 17.5 pts/100,000
Ph. 7.2. pts/100,000.
alk 17.5.
Soluble Silica ·8
Chlorine 6.4.
Sulphate 4.8.
Mg as Carbonate 2.0. 20.
Calcium as Carbonate 18.5. 185.
MJ. 4.6.47.

WQ/318/ASR. 15/5/57. from Messrs. British Portland Cement Manufacturers Ltd.,
(a)+(c) 30 ft and 135 ft. wells have been disused for many years
(b)+(d) In continuous use — see Section 6. for levels.
Yield from each well 75 m. g.p. year.

For Survey use only.

Date received.	G.S.M.	M. of H. notified.	Site marked on 1" map.
Feb 1934	6308		WRP

...GICAL SURVEY AND MUSEUM, KENSINGTON, LONDON, S.W.7.

(11969B) Wt 10256/0175 2,500 9/32 H, J, R & L, Ld Gp 616

318/148 Messrs. British Portland Cement Manufacturers Ltd., Shoreham Works, Upper Beeding

TQ10/10A-D

(a) (Disused). Surface +15. Bore 6 in. *Date unknown.*
(b) Surface +20. Bore 100. Lining tubes: 36 x 12 in from surface. R.W.E. +3. P.W.L. -4. Yield 7,500 -9,000 g.p.h. *Dando, 1933.*
R.W.L. -3. Yield 8,000 g.p.h. *Mar. 1940.* Hardness: P. 30, T. 175. Anal. *Aug. 1946.* R.W.L. +4¾. Yield 10,000 g.p.h. *1947.* P.W.L. -3½. *Oct. 1955.*
(c) (Filled in). Surface +20. Depth 30. *Before 1947.*
(d) Surface +25. Bore 100. Lining tubes: 37½ x 12 in from 1½ above. Water struck at -15 and -45. R.W.L. +7. *Dando, Aug. 1948.*
P.W.L. +¼. *Oct. 1959.*
(b) and (d) Hardness: NC. 37, C. 170. Anal. *Oct. 1957.* Yield 10,000 g.p.h. *Oct. 1960.*

(a) MCk	...	...	135	135
(b) MCk	Hard chalk and flints		70	70
	Hard chalk		30	100

A TQ 1978 0858
B TQ 1988 0858
C TQ 1996 0868
D TQ 1996 0877

SHOREHAM ADUR TIDAL WALLS OCTOBER 2013 WS

X: 108550.28 Y: Level: Prior to boring a Cable Avoidance Tool (CAT) survey was carried out. An inspec

Start: End:

Client: ENVIRONMENT AGENCY

Contractor: Fugro Engineering Services

Engineer:

Page 1

DEPTH METRES	Depth	Level	Log	Description
	0.05	-0.05		Turf over TOPSOIL
	0.55	-0.55		MADE GROUND Dark brown slightly sandy clayey gravel with rare cobbles Sand is fine to coarse Gravel is very angular to well rounded fine to coarse of flint and chalk Cobbles 70mm x 70mm x 75mm are subrounded of flint
1.0				
	1.75	-1.75		MADE GROUND Chalk fill recovered as light brown slightly sandy gravelly silt of comminuted chalk with low cobble content Locally grades into sandy very clayey gravel Gravel is angular and subangular fine to coarse of chalk Cobbles 35mm x 60mm x 90mm are very angular of chalk
2.0				
				MADE GROUND Friable light brown and brownish grey slightly sandy gravelly clay with occasional pockets 40mm of dark brown fibrous organic material Locally grades into sandy clayey gravel with low cobble content Sand is fine to coarse Gravel is subangular and subrounded fine to coarse of chalk flint and siltstone
3.0				
4.0				Stiff grey mottled orangish brown slightly sandy CLAY with occasional rootlets and occasional reddish brown veins Sand is mainly fine
	4.30	-4.30		
	4.80	-4.80		Light and dark grey silty SAND with occasional pockets 10mm of soft dark grey clay

SHOREHAM ADUR TIDAL WALLS OCTOBER 2013 WS

X: 108550.28 Y: Level: Prior to boring a Cable Avoidance Tool (CAT) survey was carried out. An inspec

Start: End:

Client: ENVIRONMENT AGENCY

Contractor: Fugro Engineering Services

Engineer:

Page 2

DEPTH METRES	Depth	Level	Log	Description
6.0	6.00	-6.00		Light and dark grey silty SAND with occasional pockets 10mm of soft dark grey clay
7.0				
8.0				
9.0				

SHOREHAM ADUR TIDAL WALLS OCTOBER 2013 WS

X: 108417.4 Y: Level: Prior to boring a Cable Avoidance Tool (CAT) survey was carried out. An inspecti

Start: End:

Client: ENVIRONMENT AGENCY

Contractor: Fugro Engineering Services

Engineer:

Page 1

DEPTH METRES	Depth	Level	Log	Description
	0.10	-0.10		Turf over TOPSOIL
	0.40	-0.40		MADE GROUND Dark brown clayey gravelly sand with rare cobbles Occasional partially decomposed leaf matter and wood fragments 40mm x 70mm x 80mm Sand is fine to coarse Gravel is subangular to well rounded fine to coarse of flint chalk brick and concrete Cobbles 40mm x 70mm x 80mm are subangular of flint
1.0				
	1.45	-1.45		MADE GROUND Chalk fill recovered as light grey slightly sandy gravelly silt with occasional cobbles Sand is fine to coarse Gravel is of chalk Cobbles 80mm x 95mm x 100mm are subangular of very weak low density white chalk
2.0				
	2.90	-2.90		MADE GROUND Friable light brown and brownish grey slightly sandy slightly gravelly clay with low cobble content and occasional rootlets Sand is fine to coarse Gravel is angular to subrounded fine to coarse of chalk flint and sandstone Cobbles 50mm x 60mm x 70mm are subangular of flint
3.0				
	3.45	-3.45		Stiff dark brown occasionally mottled orange brown slightly sandy slightly gravelly CLAY with occasional rootlets and lenses of orangish brown silt 6mm Sand is fine
4.0				
				Grey with occasional orange brown discolouration slightly silty and silty SAND with extremely closely spaced thin laminae of grey sandy clay Sand is fine and medium

SHOREHAM ADUR TIDAL WALLS OCTOBER 2013 WS

X: 108417.4 Y: Level: Prior to boring a Cable Avoidance Tool (CAT) survey was carried out. An inspecti

Start: End:

Client: ENVIRONMENT AGENCY

Contractor: Fugro Engineering Services

Engineer:

DEPTH METRES	Depth	Level	Log	Description
6.0	6.00	-6.00		Grey with occasional orange brown discolouration slightly silty and silty SAND with extremely closely spaced thin laminae of grey sandy clay Sand is fine and medium
7.0				
8.0				
9.0				

SHOREHAM ADUR TIDAL WALLS OCTOBER 2013 WS

X: 108591.49 Y: Level: Prior to boring a Cable Avoidance Tool (CAT) survey was carried out. An inspec

Start: End:

Client: ENVIRONMENT AGENCY

Contractor: Fugro Engineering Services

Engineer:

Page 1

DEPTH METRES	Depth	Level	Log	Description
	0.05	-0.05		Turf over TOPSOIL
1.0				MADE GROUND Brown slightly sandy slightly gravelly clay with rare rootlets 1mm diameter Gravel is subangular and subrounded fine to coarse of flint and chalk
2.0	2.30	-2.30		Soft grey with some black speckling slightly sandy silty CLAY with some pockets 10mm of soft black organic clay and occasional rootlets Strong organic odour
3.0	3.40	-3.40		Very soft black slightly sandy silty CLAY with occasional extremely closely spaced thin laminae of fine sand Sand is fine Slight organic odour
4.0	4.85	-4.85		Grey clayey SAND Sand is mainly fine

SHOREHAM ADUR TIDAL WALLS OCTOBER 2013 WS

X: 108591.49 Y: Level: Prior to boring a Cable Avoidance Tool (CAT) survey was carried out. An inspec

Start: End:

Client: ENVIRONMENT AGENCY

Contractor: Fugro Engineering Services

Engineer:

Page 2

DEPTH METRES	Depth	Level	Log	Description
6.0	6.00	-6.00		Grey clayey SAND Sand is mainly fine
7.0				
8.0				
9.0				

APPENDIX C - REDACTED

Historical Exploratory Hole Location Plan [redacted]

APPENDIX D

Environment Agency Site Information Request

Sam Stanton

To: Sam Stanton
Subject: 220307 SSD249184 - Shoreham Cement Works
Attachments: 10_41_311002 LICENSE 2017.pdf; SSD249184 Abstraction Licences.xlsx

From: SSD Enquiries <SSDEnquiries@environment-agency.gov.uk>
Sent: 07 March 2022 16:59
To: Paul Sheehan <PaulS@cgl-uk.com>
Subject: 220307 SSD249184 - Shoreham Cement Works

Dear Paul,

Further to our email below, please see the below responses from our technical teams:

1. General background information relating to the site, to include dates of operation;
   - Your enquiry relates to a historic landfill. We are unable to provide any information as we no longer hold the records for these sites. We recommend that you contact the Environmental Health / Environmental Protection Department at your local authority for further advice and information. They are the lead regulator for these sites and are responsible for the inspection of contaminated land in their area, which includes historic landfill sites.

2. Part 2A designations within 500m of the site;
   - Please liaise with the relevant local authority.

3. Records of historical industrial uses on site (other than the cement works);
   - Your enquiry relates to a historic landfill. We are unable to provide any information as we no longer hold the records for these sites. We recommend that you contact the Environmental Health / Environmental Protection Department at your local authority for further advice and information. They are the lead regulator for these sites and are responsible for the inspection of contaminated land in their area, which includes historic landfill sites.

4. Records of ground gas, groundwater and surface water monitoring data for the site;
   - Records of ground gas
     - Please liaise with the relevant local authority.

   - Most of our groundwater quality data is now available online, in our Water quality data archive. The archive includes data from across England for surface, coastal and groundwaters dating from 2000 and can be downloaded direct to your computer.

     A proximity search has not identified any groundwater monitoring sites meeting your specification.

     If you want to view the open data and see if there are any other sites that meet your needs, visit https://environment.data.gov.uk/water-quality/view/landing and use the search facilities provided

     Please note that water company quality data may not be public register and should be requested directly from the relevant water company.

5. Information on groundwater / surface water abstractions on site and within 500m of the site;
   - 2 boreholes on site 10/41/311002
     - 1966 onwards South end of site by road Shoreham Cement Works Point 1

    - Same license – 2017 onwards North end of site Shoreham Cement Works Point 2
- Please see attached licence details.
- No other licences within 500 metres of the site

This information is not available with the Open Government Licence but we may be able to license you under the Environment Agency Conditional licence as in the link below.
[Water Abstraction] – AfA 135, detailed information about this dataset including all the conditions applicable to this dataset, can be found on the Register Licence Abstract (you will need to download this spreadsheet to access the information about AfA 135). However, you must first check the supporting information and the above link to determine if the conditions on use are suitable for your purposes. If they are not, this information is not provided with a licence for use, and the data is provided for read right only.

6. Information on waste facilities within 250m of the site;
7. Information on discharge consents within 250m of the site; and
    - Please review the following weblink and provide the permit number(s) for the site(s) you wish to see information for: Public registers (data.gov.uk)

8. Environmental incidents within 250m of the site;
    - Please review the following weblink for your requested information: Defra Data Services Platform

Unless otherwise specified, this information is supplied subject to the notice which can be viewed via the following link: http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

Please get in touch if you have any further queries.

Kind regards

Customers & Engagement Team

Environmental Planning and Engagement | Solent and South Downs Area |
Environment Agency | Guildbourne House, Chatsworth Road, Worthing, West Sussex, BN11 1LD
SSDEnquiries@environment-agency.gov.uk

National Customer Contact Centre 03708 506506
enquiries@environment-agency.gov.uk

From: SSD Enquiries
Sent: 31 January 2022 15:37
To: 'PaulS@cgl-uk.com' <PaulS@cgl-uk.com>
Subject: 220131 SSD249184 - Shoreham Cement Works

Dear Paul

Thank you for your email of 1 December 2021; we can confirm that we have received your request below. Please be advised it has been logged and sent to our technical teams for investigation; it has also been assigned the reference number **SSD249184**

Please note that we are receiving a very high number of enquiries and apologise that our current response time is longer than usual. We will send you a response as soon as possible.

In the meantime you may want to visit our website at Gov.uk and data.gov.uk to see if there is information available that can assist you.

Thank you for your patience.

Kind regards

Customers & Engagement Team

Environmental Planning and Engagement | Solent and South Downs Area |
Environment Agency | Guildbourne House, Chatsworth Road, Worthing, West Sussex, BN11 1LD
SSDEnquiries@environment-agency.gov.uk

National Customer Contact Centre 03708 506506
enquiries@environment-agency.gov.uk

From: Paul Sheehan [mailto:PaulS@cgl-uk.com]
Sent: 01 December 2021 14:19
To: Oxley, Marguerite <marguerite.oxley@environment-agency.gov.uk>
Cc: Sam Stanton <SamS@cgl-uk.com>
Subject: CG/39033 - Shoreham Cement Works

Dear Marguerite,

I have been passed you details by Allison Keech at SDNPA. CGL has been appointed as a consultant for contaminated land and remediation for the Shoreham Cement Works AAP and I understand you previously provided comments on the scheme.

Would you be able to provide copies of any records under a contaminated land search and historical development of the Shoreham Cement works site located at:

Steyning Road
Upper Beeding
BN44 3TX

It would be much appreciated if you could provide supporting information where relevant/available regarding the following:

1. General background information relating to the site, to include dates of operation;
2. Part 2A designations within 500m of the site;
3. Records of historical industrial uses on site (other than the cement works);
4. Records of ground gas, groundwater and surface water monitoring data for the site;
5. Information on groundwater / surface water abstractions on site and within 500m of the site;
6. Information on waste facilities within 250m of the site;
7. Information on discharge consents within 250m of the site; and
8. Environmental incidents within 250m of the site;

If you have any other information pertinent to the potential for contamination on or near the site, please let me know.

Kind regards,
Paul

Paul Sheehan
Technical Director
01483 310600 07908895673
PaulS@cgl-uk.com cgl-uk.com

CGL were proud winners at the Ground Engineering Awards for UK Project with a Geotechnical Value from £500k to £1M. CGL has been shortlisted eight times since 2011 for this category and won four times – a strong endorsement from our peers of CGL's design and technical excellence in the last decade.

The project demonstrated exceptional design and construction, simple in concept but complex in technical detail, which was delivered innovatively, collaboratively with technical excellence at rocket pace during the Lockdown #3 period to virtually save the project for our client.

Water Resources
LICENCE TO
ABSTRACT
WATER

Environment Act 1995
Water Resources Act 1991 as amended by the Water Act 2003
Water Resources (Abstraction and Impounding) Regulations 2006

IMPORTANT NOTES

Need for safekeeping

This licence is an important document. The permission or right to abstract water may be valuable to your landholding. So -

- **Keep the licence safe, preferably with your deeds etc.**
- **Take careful note of the comments below about "transfer and apportionment" and "death and bankruptcy".**

This is to ensure that the permission and any rights granted by the licence continue if you need to pass it on to someone else.

If you want to:

- **revoke (cancel) the licence;**
- **vary (change/amend) the licence in any way or**
- **change your contact address (but you continue to hold the licence).**

Please write to WR Permitting Support, PO Box 4209, Sheffield, S9 9BS

Details of this licence are placed on a register, kept by the Environment Agency and open for inspection by the public. The public may also obtain further details about it by virtue of the Environmental Information Regulations 2004 (see also Disclosure of Information) except in special cases (for advice please contact us at the address shown on the front page of the licence).

Transfer and apportionment

If you need to pass this licence or any part of it to someone else, you must contact the Environment Agency and obtain the appropriate application forms. Temporary licences cannot be transferred or apportioned. The licence holder remains responsible for compliance with the terms of the licence and any charges payable until the licence has been transferred or apportioned.

Death or bankruptcy of the licence holder

If a licence has been **'vested'** in you, as a result of the death or bankruptcy of the licence holder, please contact the Environment Agency in writing, telling us the licence number(s) and the date that the licence vested in you as a personal representative or trustee of the licence holder. This is necessary in order to enable you to subsequently transfer the licence.

'Vesting' is the transfer of responsibility and ownership of a licence when an existing licence holder is no longer able to hold the licence either through death or bankruptcy.

You do not have to complete a form, but you must notify us in writing within 15 months of the date of vesting, giving the full names of all personal representatives or trustees and a contact address.

Time limits

Your licence may be subject to a time limit (stated on the front of your licence). All new abstraction licences are legally required to include a time limit. For variations to licences, time limits are added in accordance with our policy.

The duration of a time limit is determined in accordance with our time limiting policy. The time limit is linked to the next or subsequent review of water resources within a Catchment Abstraction Management Strategy (CAMS).

There will be a presumption of renewal providing three tests are met: environmental sustainability is not in question; there is continued justification of need; and water is being used efficiently. Any application for renewal will still be subject to the normal statutory considerations.

If your licence is time limited and you wish to renew it when it expires, you will need to apply for a new licence to replace the existing one. You are advised to submit this application at least three months before it expires. To allow you to give early consideration to this, we will send you a reminder approximately 18 months before the expiry date.

If your licence cannot be renewed, we will endeavour to give at least six years notice. We will also endeavour to give at least six years notice where the licence is likely to be renewed on different terms and will significantly impact upon the use of the licence.

In exceptional circumstances, for example where there are other overriding statutory duties such as the Habitats Regulations, it may not be possible to provide six years notice.

Charges

Unless specifically exempted, we may levy an annual CHARGE for water AUTHORISED to be abstracted by this licence, in accordance with our abstraction charges scheme in force at the time.

The licence may be revoked if charges are not paid.

Quantity and quality of water

You must not abstract more than the quantity specified in the licence.

The Environment Agency does not, by issue of this licence or otherwise, in any way guarantee that the source of supply will produce the quantity of water authorised to be abstracted by this licence, nor that the water is fit for its intended use.

The quantity of water authorised for abstraction is given in cubic metres. One cubic metre is approximately 220 gallons.

(The precise conversion is 1 cubic metres = 219.969 gallons).

Source of supply and authorised point of abstraction

You may abstract from the point(s) specified in the licence and from no other points. If you want to add or change the authorised point(s) of abstraction, you must apply to us to vary the licence.

Land on which water is authorised to be used

Where this condition applies, you may only use the water you abstract on the area specified in the licence. You must apply to us to vary the licence if you wish to extend or alter this area or remove it.

Purpose for which water is authorised to be used

You may only use the water for the purpose(s) specified in the licence. You must apply to us to vary the licence if you wish to add to or change the purpose(s).

Offences

Under the Water Resources Act 1991 it is an offence:-

- to abstract water, or cause or permit any other person to abstract water, unless the abstraction is authorised by and in accordance with an abstraction licence, or is subject to an exemption;
- to do anything to enable abstraction, or to increase abstraction, except in accordance with an abstraction licence or exemption;
- to fail to comply with the conditions of an abstraction licence. **Note in particular that it may be a condition of the licence to maintain the meter or other measuring device etc. and failure to do so will be an offence;**
- to interfere with a meter or other device which measures quantities of water abstracted so as to prevent it from measuring correctly;
- to fail to provide information which we have reasonably required for the purpose of carrying out any of the Environment Agency's water resources functions;
- to knowingly make false statements for the purpose of obtaining a licence or consent or in giving required information.

The requirement for a licence is subject to some exemptions, set out in the Water Resources Act 1991 as amended. If in any doubt as to whether you need a licence, contact us at the address shown at the bottom of the front page of the licence.

Right of appeal

If you are dissatisfied with our decision on your licence application, you may appeal.

If you are in England, you should write to the Secretary of State for the Environment, Food and Rural Affairs, care of The Planning Inspectorate at:
Room 4/19 Eagle Wing,
Temple Quay House,
2 The Square,
Temple Quay,
Bristol,
BS1 6PN.

If you are in Wales, you should write to The National Assembly for Wales care of The Planning Inspectorate at:
Crown Buildings,
Cathays Park,
Cardiff,
CF10 3NQ.

You must serve notice of appeal within 28 days of the date of receipt of this licence (although the Secretary of State and The National Assembly have power to allow a longer period for serving notice of appeal). See Water Resources Act 1991, section 43.

Disclosure of information

Information about this licence is available in the public Register held by the Environment Agency. Members of the public are also entitled to ask us for other "environmental information" it holds, including any activities likely to affect "the state of any water" or any "activities or other measures designed to protect it". That would include the information additional to the licence document e.g. any related agreement or abstraction returns. In certain restricted circumstances it is possible to claim that information should be kept confidential. If you require more information about keeping this information off the public register because it is confidential, please contact us by writing to the address shown on the front page of the licence within 28 days of receiving this licence.

Licence Serial No:	10/41/311002

Please quote the serial number in all correspondence about this licence

FULL LICENCE TO ABSTRACT WATER

The Environment Agency ("the Agency") grants this licence to:-

Dudman Aggregates Limited ("the Licence Holder")
Albion Wharf
Albion Street
Southwick
Brighton
BN42 4ED
Company registration number 07803522

This licence authorises the Licence Holder to abstract water from the source of supply described in the Schedule of Conditions to this licence and subject to the provisions of that Schedule. The licence commences from the effective date shown below and shall remain in force until revoked.

Signed G House

Gemma House
Permitting Team Leader

Environment Agency
Permitting and Support Centre
Water Resources Team
Quadrant 2
99 Parkway Avenue
Parkway Business Park
Sheffield
S9 4WF

Date of issue ..... 7 August 2017

Date effective ..... 7 August 2017

The licence should be kept safe and its existence disclosed on any sale of the property to which it relates. Please read the 'important notes' on the cover to this licence.

Note: References to "the map" are to the map which forms part of this licence.
References to "the Agency" are to the Environment Agency or any successor body.

Licence Serial No:	10/41/311002

SCHEDULE OF CONDITIONS

1. SOURCE OF SUPPLY

1.1 Underground strata at the Shoreham Works of the Associated Portland Cement Manufacturers Limited.

2. POINTS OF ABSTRACTION

2.1 At National Grid Reference TQ 19903 08579 marked '1' on the map.

2.2 At National Grid Reference TQ 20109 08681 marked '2' on the map.

3. LAND ON WHICH LICENCE AUTHORISES USE OF WATER

3.1 The water abstracted shall be used only on land and in buildings in the occupation of the Licence Holder at Shoreham.

4. MEANS OF ABSTRACTION

4.1 Point 1

A borehole not exceeding 30.48 metres in depth with a pump.

4.2 Point 2

A borehole not exceeding 30.48 metres in depth with a pump.

5. PURPOSE(S) OF ABSTRACTION

5.1 The water abstracted shall be used solely for slurry, cooling and manufacturing processes.

6. PERIOD OF ABSTRACTION

6.1 All year.

7 MAXIMUM QUANTITY OF WATER TO BE ABSTRACTED

7.1 109.106 cubic metres per hour
2,577.633 cubic metres per day
763,743.120 cubic metres per year

Note: an hour means any period of 60 consecutive minutes, a day means any period of 24 consecutive hours and a year means the 12 month period beginning on 1 April and ending on 31 March.

Licence Serial No:	10/41/311002

SCHEDULE OF CONDITIONS

8. MEANS OF MEASUREMENT OF WATER ABSTRACTED

8.1 (i) The quantity of water abstracted shall be measured by a meter of a type to be approved by the Agency.

(ii) Readings of the said meter shall be taken and recorded by the Licence Holder in a log which shall be in a form prescribed by the Agency to show the quantity of water abstracted in each day.

9 RECORDS

9.1 The Licence Holder shall forward to the Agency not later than the 30th April in each year a copy of the log referred to in the last preceding condition containing the record of the quantities of water abstracted during the preceding period of twelve months ended the 31st March or at such intervals as may be required by the Agency.

9.2 A duly authorised officer of the Agency shall be entitled on request to inspect the meter and to inspect or transcribe the records required to be kept under the last but one preceding condition.

ADDITIONAL INFORMATION

Note: the following is provided for information only. It does not form part of the licence.

REASONS FOR CONDITIONS

The reason for imposing the foregoing conditions is to enable the Agency to secure the proper use of water resources.

IMPORTANT NOTES

Licence History

Licence serial number	Issue date	Expiry date	Summary of changes
10/41/311002	17/01/1966		Original licence of right to abstract water granted to The Associated Portland Cement Manufacturers Limited.
10/41/311002	01/10/1971		Variation to increase hourly, daily and annual quantities granted.
10/41/311002	06/07/1978		Name changed to Blue Circle Industries Limited.
10/41/311002	02/07/1990		Transfer of holder to Blue Circle Industries plc.
10/41/311002	08/05/1998		Transfer of holder to Callstone Limited.
10/41/311002	01/10/2007		Transfer of holder to Dudman Group Limited.
10/41/311002	07/08/2017		Transfer of holder to Dudman Aggregates Limited.

Environment Agency

MAP ACCOMPANYING LICENCE NUMBER
10/41/311002

Scale: 1:10,000

N

Would you like to find out more about us, or about your environment?

Then call us on
03708 506 506 (Mon-Fri 8-6)

email
enquiries@environment-agency.gov.uk

or visit us at
www.gov.uk/environment-agency

incident hotline 0800 80 70 60 (24hrs)
floodline 0845 988 1188

Environment first: This publication is printed on paper made from 100 per cent previously used waste. By-products from making the pulp and paper are used for composting and fertiliser, for making cement and for generating energy.

APPENDIX E

Adur & Worthing Council Site Information Request

Sam Stanton

From: Adur & Worthing Councils <no-reply@adur-worthing-hr.onmats.com>
Sent: 11 February 2022 10:14
To: Sam Stanton
Subject: Our response to your request for information (ref 11675295)
Attachments: Old Cement Works Garage workshop.pdf; Adue Valley Park (Quarry) Maps.pdf

Dear Sam Stanton,

Thank you for your request for information (ref 11675295) sent to Adur & Worthing Councils on 8th December 2021.

Your request has been considered and our response is below. Alternatively, view your request and response at: https://adur-worthing-hr.onmats.com/w/webpage/4525BBFCF1?context_record_id=11675295&webpage_token=a6e8f977549a5074d50d2a81a909787730bacfec2714007f569cdd5b01f74988

Request:
CGL has been appointed as a consultant for contaminated land and remediation for the Shoreham Cement Works AAP.

Would you be able to provide copies of any records under a contaminated land search and historical development of the Shoreham Cement works site located at:

Steyning Road
Upper Beeding
BN44 3TX

It would be much appreciated if you could provide supporting information where relevant/available regarding the following:

General background information relating to the site, to include dates of operation;
Part 2A designations within 500m of the site;
Records of historical industrial uses on site (other than the cement works);
Records of ground gas, groundwater and surface water monitoring data for the site;
Information on groundwater / surface water abstractions on site and within 500m of the site;
Information on waste facilities within 250m of the site;
Information on discharge consents within 250m of the site; and
Environmental incidents within 250m of the site;

If you have any other information pertinent to the potential for contamination on or near the site, please let me know.

Response:
Please be advised the majority of the land you refer to lies within the boundary of Horsham District

Council (HDC). Some of the southern edge is within the boundary of Adur District Council (ADC) and since the creation of the South Downs National Park Authority (SDNPA) in 2011 the site is now under SDNPA Planning jurisdiction.

You may wish to contact HDC and SDNPA for records of recorded information they hold in relation to your request.

ADC holds records of the following information in relation to your request:

Planning historic cards for the site to 2011.

Regarding your request for "General background information relating to the site, to include dates of operation", we do not hold this information.

The Council holds documents relating to a planning application to Horsham District Council in 2002, which contains information about the site.

Regarding your request for "Information on groundwater / surface water abstractions on site and within 500m of the site; Information on waste facilities within 250m of the site; and Information on discharge consents within 250m of the site" - would all be for the Environment Agency to answer.

We don't hold current information. It should be borne in mind the application site lies within Horsham DC so they could be approached for this information.

We hope this is sufficient for your purposes.

Review procedure
If you are not satisfied with the response to your request for information you have the right to an internal review. Details can be found on www.adur-worthing.gov.uk/foi

Your request for internal review should be submitted to us within three (3) months of receipt by you of this response. Any such request received after this time will only be considered at the discretion of the Council.

If having exhausted the review process you are not content that your request or review has been dealt with correctly, you have a further right to appeal to the Information commissioner's Office (ICO), details of which can be found here: www.ico.org.uk/concerns

Yours sincerely
Information Governance Team
Adur & Worthing Councils

For Freedom of Information (FOI) and Environmental Information Regulations (EIR):
Email: information.officer@adur-worthing.gov.uk

For Data Protection (DP) and General Data Protection Regulations (GDPR):
Email: data.protection@adur-worthing.gov.uk

Website: www.adur-worthing.gov.uk/about-the-councils/legal/foi/

This message was sent from an email address not monitored. Please do not respond to this message. To reply, please email information.officer@adur-worthing.gov.uk quoting your reference number, 11675295, in your message.

37969600000000

PI	ADDRESS CEMENT WORKS STEYNING ROAD	LB CONSERVATION AREA	DECISION BR's	DECISION TP	COMM	COMP
4242	hire works (east side)		R 6/9/38	REF 4/10/38		
4262	" " amended lavatory acc		R 27/9/38	R 4/10/38		
4272	Amended lavatory accommodation		25/10/38	REF 1/11/38		
4295	hire works		3/1/39	REF 10/1/39		
153/54	Housing for slurry filtering plant		20/7/54	7/10/54		
293/54	" " "		2/12/54	6/1/55	13/1/55	22/4/55
293A/54	Renewal of consent		-	16/11/59		
293B/54	Renewal of consent for housing for slurry filtering		-	2/4/63		
293C/54	" " " " "		-	A 7/7/64		

NOTES
1:2500.

mineral consultation area

Seaed:

PTO

PLAN NO	ADDRESS CEMENT WORKS STEYNING ROAD. 3796960000000	LB CONSERVATION AREA	DECISION BR's	DECISION TP	COMM	COMP
261/70	Extension to dispatch office		22/9/70	-	15/10/70	4/1/71
26/70	Vehicle repair shop		2/4/70	-	4/4/70	4/1/71
232/69	Extension to despatch		30/7/69	-	10/9/69	20/10/69
389/72/AD	Sign		—	18/9/72		
415/73	Vehicle wash plant		31/10/73	-		
459/74 OH	Erection of high voltage overhead line					
53/81/AD	hard to W of Steyning Road.			REFUSED 6.5.81		
	Non illuminated hoarding sign					
SU/298/88/TP	Use as commercial vehicle workshops		—	1.2.89	TEMP TILL c 31/1/94	

NOTES

1258/89 (motor depot)

	ADDRESS 379696 CEMENT WORKS STEYNING ROAD.	LB CONSERVATION AREA	DECISION BR's	DECISION TP	COMM	COMP
SU/6/98/TP/OA	NATIONAL WINTER SPORTS CENTRE (INDOOR ARTIFICIAL SKI SLOPE & ASSOCIATED FACILITIES INCLUDING SERVICES & ACCOMMODATION): SCIENCE/BUSINESS PARK & NEW ACCESS (OUTLINE)		—	CW 3.8.99		
SU/191/98/TP/FP	Temporary use (for 2 years) of Buildings & Concreted Areas on west side of A283 for garaging & parking of vehicles & Storage		—	CW 12.9.00		
SU/19/99/TP/FP	New accesses (on east & west sides of A283) to serve proposed redevelopment in accordance with local plan policies		—	-		
SU/20/99/TP/AP	Redevelopment for business (45,000 sq.m.) & Leisure (25,000 sq.m) use including demolition of existing structures + Landscape improvement works (outline)			W. 31.12.99		
NOTES						

PLAN NO	ADDRESS	LB / CONSERVATION AREA	DECISION BR's	DECISION TP	COMM	
SW/134/00/TP/FP	Use of workshop & hardstandings for repair, maintenance & storage of vehicles (inc. buses) with residential use of bus for 24 hr. Security (Retrospective)			App. 11.9.00	Temp. Until 11.9.2002	
SW/30/02/TP/XX	Continued use of workshop + hardstanding for Repair, maintenance + Storage of Vehicles (inc. Buses) with Residential use of Bus for 24 Hr. Security (Renewal of SW/134/00)	—		App. 25.3.02	Temp until 11.9.2004	
SW/102/02/TP/TR	14.2m Telecommunications monopole mast (incl. Antenna + dish) and ground Compound with Cabin + Cabinet	—		Refused 21-6-02		
SW/124/02/TP	Major mixed use redevelopment comprising residential, office, industrial, storage/distribution, hotel + other uses with landscaping, open space + highway works (O/L with details except design + external appearance of buildings)	—		Obj	Called in by SC + State REF 10-9-03	

NOTES

PLAN No	ADDRESS	LB CONSERVATION AREA	DECISION BR's	DECISION TP	COMM	COMP
	CEMENT WORKS Steyning Rd.					
SU/209/04	Temporary use (~~for~~ 5 years) of land + Buildings For class B1, B2 ~~&~~ / ~~or~~ B8 uses (Business, Industry ~~&~~ storage) incl. continued use For Vehicle ~~maintenance~~ repair / storage with Residential Security caravan.			APPROVED 18-11-04	C	Temporary P. expires 31/12/09
AK/04/68/09	CONTINUED USE (FOR 5 YEARS) OF LAND & BUILDINGS ON WEST SIDE OF A283 FOR USES WITHIN CLASSES B1, B2, & B8 (BUSINESS, INDUSTRY & STORAGE) INCLUDING VEHICLE REPAIR (STORAGE) & RESIDENTIAL SECURITY CARAVAN (RENEWAL OF SU/209/04)	—		WDN 3.608.		
AK/04/24/09	CONTINUED TEMPORARY USE OF LAND & BUILDINGS ON WEST SIDE OF A283 (SOUTH PART) FOR PURPOSES FALLING WITHIN USE CLASSES B1, B2 & B8 (BUSINESS, INDUSTRY & STORAGE) INCLUDING RESIDENTIAL SECURITY CARAVAN (RENEWAL OF SU/209/04)	—		7.1.10	C	

NOTES

PLAN No	ADDRESS	LB CONSERVATION AREA	DECISION BR's	DECISION TP	COMM	COMP
ANOM/0992/11	CONTINUED TEMPORARY USE OF LAND & BUILDINGS ON WEST SIDE OF A283 (SOUTH PART) FOR PURPOSES FALLING WITHIN CLASSES B1, B2 & B8 (BUSINESS, INDUSTRY & STORAGE) INCLUDING RESIDENTIAL SECURITY CARAVAN (RENEWAL OF AOC/0124/09)	—				

NOTES

EnviroCheck

Environmental Site Sensitivity Data

CLIENT DETAILS

Customer Ref: Jaki Bell
Peter Brett Associates
Snook House 56 Tilehurst Road
READING
Berkshire RG30 2JH

Order No. QS27094-1

SITE DETAILS

Shoreham Cement Works

SHOREHAM

Site Sensitivity Plan

Figure 14

KEY TO THE LEGEND DATABASE

- Search Criteria (where applicable)
- 8 Reference Number
- Several of Type at Location
- Pylon or Mast
- Landfill
- BGS Recorded Landfill Site
- BGS Recorded Mineral Site
- BGS Borehole
- River Network and Water Feature
- Water Abstraction
- Discharge Consent
- Site of Special Scientific Interest
- Integrated Pollution Control
- Air Pollution Control
- Red List Discharge Consent
- Enforcement or Prohibition Notice
- Prosecution Relating to Authorised Process
- Registered Radioactive Substance
- Post 1998 Planning Application (of Possible Contaminative Use)
- Waste Treatment or Disposal Site
- Waste Transfer Site
- Integrated Pollution Control Registered Waste Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement
- Trade Directory Entry
- Fuel Station Entry
- Prosecution Relating to Controlled Waters
- Pollution Incident Relating to Controlled Waters

ENVIRONMENT AGENCY

British Geological Survey
Value Added Reseller

Ordnance Survey
Value Added Reseller

Produced by Landmark Information Group Limited

SOIL CLASSIFICATION

The soil vulnerability classification groups the many different soils of England and Wales into three soil vulnerability classes and six sub-classes. Each is based on soil physical and chemical properties which affect the downward passage of water and contaminants. These include: texture, structure, soil water regime and the presence of distinctive layers such as raw peaty topsoil and rock or gravel at shallow depth. This classification is not applied to soils above Non-Aquifers.

Soils of High Leaching Potential (H)

Soils with little ability to attenuate diffuse source pollutants and in which non-adsorbed diffuse source pollutants and liquid discharges have the potential to move rapidly to underlying strata or to shallow groundwater. They include soils of the Andover, Newchurch and Upton Associations from the National Soil Map. Three sub-classes are recognised:

H1 Soils which readily transmit liquid discharges because they are either shallow, or susceptible to rapid flow directly to rock, gravel or groundwater;

H2 Deep, permeable, coarse textured soils which readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential; and

H3 Coarse textured or moderately shallow soils which readily transmit non-adsorbed pollutants and liquid discharges but which have some ability to attenuate adsorbed pollutants because of their clay or organic matter contents.

Soils of Intermediate Leaching Potential (I)

Soils which have a moderate ability to attenuate diffuse source pollutants or in which it is possible that some non-adsorbed diffuse source pollutants and liquid discharges could penetrate the soil layer. They include soils of the Coombe, Curtisden and South Petherton Associations. Two sub-classes are recognised:

I1 Soils which can possibly transmit a wide range of pollutants; and

I2 Soils which can possibly transmit non- or weakly adsorbed pollutants and liquid discharges but are unlikely to transmit adsorbed pollutants.

Soils of Low Leaching Potential (L)

Soils in which pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have the ability to attenuate diffuse pollutants. Lateral flow from these soils may contribute to groundwater recharge elsewhere in the catchment. They generally have a high clay content and include soils of the Denchworth, Poundgate and Wickham Associations.

Publications and information on soil are available from Soil Survey and Land Research Centre, Cranfield University, Silsoe, Bedfordshire, MK45 4DT.

VULNERABILITY CLASSES

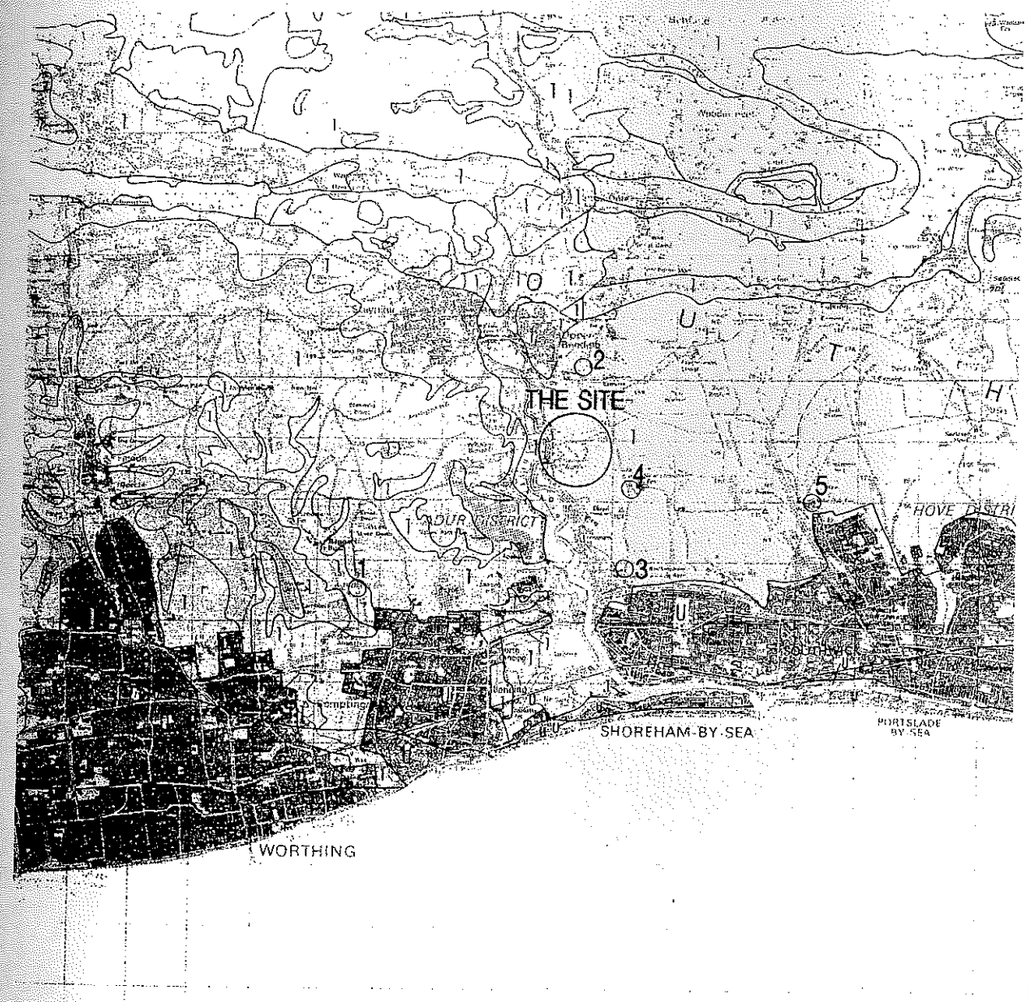
Geological Classes	Soil Classes
Major Aquifer (Highly Permeable)	High (H) 1, 2, 3, U*
	Intermediate (I) 1, 2
	Low
Minor Aquifer (Variably Permeable)	High (H) 1, 2, 3, U*
	Intermediate (I) 1, 2
	Low
Non-Aquifer (Negligibly Permeable)	

Low permeability drift deposits occurring at the surface and overlying Major and Minor Aquifers are head (clayey), clay-with-flints, peat and marine and estuarine alluvium.

* – Soil information for restored mineral workings and urban areas is based on fewer observations than elsewhere. A worst case vulnerability classification (H) is therefore assumed for these areas and for current mineral workings. All are given a designation HU until proved otherwise.

All maps involve a compromise between the representation of natural complexity and ease of interpretation of the map. Such compromises place limitations on the resolution and precision of map information. In this case, the variety of soils, geological strata and potential contaminants that have to be covered is wide, and the classification used is, of necessity, generalized. Individual sites and circumstances will always require further and more detailed assessments to determine the specific impact on groundwater resources. The maps only represent conditions at the surface and therefore where the soil and/or underlying formations have been disturbed or removed, for example during mineral extraction, the vulnerability class may have been changed. Hence, where there is evidence of disturbance there will be a need to determine groundwater vulnerability using site-specific data.

Map prepared by Cartographic Department, Soil Survey and Land Research Centre, Cranfield University, Silsoe, Bedford, MK45 4DT



Key to Groundwater Abstraction Boreholes

1 – Sompting P.S.

2 – Steyning P.S.

3 – Shoreham P.S.

4 – Mossy Bottom

5 – Mile Oak P.S.

Site: Shoreham Cement Works			Groundwater Vulnerability Plan & Key
Client: Hargreaves Management Ltd	Date: Nov 1999		Job No: 10557
Peter Brett Associates Consulting Engineers	By: BDA	Checked:	Figure: 13

INDEX AND EXPLANATION OF GEOLOGICAL SYMBOLS AND COLOURS

DRIFT

QUATERNARY

- Alluvium
- First to Third River Terrace Deposits, as numbered
- River Terrace Deposits, undifferentiated
- Marine Beach Deposits
- Marine and Estuarine Alluvium
- Storm Gravel Beach Deposits
- Raised Beach Deposits
- Head
- Head Gravel
- Older Head
- Clay with Flints
- Brickearth

For Solid symbols and colours see Generalized Vertical Section

- Gently inclined strata
- Inclined strata, dip in degrees
- General or regional dip of strata
- Geological boundary, Drift
- Geological boundary, Solid
- Fault at surface, crossmark indicates downthrow side

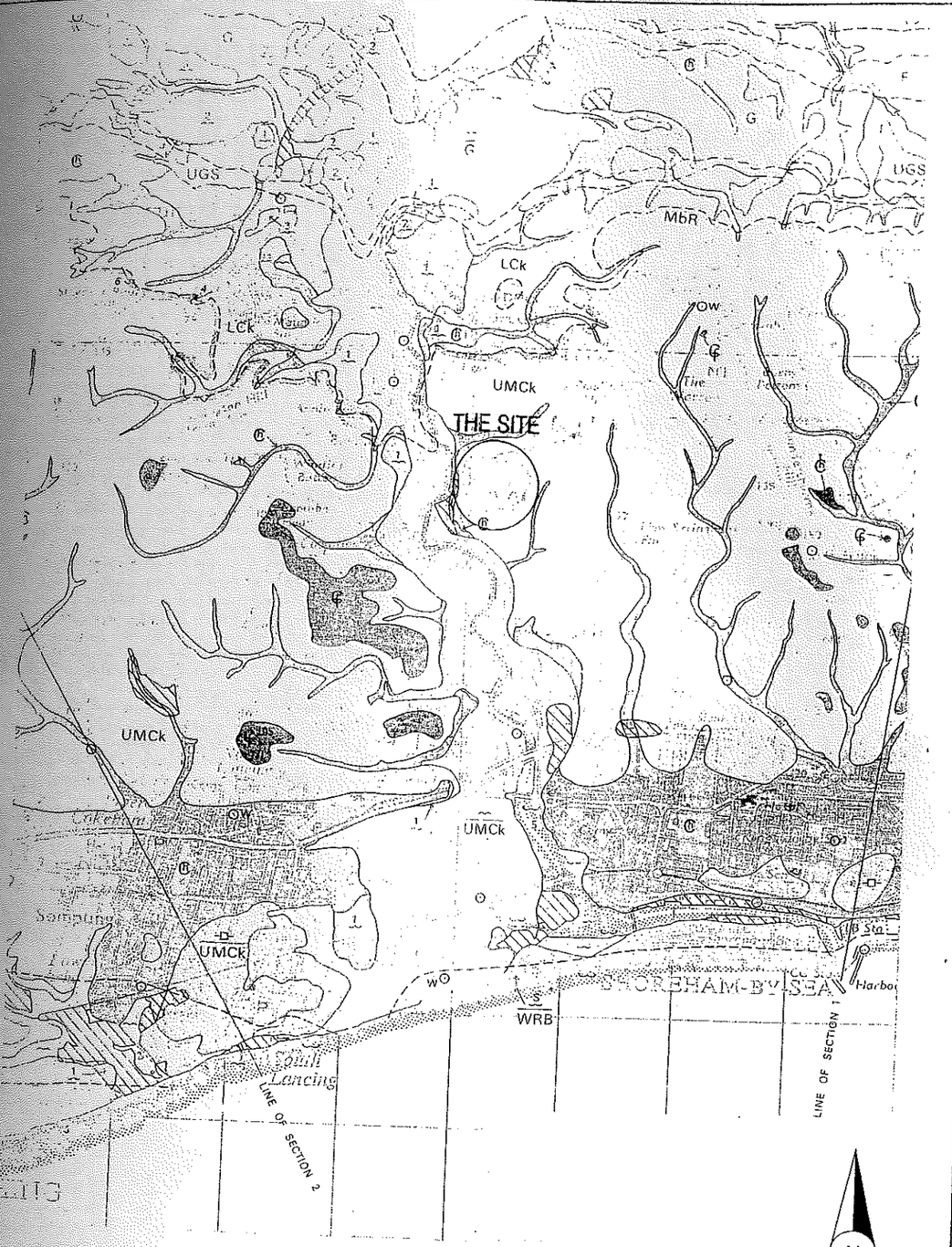
Broken lines denote uncertainty

- Borehole
- Borehole, exact site uncertain
- Water well or borehole

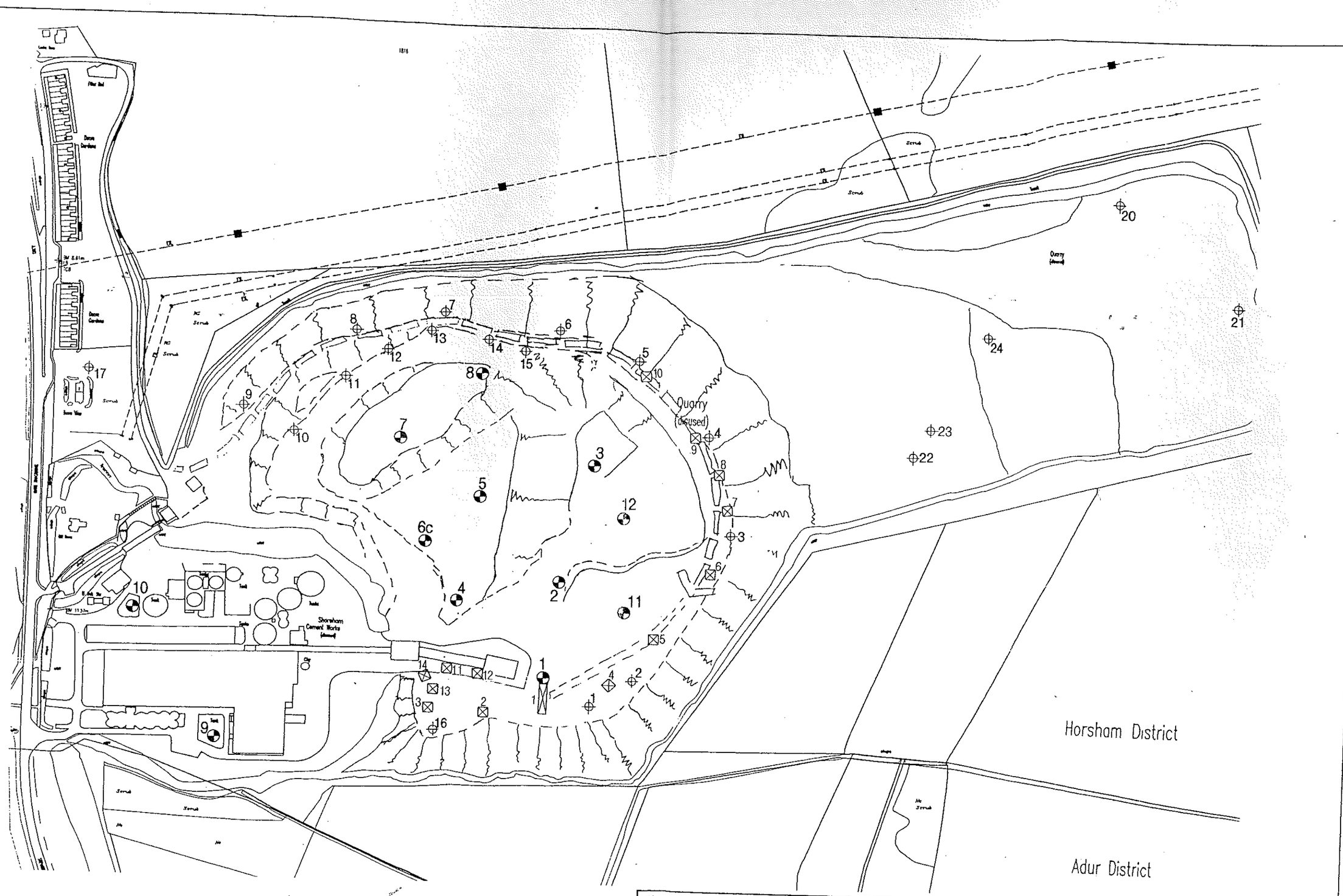
GENERALIZED VERTICAL SECTION
Scale 1:2000

SOLID

PALAEOCENE EOCENE	LC	London Clay, up to 10m Sand S(LC)
	WRB	Woolwich and Reading Beds up to 30m
	Unconformity	
CRETACEOUS	UMCk	Upper and Middle Chalk, undivided up to 325m
	MbR	Melbourn Rock
	LCk	Lower Chalk 74-100m
	UGS	Upper Greensand 0-25m
	G	Gault 54-100m



Site: Shoreham Cement Works			Geological Map & Key
Client: Hargreaves Management Ltd	Date: Nov 1999		Job No: 10557
Peter Brett Associates Consulting Engineers	By: BDA	Checked:	Figure: 12



◓ - Geotechnical Services Ltd 1997 Borehole

☒ - PBA 1999 Trial Pit

⊕ - ACS 1999 Sampling Position

Site: Shoreham Cement Works	Location of Ground Investigation Points and Sample Positions		
Client: Hargreaves Management Ltd	Date: Dec 1999		Job No: 10557
Peter Brett Associates Consulting Engineers	By: BDA	Checked:	Figure: 11

EnviroCheck

Environmental Site Sensitivity Data

CLIENT DETAILS

Order No. QH27094-1

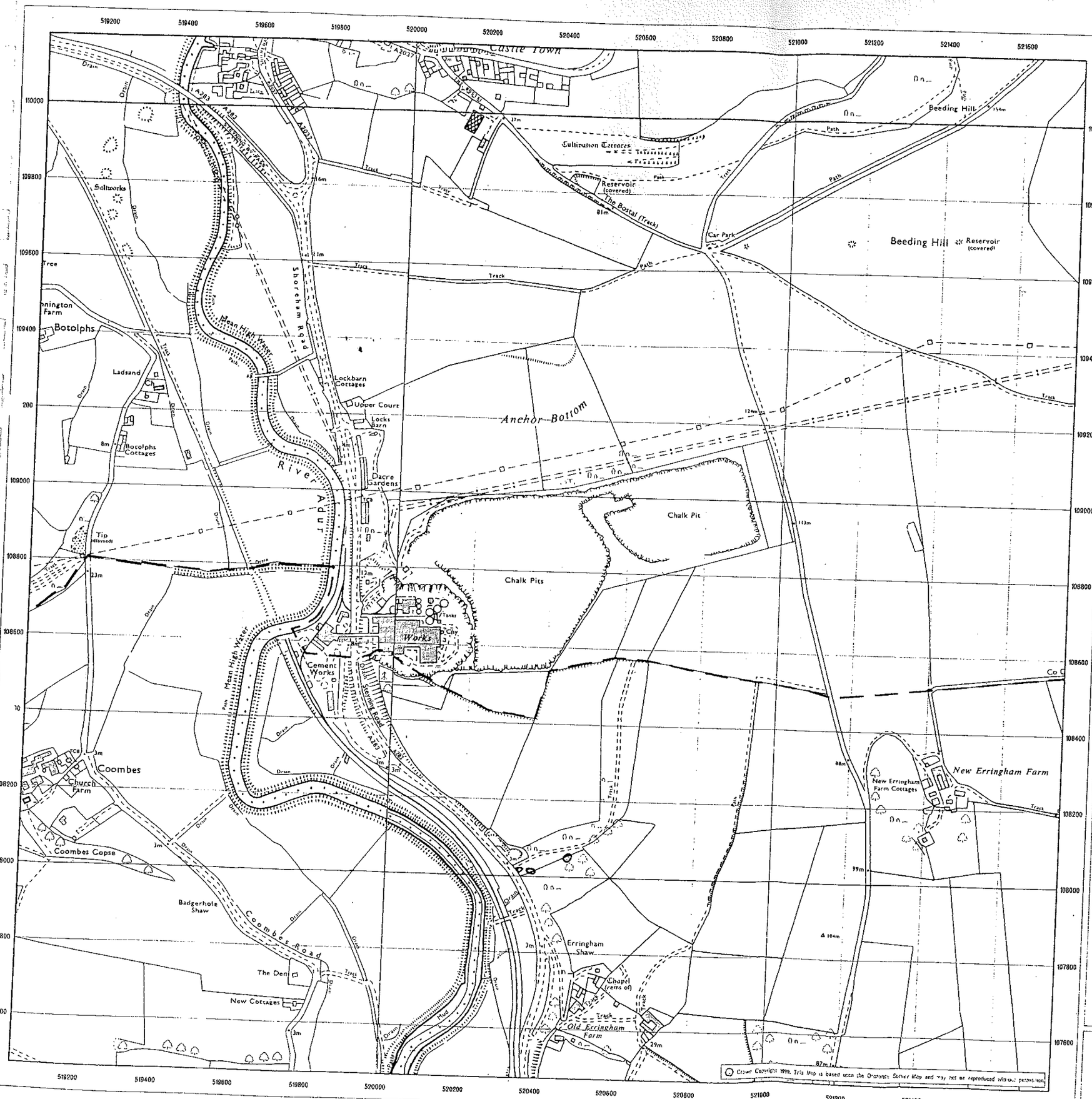
Customer Ref: Jaki Bell
Peter Brett Associates
Snook House 66 Tilehurst Road
READING
Berkshire RG30 2JH

SITE DETAILS

Shoreham Cement Works

SHOREHAM

Figure 10



Historical Map Legend

- Chalk Pit, Clay Pit or Quarry
- Gravel Pit
- Sand Pit
- Disused Pit or Quarry
- Refuse or Slag Heap
- Lake, Loch or Pond
- Non-Coniferous Trees
- Coniferous Trees
- Scrub
- Pylon
- Pole
- Electricity Transmission Line
- Direction of Flow of Water
- Shingle
- Sand
- Bracken
- Heath
- Rough Grassland
- Reeds
- Marsh
- Saltings
- Cutting
- Embankment
- Road Under
- Road Over
- Level Crossing
- Foot Bridge
- Standard Gauge Multiple Track
- Standard Gauge Single Track
- Siding, Tramway or Mineral Line
- Narrow Gauge

Ordnance Survey Plan

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given on the right therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

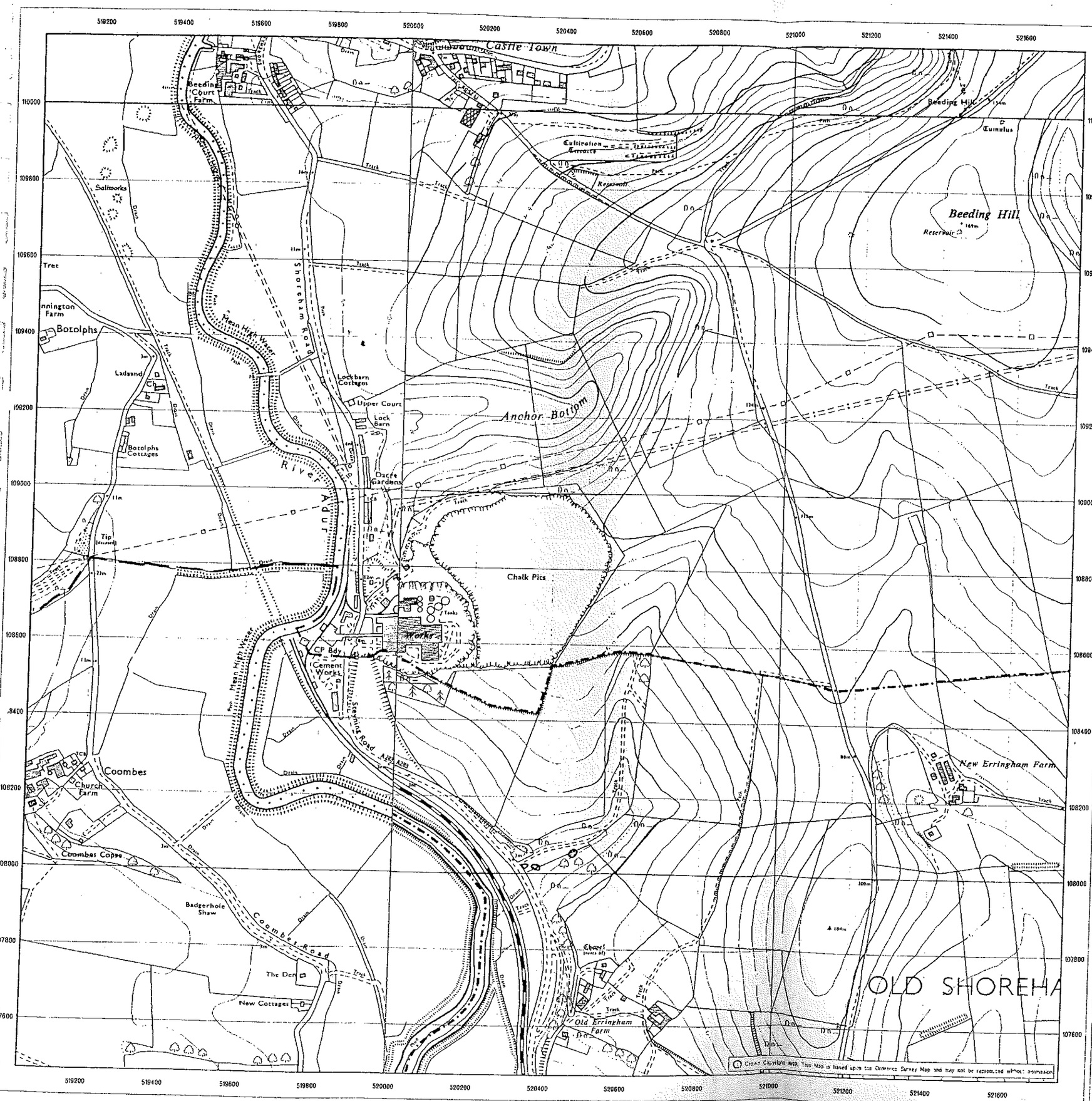
In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

1993	1976
1990	1984

Date(s) of Publication

Ordnance Survey
Value Added Reseller

Landmark Information Group Limited
7 Abbey Court, Eagle Way, Sowton
Exeter EX2 7HY
LANDMARK Telephone 01392 441723 Fax 01392 441735



EnviroCheck

Environmental Site Sensitivity Data

CLIENT DETAILS

Order No. QH27094-1

Customer Ref: Jaki Bell
Peter Brett Associates
Snook House 66 Tilehurst Road
READING
Berkshire RG30 2JH

SITE DETAILS

Shoreham Cement Works

SHOREHAM

Figure 9

Historical Map Legend

- Chalk Pit, Clay Pit or Quarry
- Gravel Pit
- Sand Pit
- Disused Pit or Quarry
- Refuse or Slag Heap
- Lake, Loch or Pond
- Non-Coniferous Trees
- Coniferous Trees
- Scrub
- Pylon
- Electricity Transmission Line
- Pole
- Direction of Flow of Water
- Shingle
- Sand
- Cutting
- Embankment
- Road Under
- Road Over
- Level Crossing
- Foot Bridge
- Bracken
- Heath
- Rough Grassland
- Reeds
- Marsh
- Saltings
- Standard Gauge Multiple Track
- Standard Gauge Single Track
- Siding, Tramway or Mineral Line
- Narrow Gauge

Ordnance Survey Plan

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given on the right therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

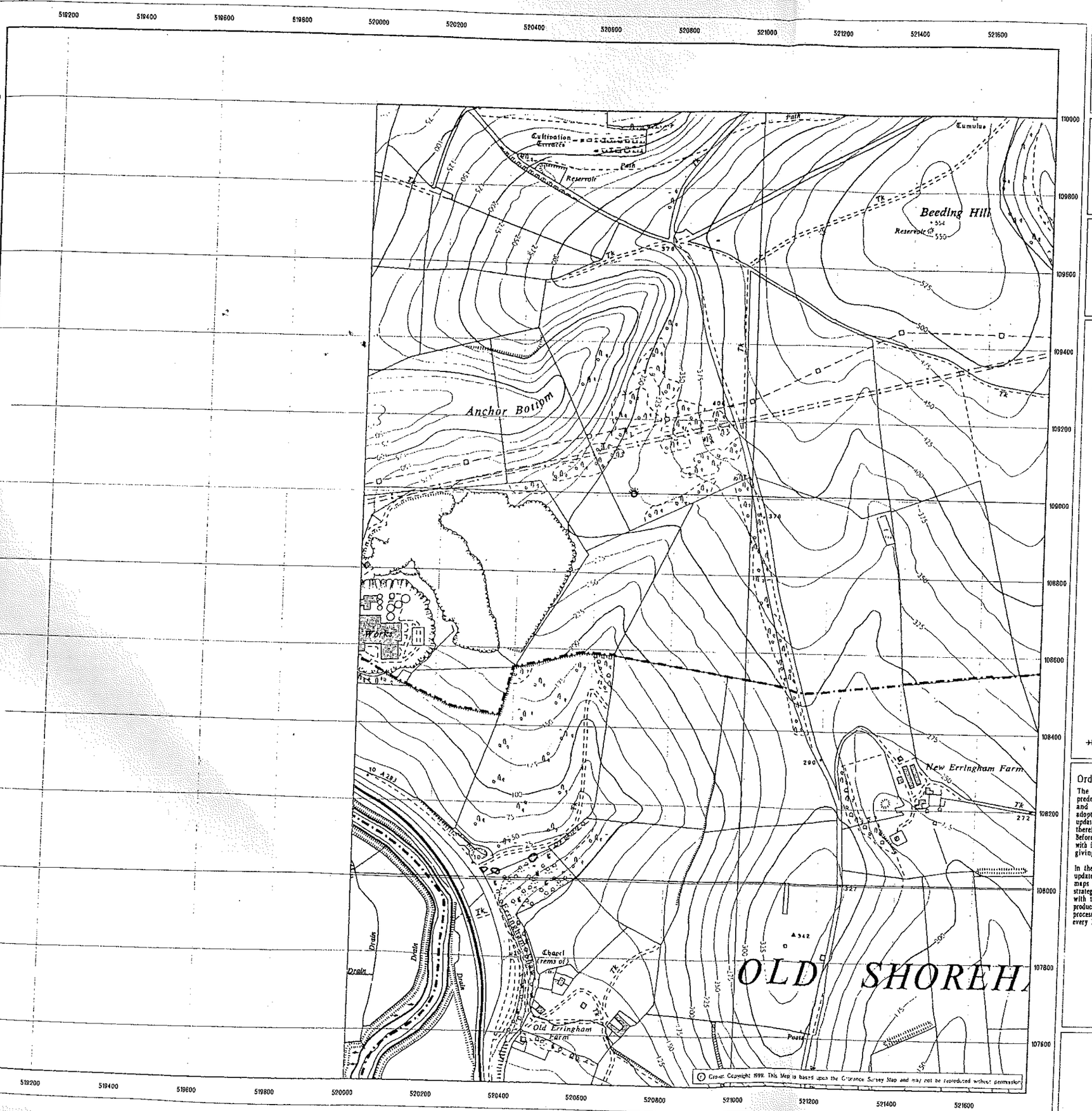
In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

1977	1976
1975	1972

Date(s) of Publication

Ordnance Survey
Value Added Reseller

Landmark Information Group Limited
7 Abbey Court, Eagle Way, Sowton
Exeter EX2 7HY
Telephone 01392 441728 Fax 01392 441709



EnviroCheck

Environmental Site Sensitivity Data

CLIENT DETAILS

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Customer Ref: Jaki Bell
Peter Brett Associates
Snook House 66 Tilehurst Road
READING
Berkshire RG30 2JH

SITE DETAILS

Shoreham Cement Works

SHOREHAM

Figure 8

Historical Map Legend

Quarry
Shingle
Railway over Road
Road over Railway
Railway over River
Gravel Pit
Sand Pit
Level Crossing
Other Pits
Road over River or Canal
Road over Stream
Mixed Wood
Rough Pasture
Road over Stream
Marsh
Sunken Road
Raised Road
Sketched Contour
Arrow denotes flow of water
Instrumental Contour

Ordnance Survey Plan

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given on the right therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

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1968

Date(s) of Publication

Ordnance Survey
Value Added Reseller

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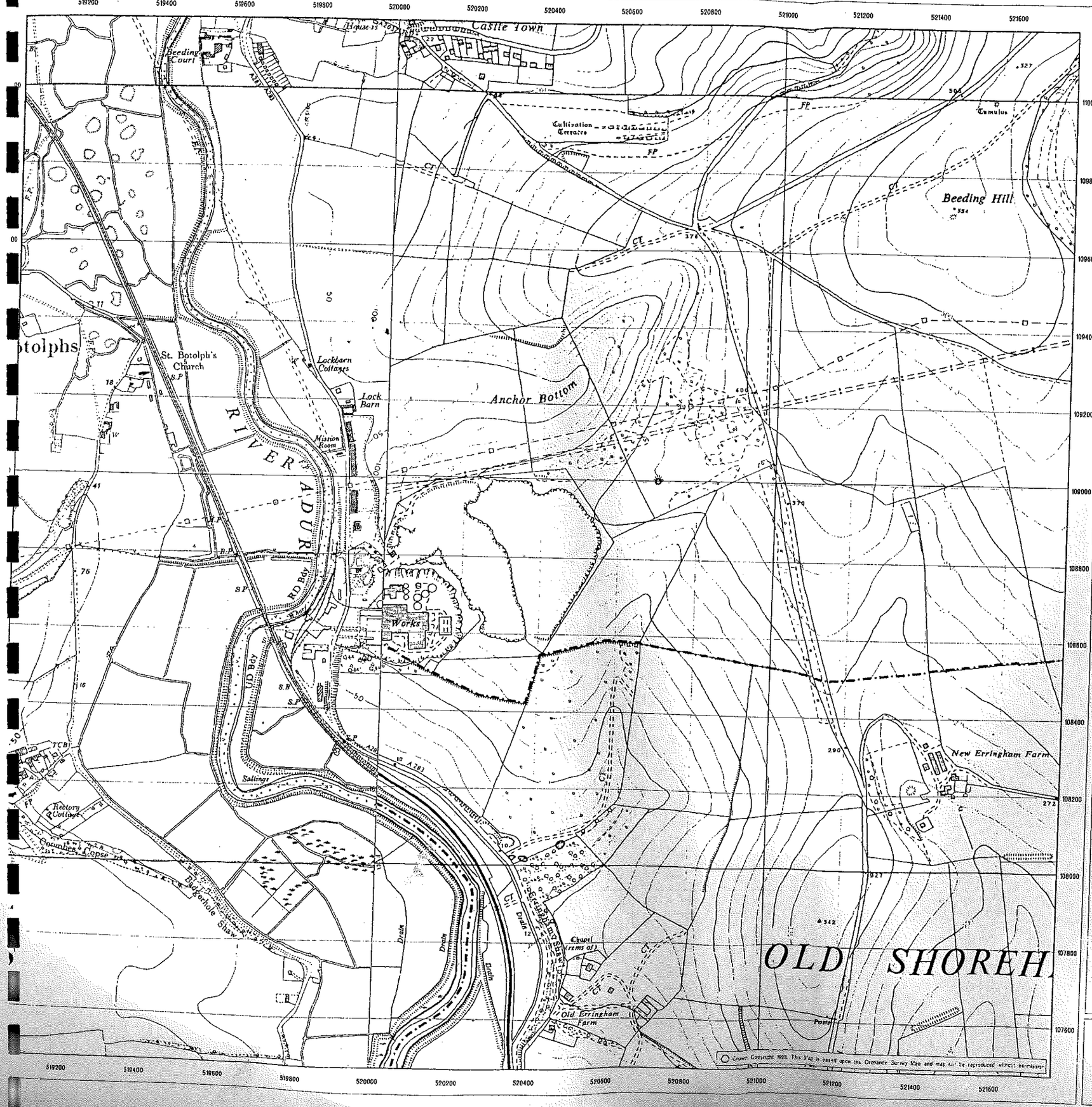
Exeter EX2 7HY
Telephone 01392 441729 Fax 01392 441709



EnviroCheck

Environmental Site Sensitivity Data

CLIENT DETAILS

Order No. QH27094-1

Customer Ref: Jaki Bell
Peter Brett Associates
Snook House 66 Tilehurst Road
READING
Berkshire RG30 2JH

SITE DETAILS

Shoreham Cement Works

SHOREHAM

Figure 7

Historical Map Legend

Quarry
Shingle
Railway over Road
Road over Railway
Railway over River
Gravel Pit
Sand Pit
Level Crossing
Other Pits
Road over River or Canal
Road over Stream
Mixed Wood
Rough Pasture
Road over Stream
Marsh
Sunken Road
Raised Road
Sketched Contour
Arrow denotes flow of water
Instrumental Contour

Ordnance Survey Plan

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given on the right therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

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1961	1962
1961	1963

Date(s) of Publication

Ordnance Survey
Value Added Reseller

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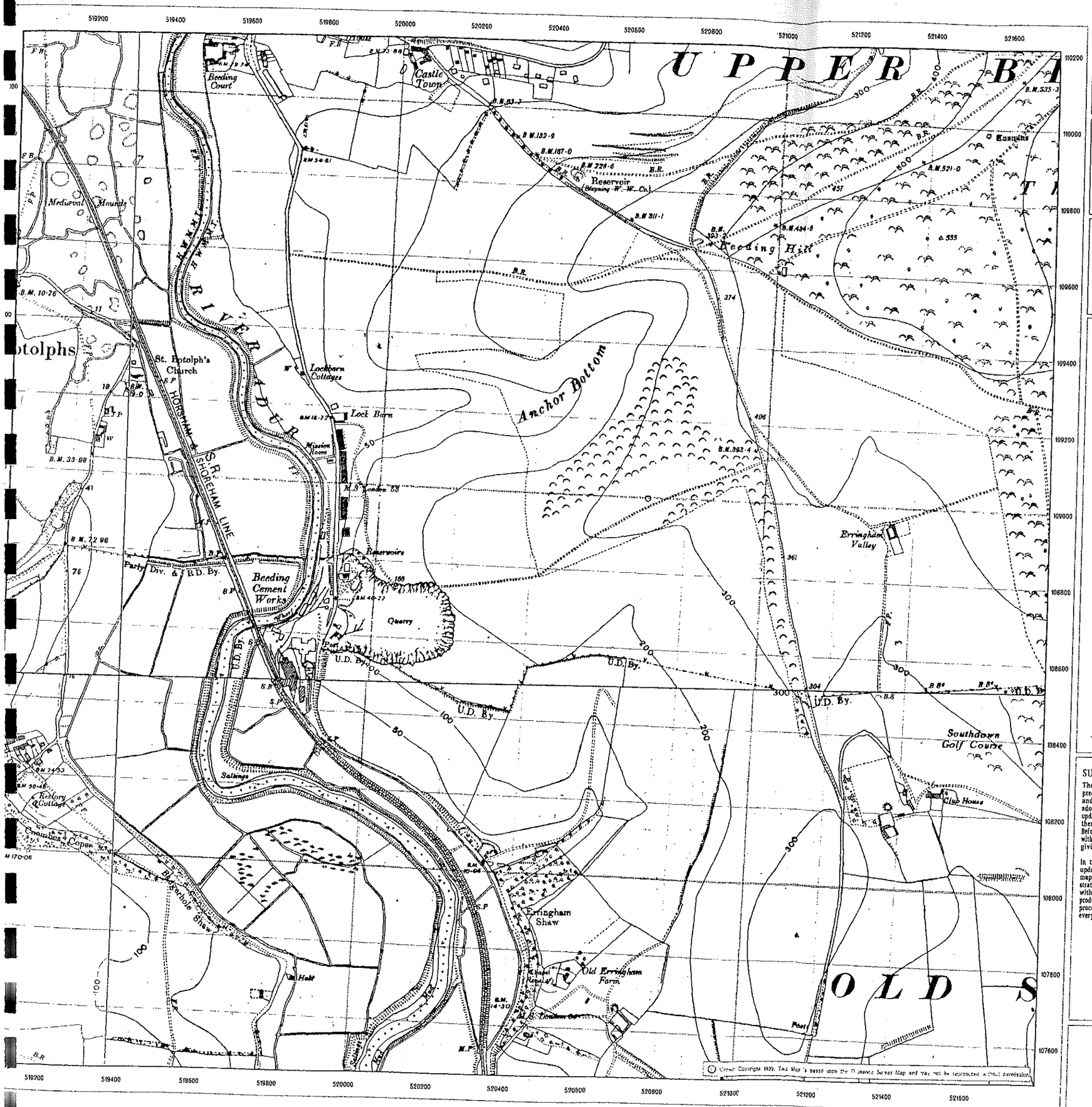
Exeter EX2 7HY
Telephone 01392 441029 Fax 01392 441009



EnviroCheck

Environmental Site Sensitivity Data

CLIENT DETAILS

Order No. QH27094-1

Customer Ref: Jaki Bell
Peter Brett Associates
Snook House 66 Tilehurst Road
READING
Berkshire RG30 2JH

SITE DETAILS

Shoreham Cement Works

SHOREHAM

Figure 6

Historical Map Legend

Quarry
Shingle
Railway over Road
Road over Railway
Railway over River
Gravel Pit
Sand Pit
Level Crossing
Other Pits
Road over River or Canal
Road over Stream
Mixed Wood
Rough Pasture
Road over Stream
Marsh
Sunken Road
Raised Road
Sketched Contour
Instrumental Contour
Arrow denotes flow of water

SUSSEX county

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given on the right therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

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1947	1947
1947	1947

Date(s) of Publication

Ordnance Survey
Value Added Reseller

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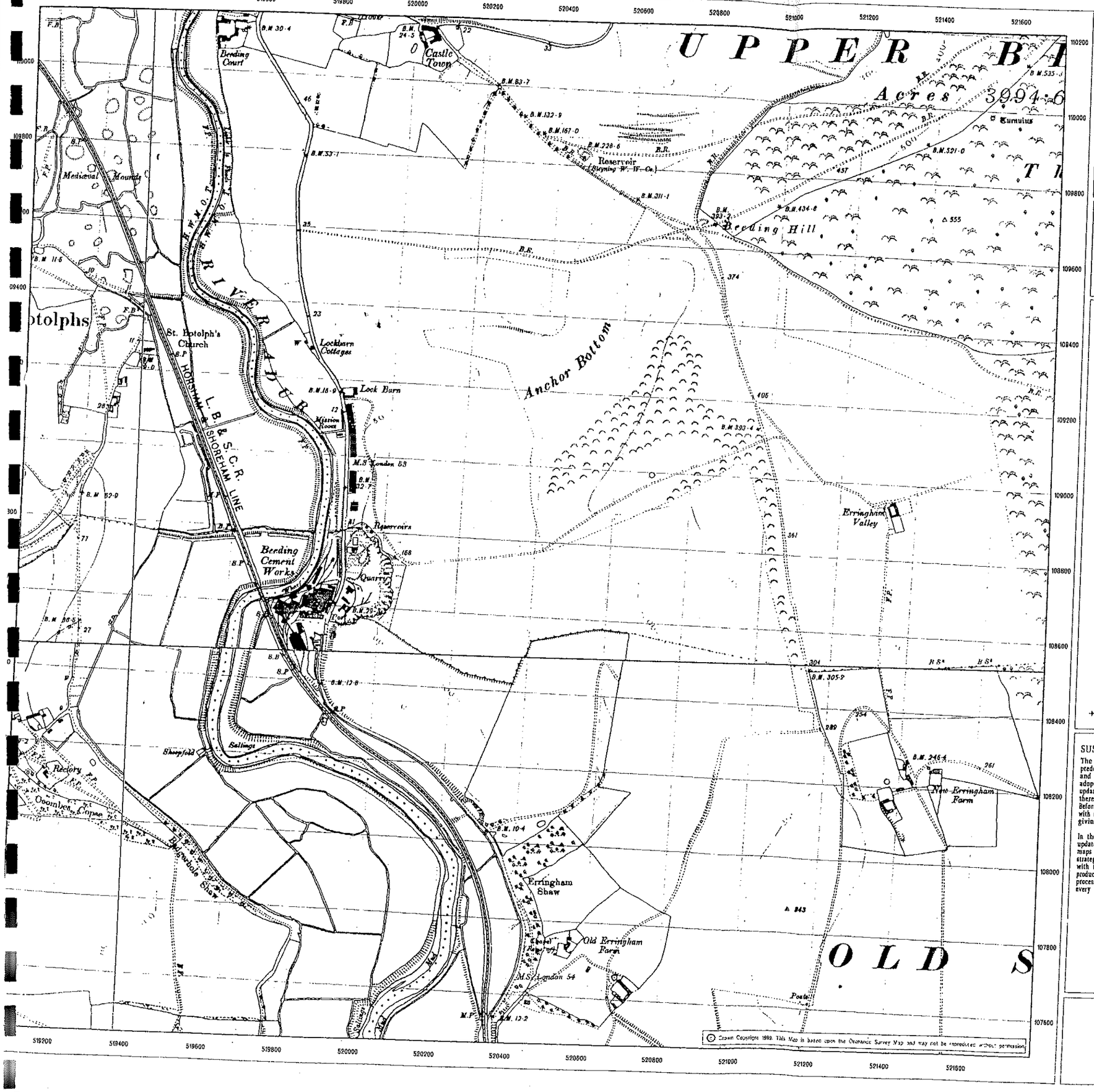

EnviroCheck

Environmental Site Sensitivity Data

CLIENT DETAILS

Order No. QH27094-1

Customer Ref: Jaki Bell
Peter Brett Associates
Snook House 66 Tilehurst Road
READING
Berkshire RG30 2JH

SITE DETAILS

Shoreham Cement Works

SHOREHAM

Figure 5

Historical Map Legend

Quarry
Shingle
Railway over Road
Road over Railway
Railway over River
Gravel Pit
Sand Pit
Level Crossing
Other Pits
Road over River or Canal
Road over Stream
Mixed Wood
Rough Pasture
Road over Stream
Marsh
Sunken Road
Raised Road
Sketched Contour
Arrow denotes flow of water
Instrumental Contour

SUSSEX county

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	Date(s) of Publication
1914	1914
1913	1912

Ordnance Survey
Value Added Reseller

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Exeter EX2 7HY
Telephone 01392 441729 Fax 01392 441703

EnviroCheck

Environmental Site Sensitivity Data

CLIENT DETAILS

Order No. QH27094-1

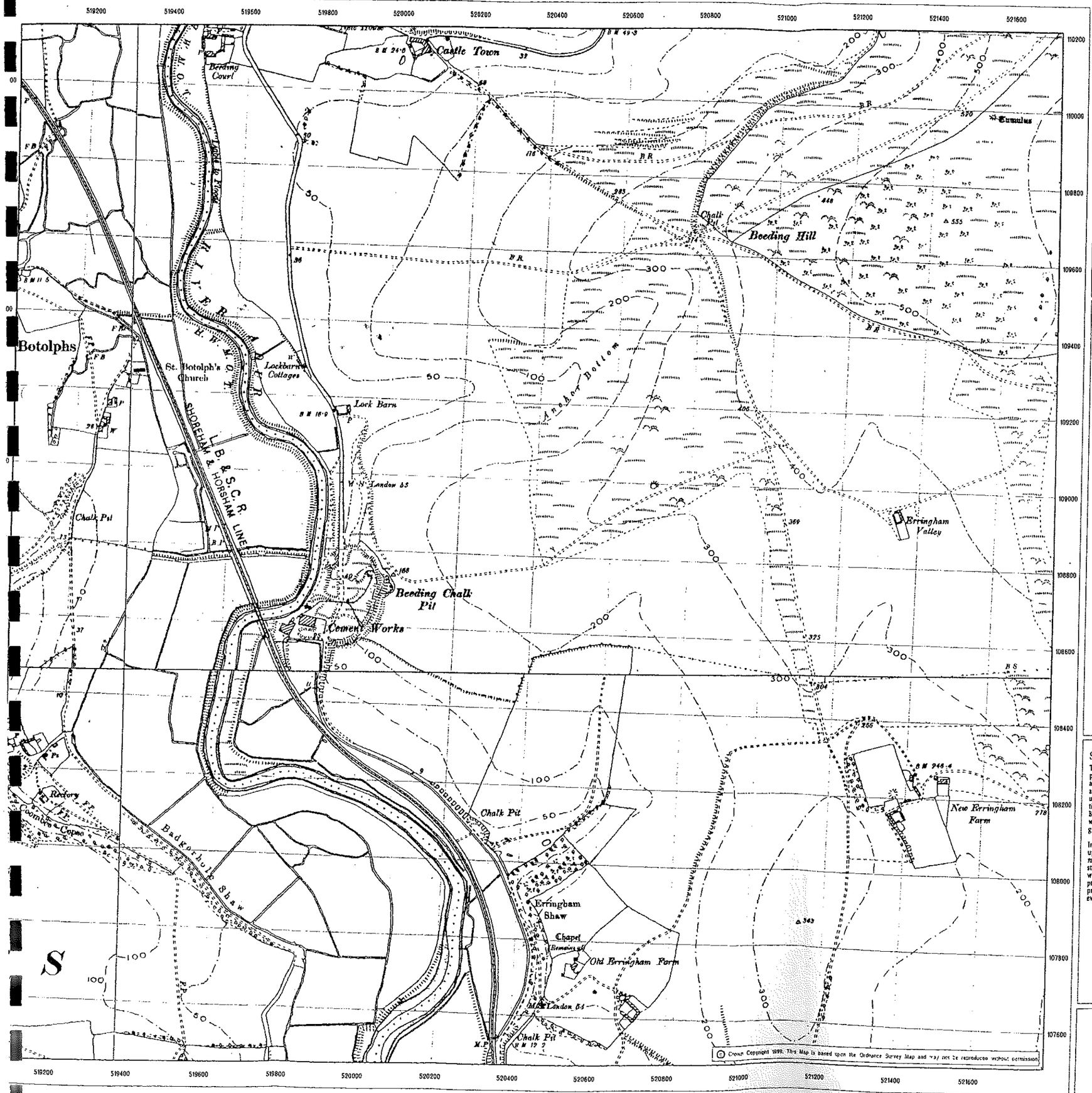
Customer Ref: Jaki Bell
Peter Brett Associates
Snook House 66 Tilehurst Road
READING
Berkshire RG30 2JH

SITE DETAILS

Shoreham Cement Works

SHOREHAM

Figure 4



Historical Map Legend

Quarry
Shingle
Railway over Road
Road over Railway
Railway over River
Gravel Pit
Sand Pit
Level Crossing
Other Pits
Road over River or Canal
Road over Stream
Mixed Wood
Rough Pasture
Road over Stream
Marsh
Sunken Road
Raised Road
Sketched Contour
Arrow denotes flow of water
Instrumental Contour

SUSSEX county

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1340's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given on the right therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

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1899	1899
1899	1899

Date(s) of Publication

Ordnance Survey
Value Added Reseller

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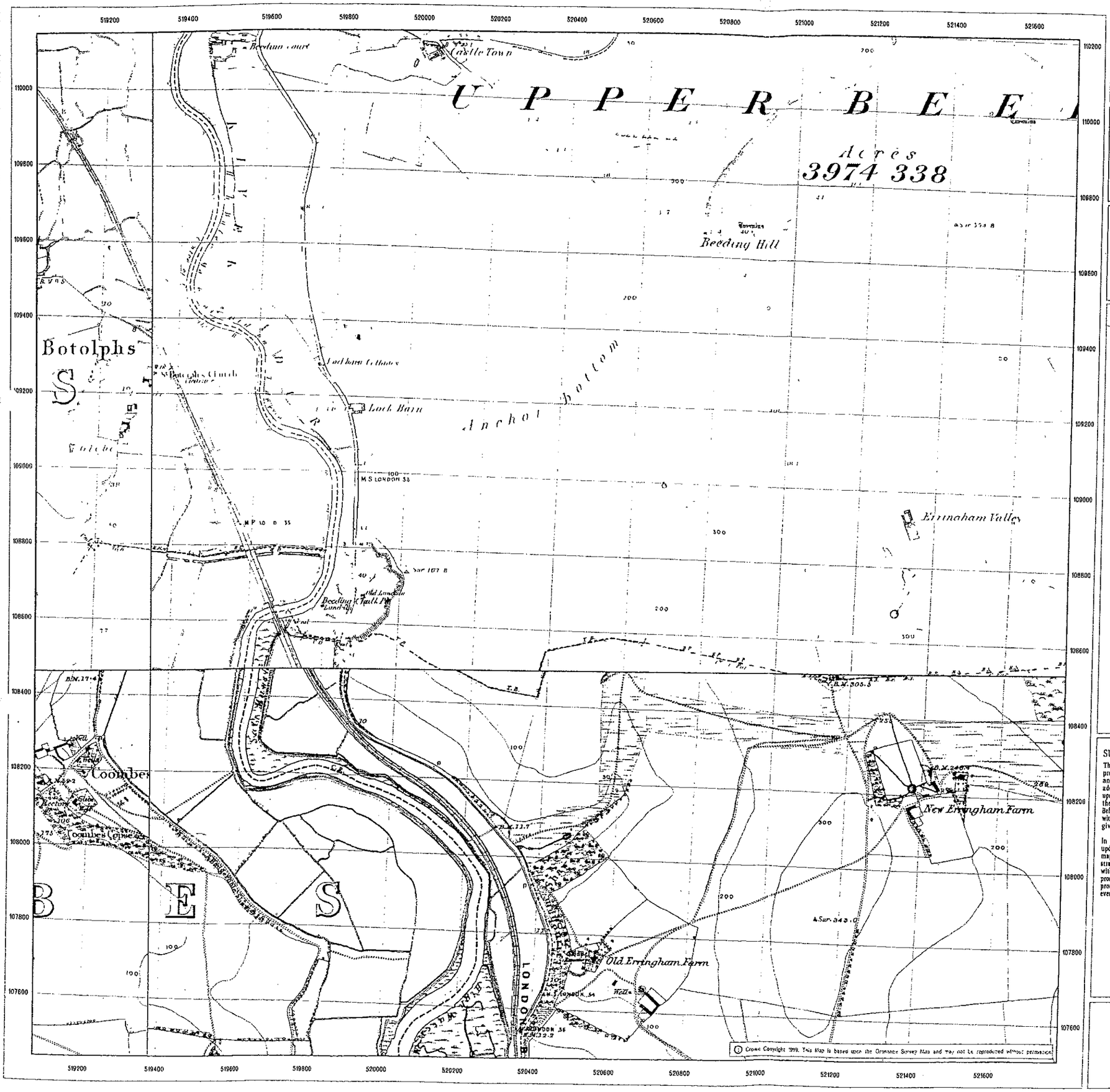
Telephone 01392 441729 Fax 01392 441709



EnviroCheck

Environmental Site Sensitivity Data

CLIENT DETAILS

Order No. QH27094-1

Customer Ref: Jaki Bell
Peter Brett Associates
Snook House 66 Tilehurst Road
READING
Berkshire RG30 2JH

SITE DETAILS

Shoreham Cement Works

SHOREHAM

Figure 3

Historical Map Legend

Quarry
Shingle
Railway over Road
Road over Railway
Railway over River
Gravel Pit
Sand Pit
Level Crossing
Other Pits
Road over River or Canal
Road over Stream
Mixed Wood
Rough Pasture
Road over Stream
Marsh
Sunken Road
Raised Road
Sketched Contour
Arrow denotes flow of water
Instrumental Contour

SUSSEX county

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given on the right therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

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1879	1879
1879	1879

Date(s) of Publication

Ordnance Survey
Value Added Reseller

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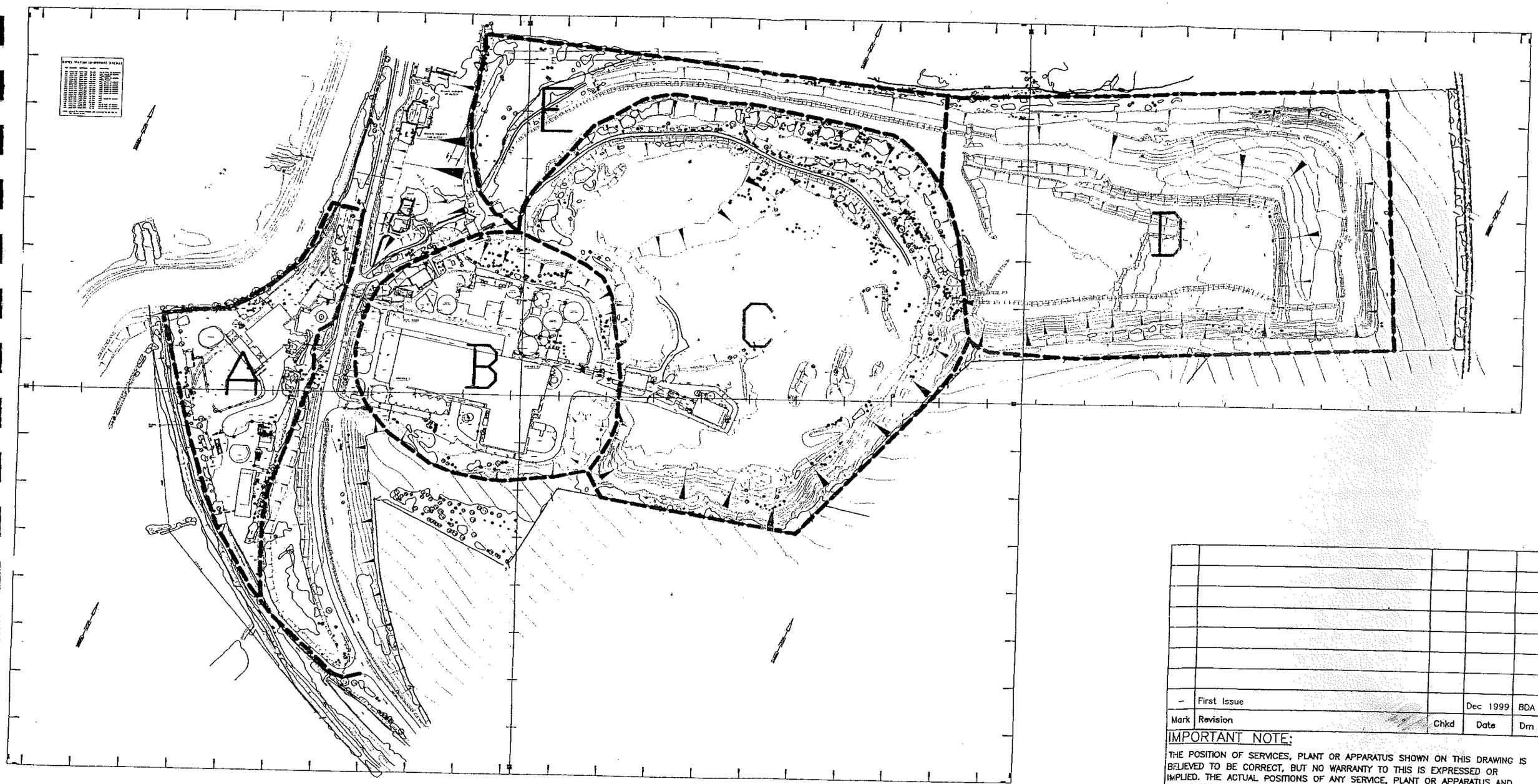
Telephone 01392 441721 Fax 01392 441709



Mark	Revision	Chkd	Date	Drn
–	First Issue		Dec 1999	BDA

IMPORTANT NOTE:

THE POSITION OF SERVICES, PLANT OR APPARATUS SHOWN ON THIS DRAWING IS BELIEVED TO BE CORRECT, BUT NO WARRANTY TO THIS IS EXPRESSED OR IMPLIED. THE ACTUAL POSITIONS OF ANY SERVICE, PLANT OR APPARATUS AND THOSE WHICH MAY BE PRESENT BUT NOT SHOWN MUST BE ESTABLISHED BY THE CONTRACTOR ON SITE.

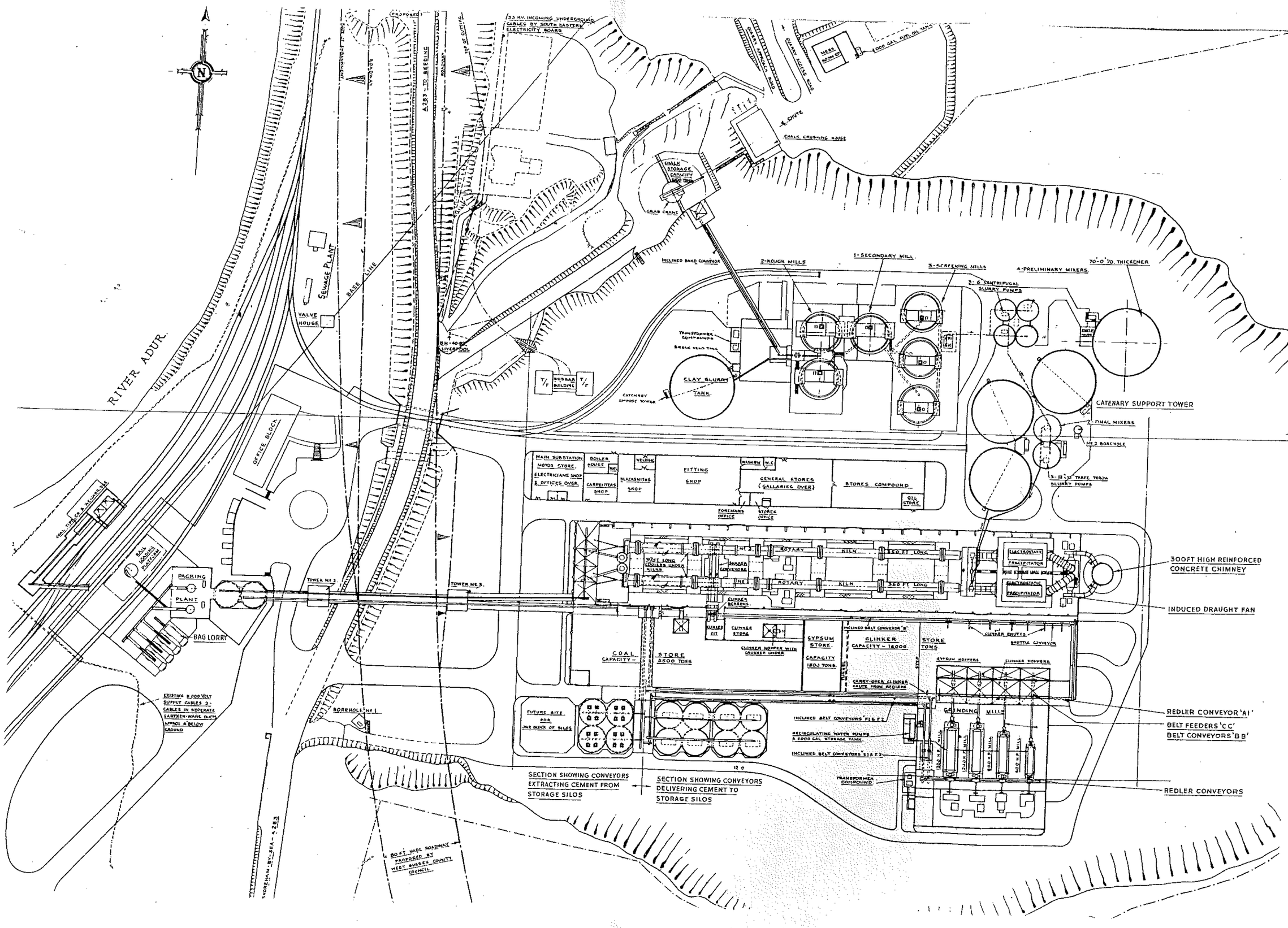
Shoreham Cement Works
10557
Site Survey

pba
peter brett associates
CONSULTING ENGINEERS

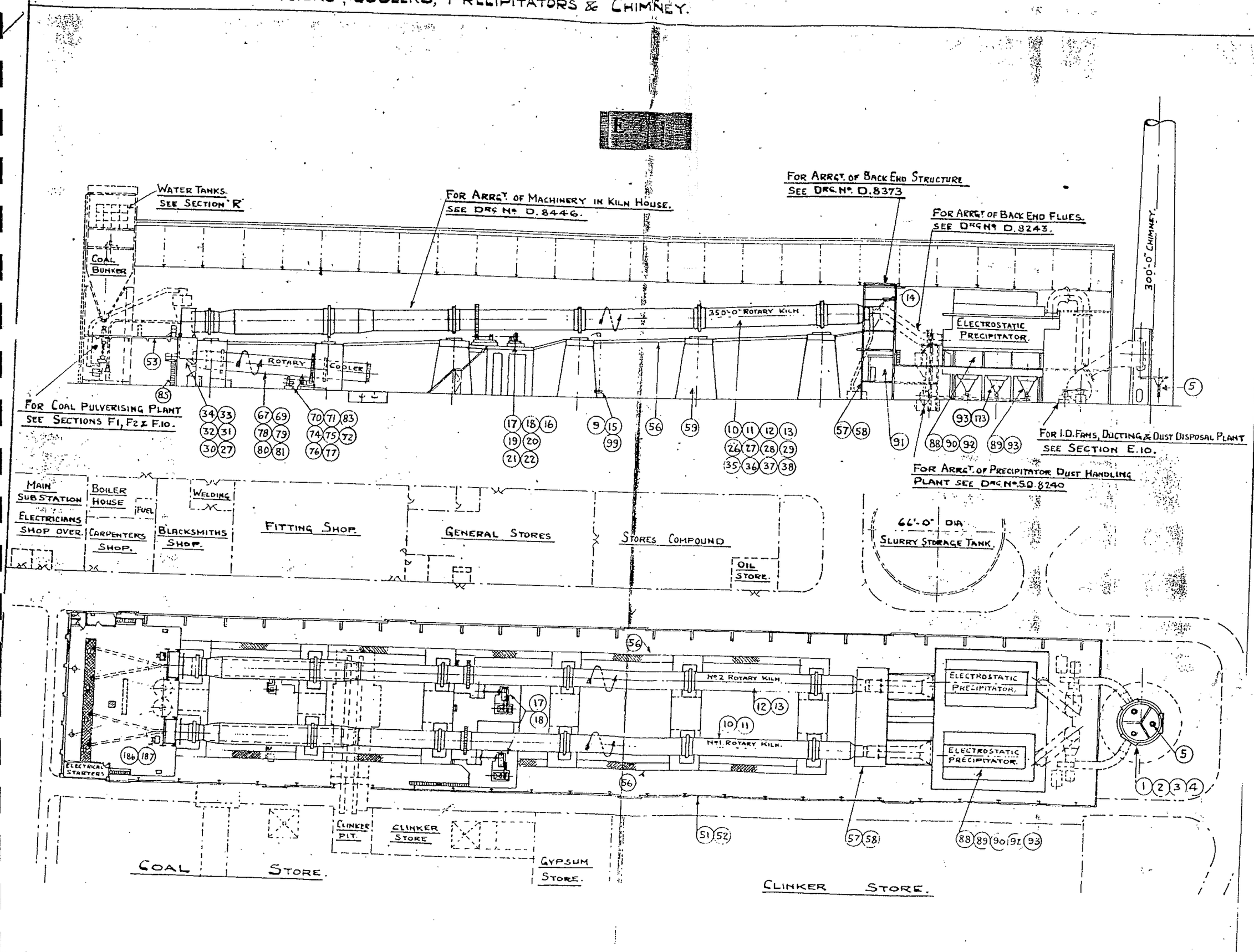
Snook House 66 Tilehurst Road Reading RG30 2JH Tel 0118 9508777 Fax 0118 9508198

Scales	1:4000
Date.	Dec 1999
Cad Ref.	J/10000/10557/acad

Drawing No.
Figure 2


RIVER ADUR
SEWAGE PLANT
VALVE HOUSE
BASE LINE
BROADWAY
PROPOSED
33 KV. INCOMING UNDERGROUND CABLES BY SOUTH EASTERN ELECTRICITY BOARD
QUARRY APPROACH ROAD
QUARRY ACCESS ROAD
MESS ROOM ETC
1000 GAL FUEL OIL TANK
4 CHUTE
CHALK CRUSHING HOUSE
CHALK STORAGE CAPACITY 1400 TONS
GRAB CRANE
INCLINED BAND CONVEYOR
2-ROUGH MILLS
1-SECONDARY MILL
3-SCREENING MILLS
4-PRELIMINARY MIXERS
70-0" DIA THICKENER
3-6" CENTRIFUGAL SLURRY PUMPS
TRANSFORMER COMPOUNDS
BREAK HEAD TANK
CLAY SLURRY TANK
CATENARY SUPPORT TOWER
T/F
BUS BAR BUILDING
T/F
CATENARY SUPPORT TOWER
2-FINAL MIXERS
NO 2 BOREHOLE
3-12"x12" THREE THROW SLURRY PUMPS
OFFICE BLOCK
COAL TIPPER & RECLAIMER
RAIL LOADING PLATFORM
PACKING PLANT
BAG LORRY
TOWER No 2
TOWER No 3
MAIN SUBSTATION
MOTOR STORE
ELECTRICIANS SHOP & OFFICES OVER
BOILER HOUSE
CARPENTERS SHOP
BLACKSMITHS SHOP
WELDING
FITTING SHOP
WASHRM
W.C
GENERAL STORES (GALLARIES OVER)
STORES COMPOUND
OIL STORE
FOREMANS OFFICE
STORES OFFICE
ROTARY KILN 360 FT LONG
ROTARY KILN 360 FT LONG
97 FT LONG COOLERS UNDER KILNS
SHAKER CONVEYORS
CLINKER SCREENS
ELECTROSTATIC PRECIPITATOR
ELECTROSTATIC PRECIPITATOR
300FT HIGH REINFORCED CONCRETE CHIMNEY
INDUCED DRAUGHT FAN
RUNNER PIT
CLINKER STONE
CLINKER HOPPER WITH CRUSHER UNDER
COAL CAPACITY –
STORE 3500 TONS
GYPSUM STORE CAPACITY 1800 TONS
INCLINED BELT CONVEYOR 'G'
CLINKER CAPACITY – 18000
STORE TONS
RUNNER CHUTES
SHUTTLE CONVEYOR
GYPSUM HOPPERS
CLINKER HOPPERS
CARRY-OVER CLINKER CHUTE FROM REGLERS
INCLINED BELT CONVEYORS F1 & F2
GRINDING MILLS
REDLER CONVEYOR 'A1'
BELT FEEDERS 'C C'
BELT CONVEYORS 'B B'
RECIRCULATING WATER PUMPS & 5000 GAL STORAGE TANK
INCLINED BELT CONVEYORS E1A E2
TRANSFORMER COMPOUND
REDLER CONVEYORS
FUTURE SITE FOR ONE BLOCK OF SILOS
EXISTING 11,000 VOLT SUPPLY CABLES 2 - CABLES IN SEPERATE EARTHEN-WARE DUCTS APPROX 4' BELOW GROUND
BOREHOLE No 1
80 FT WIDE ROADWAY PROPOSED BY WEST SUSSEX COUNTY COUNCIL
SHOREHAM - BY - SEA - A 283
SECTION SHOWING CONVEYORS EXTRACTING CEMENT FROM STORAGE SILOS
SECTION SHOWING CONVEYORS DELIVERING CEMENT TO STORAGE SILOS

SECTIONS E1 - 4 KILNS, COOLERS, PRECIPITATORS & CHIMNEY.



APPENDIX F

Horsham District Council Site Information Request

Sam Stanton

From: Lee.Money <Lee.Money@horsham.gov.uk>
Sent: 03 December 2021 17:13
To: Sam Stanton
Subject: RE: CG/39033 - Shoreham Cement Works
Attachments: Shoreham Cement WorksHDC planning history.xlsx

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Sam

Thanks for your enquiry.

Please find below answers to your enquiries. Some of the EA information may be available through DEFRA Magic map. I have attached the planning history but please note Horsham District Council is no the minerals and waste planning authority for the site.

1. General background information relating to the site, to include dates of operation;

   No detailed records held. Information on the operational history of the site can be found at the following link:

   bcd-urbex.com/shoreham-cement-works-west-sussex/#:~:text=Shoreham%20Works%20was%20established%20in,The%20site%20closed%20in%201991.&text=The%20Beeding%20Portland%20Cement%20Company,Beeding%20near%20Shoreham%20in%201883.

2. Part 2A designations within 500m of the site;

   No sites designated with Horsham District Council's area

3. Records of historical industrial uses on site (other than the cement works);

   No records held

4. Records of ground gas, groundwater and surface water monitoring data for the site;

   Records may be available through planning files but not available electronically

5. Information on groundwater / surface water abstractions on site and within 500m of the site;

   Records held by Environment Agency. No private water supplies known to this authority

6. Information on waste facilities within 250m of the site;

   Records held by Environment Agency. West Sussex County Council is the waste planning authority

7. Information on discharge consents within 250m of the site; and

   Records held by Environment Agency

8. Environmental incidents within 250m of the site;

   Records held by Environment Agency

Please note that the reply given is specific to your request and all the data is based upon information available to the officers of the local authority at the time of preparation. This authority gives no absolute guarantee as to the accuracy or validity of the data and accepts no responsibility in respect of loss or claim which may arise from its use.

Please contact me if you require any further information or advice.

Regards

Lee

Lee Money
Team Leader Environmental Protection

Telephone: 441403215410
Email: Lee.Money@horsham.gov.uk

Horsham District Council

Horsham District Council, Parkside, Chart Way, Horsham, West Sussex RH12 1RL
Telephone: 01403 215100 (calls may be recorded) www.horsham.gov.uk Chief Executive: Glen Chipp

From: Sam Stanton <SamS@cgl-uk.com>
Sent: 24 November 2021 18:01
To: Lee.Money <Lee.Money@horsham.gov.uk>
Cc: Paul Sheehan <PaulS@cgl-uk.com>
Subject: CG/39033 - Shoreham Cement Works

Dear Lee,

I have been passed you details by Allison Keech at SDNPA. CGL has been appointed as a consultant for contaminated land and remediation for the Shoreham Cement Works AAP.

Would you be able to provide copies of any records under a contaminated land search and historical development of the Shoreham Cement works site located at:

Steyning Road
Upper Beeding
BN44 3TX

It would be much appreciated if you could provide supporting information where relevant/available regarding the following:

1. General background information relating to the site, to include dates of operation;
2. Part 2A designations within 500m of the site;
3. Records of historical industrial uses on site (other than the cement works);
4. Records of ground gas, groundwater and surface water monitoring data for the site;
5. Information on groundwater / surface water abstractions on site and within 500m of the site;
6. Information on waste facilities within 250m of the site;
7. Information on discharge consents within 250m of the site; and
8. Environmental incidents within 250m of the site;

If you have any other information pertinent to the potential for contamination on or near the site, please let me know.

Kind regards,

Sam

Sam Stanton
Senior Engineer
01483 310600 07376 344068
SamS@cgl-uk.com cgl-uk.com

Providing Ground Solutions

CGL were proud winners at the Ground Engineering Awards for UK Project with a Geotechnical Value from £500k to £1M. CGL has been shortlisted eight times since 2011 for this category and won four times – a strong endorsement from our peers of CGL's design and technical excellence in the last decade.

The project demonstrated exceptional design and construction, simple in concept but complex in technical detail, which was delivered innovatively, collaboratively with technical excellence at rocket pace during the Lockdown #3 period to virtually save the project for our client.

Disclaimer

Reference no.	Description
Ref. No: UB/55/01	Retention of kennels mobile home for staff facilities and caravan Site: Gdas Kennels The Old Cement Works Shoreham Road Upper Beeding
	| Status: Application Refused
Ref. No: UB/10/02	Renewal of planning permission ub/52/98 allowing continued temporary use of buildings and concreted areas for storage for 2 years Site: Shoreham Cement Works Shoreham Road Upper Beeding
	| Status: Application Permitted
Ref. No: UB/43/02	Redevelopment comprising houses office industrial storage/distribution hotel & other uses landscaping open space & highways (outline) Site: Shoreham Cement Works Shoreham Road Upper Beeding
	| Status: Application Refused
Ref. No: UB/50/91	Modification of condition 2 on approval ub/59/87 for deposit of waste soils, sub-soils & aggregates residue - section 73 Site: Shoreham Cement Works Shoreham Rd Upper Beeding
	| Status: Application Permitted
Ref. No: UB/5/92	Application for registration of old mining permission Site: Shoreham Cement Works (Blue Circle) Shoreham Rd Upper Beeding
	Status: Application Permitted
Ref. No: UB/53/97	Determination of conditions on a mineral site (county consultation) Site: Shoreham Cement Works Chalkpit Steyning Road Upper Beeding
	| Status: Application Permitted
Ref. No: UB/14/98	Winter sports centre & academy with indoor ski slope ice rinks leisure facilities accommodation science/business park & new access (outline) Site: Shoreham Cement Works Shoreham Road Upper Beeding
	| Status: Application Withdrawn
Ref. No: UB/52/98	Temporary use of buildings and concreted areas for storage for 2 years Site: Shoreham Cement Works Shoreham Road Upper Beeding
	| Status: Application Permitted
Ref. No: UB/3/99	New vehicular access to serve proposed redevelopment of cement works Site: Shoreham Cement Works Shoreham Road Upper Beeding
	| Status: Application Withdrawn
Ref. No: UB/63/99	Temporary use of buildings & concreted areas for storage for 2 years Site: Shoreham Cement Works Shoreham Road Upper Beeding
	| Status: Application Withdrawn
Ref. No: UB/6/99	Redevelopment for business and leisure use including demolition of existing structures and landscape improvement works (outline) Site: Shoreham Cement Works Shoreham Road Upper Beeding
	| Status: Application Withdrawn
Ref. No: DC/04/0594	Importation, storage and treatment of inert material to produce recycled/secondary aggregates for a period of 5 years
	| Status: Application Permitted
Ref. No: DC/05/0205	Temporary use of land for storage of roll-on-off containers and commercial waste bins
	| Status: Application Permitted
Ref. No: DC/05/0886	Stationing a caravan for a night watchman under condition 9 of planning permission DC/04/0594 (County Matter)
	| Status: Application Permitted
Ref. No: DC/09/2031	Importation, storage and treatment of inert material to produce recycled/secondary aggregates for period of 5 years (County Consultation)
	| Status: No Objection to Consultation
Ref. No: DC/09/2031	Continued use of buildings and concreted areas for storage (renewal of planning permission UB/10/02)
	| Status: Application Permitted
Ref. No: DC/11/2466	Permission to vary condition 1 of previous permission DC/09/2031 (Continued use of buildings and concreted areas for storage) to extend time period for use of buildings and concreted areas for storage until 31 January 2015 (South Downs National Park) NOTE: CALLED IN BY SDNP AUTHORITY FOR DETERMINATION
	| Status: Application Permitted
Ref. No: UB/43/02	Redevelopment comprising houses office industrial storage/distribution hotel & other uses landscaping open space & highways (outline) Site: Shoreham Cement Works Shoreham Road Upper Beeding
	| Status: Application Refused
Ref. No: UB/14/98	Winter sports centre & academy with indoor ski slope ice rinks leisure facilities accommodation science/business park & new access (outline) Site: Shoreham Cement Works Shoreham Road Upper Beeding
	| Status: Application Withdrawn
Ref. No: UB/6/99	Redevelopment for business and leisure use including demolition of existing structures and landscape improvement works (outline) Site: Shoreham Cement Works Shoreham Road Upper Beeding
	| Status: Application Withdrawn
Ref. No: DC/09/2019	Importation, storage and treatment of inert material to produce recycled/secondary aggregates for period of 5 years (County Consultation)
	Ref. No: DC/09/2019 | Status: No Objection to Consultation

APPENDIX G

West Sussex County Council Site Information Request

Sam Stanton

From: Rupy Sandhu <rupy.sandhu@westsussex.gov.uk>
Sent: 26 January 2022 09:45
To: Paul Sheehan
Cc: Sam Stanton
Subject: RE: Shoreham cement works

Dear Paul/Sam,

My colleague from our waste management team came back to me and provided the following;

The license issued for the historic landfill site (1960-1993) would have been issued by WSCC (planning) and would also have had planning from the district council (Horsham). We won't have any records from our department. Regardless, the license will have been surrendered, so the legislation that applies to the site is via the Contaminated Land regime (EPA part 2) which is via the district council. Lee Money at Horsham DC is usually really helpful so should be able to advise.

Kind regards,
Rupy

Rupy Sandhu
Principal Planner - Planning Policy and Infrastructure, Planning Services
West Sussex County Council, Ground Floor, Northleigh, County Hall, Chichester, PO19 1RH
Phone: 0330 2226454
E-mail: rupy.sandhu@westsussex.gov.uk | Web: www.westsussex.gov.uk

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From: Rupy Sandhu
Sent: 25 January 2022 17:07
To: Paul Sheehan <PaulS@cgl-uk.com>
Cc: Sam Stanton <SamS@cgl-uk.com>
Subject: RE: Shoreham cement works

Dear Sam and Paul,

Happy new year to you both and apologies for not coming back to you on this sooner.

I don't know any detail about activities at the cement works. Any landfill permit would be through the Environment Agency, therefore they are likely to be best placed to provide some information. In the time I've worked at WSCC, all planning matters have been in the SDNPs control for that site. I have contacted a colleague in our waste management team, who may be able to shed some light on historic activities. I will come back to you when I hear back.

Kind regards,
Rupy

Rupy Sandhu
Principal Planner - Planning Policy and Infrastructure, Planning Services
West Sussex County Council, Ground Floor, Northleigh, County Hall, Chichester, PO19 1RH
Phone: 0330 2226454
E-mail: rupy.sandhu@westsussex.gov.uk | Web: www.westsussex.gov.uk

From: Paul Sheehan <PaulS@cgl-uk.com>
Sent: 25 January 2022 15:09
To: Rupy Sandhu <rupy.sandhu@westsussex.gov.uk>
Cc: Sam Stanton <SamS@cgl-uk.com>
Subject: RE: Shoreham cement works

Dear Rupy – hope 2022 is treating you well so far? – Apologies if I have missed it but have you been able to look at the information request sent by Sam Stanton on the 8 December?

With kind regards
Paul

Paul Sheehan
Technical Director
01483 310600 07908895673
PaulS@cgl-uk.com cgl-uk.com

CGL were proud winners at the Ground Engineering Awards for UK Project with a Geotechnical Value from £500k to £1M. CGL has been shortlisted eight times since 2011 for this category and won four times – a strong endorsement from our peers of CGL's design and technical excellence in the last decade.

The project demonstrated exceptional design and construction, simple in concept but complex in technical detail, which was delivered innovatively, collaboratively with technical excellence at rocket pace during the Lockdown #3 period to virtually save the project for our client.

From: Sam Stanton <SamS@cgl-uk.com>
Sent: 08 December 2021 17:10
To: 'Rupy Sandhu' <rupy.sandhu@westsussex.gov.uk>
Cc: Allison Keech <Allison.Keech@southdowns.gov.uk>; Lucy Howard <Lucy.Howard@southdowns.gov.uk>; Paul Sheehan <PaulS@cgl-uk.com>
Subject: RE: Shoreham cement works

Good afternoon Rupy,

As per the below emails, would you be able to confirm the status of the Landfill permit at the former Shoreham Cement Works? The site address is:

Steyning Road
Upper Beeding
BN44 3TX

Kind regards,

Sam

Sam Stanton
Senior Engineer

APPENDIX H

CGL Risk Assessment Methodology

CGL Risk Assessment Methodology

The following risk Assessment methodology is based on CIRIA C552 (2001) Contaminated Land Risk Assessment – A Guide to Good Practice[1], in order to quantify potential risk via risk estimation and risk evaluation, which can be adopted at the Phase I stage. This will then determine an overall risk category which can be used to identify likely actions. This methodology uses qualitative descriptors and therefore is a qualitative approach and is undertaken for each potential pollution linkage (source-pathway-receptor) identified for the site in accordance with Land Condition Risk Management[3].

The methodology requires the classification of:

- The magnitude of the consequence (severity) of a risk occurring, and
- The magnitude of the probability (likelihood) of a risk occurring.

The potential consequences of contamination risks occurring at this site are classified in accordance with Table 1 below, which is adapted from the CIRIA guidance[1].

Table 1. Classifications of Consequence ratings

Classification	*Definition of Consequence*	*Examples*
Severe	Short-term (acute) risks to human health.	High concentration of cyanide on the surface of an informal recreation area
	Short-term (acute) risk of pollution of sensitive water resource or ecosystem.	Major spillage of contaminants from site into controlled waters
	Catastrophic damage to crops/buildings/property/infrastructure, including off-site soils.	Explosion causing building collapse
Medium	Long-term (chronic) risks to human health	Concentrations of a contaminant from site exceeding the generic or site specific assessment criteria
	Long-term (chronic) pollution of sensitive water resource	Leaching of contaminants from a site into a major or minor aquifer
	Significant change in an ecosystem/contamination of off-site soils	Death of a species within a designated nature reserve
Mild	Pollution of non-sensitive water resource	Pollution of a non-classified groundwater
	Significant damage to crops/ buildings/property/infrastructure	Damage to a building rendering it unsafe to occupy (e.g. foundation damage resulting in instability)
	Damage to an ecosystem or sensitive buildings/structures/services	
Minor	Easily preventable non-permanent health effects	Presence of contamination at concentrations which require the use of personal protective equipment during site work
	Harm, although not necessarily significant harm, which may result in financial loss or expenditure to resolve	Loss of plants in a landscaping scheme/discolouration of concrete
	Easily repairable effects of damage to buildings/structures/services	

[1] CIRIA, (2001). *Contaminated Land Risk Assessment. A Guide to Good Practice*. CIRIA C552.

[2] M.J. Carter Associates, (1995*). Prioritisation and Categorisation Procedure for Sites Which May Be Contaminated*. Contaminated Land Report 6. Department of the Environment. C

[3] Land Condition Risk Management - https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm

The potential probability of the risks being realised are classified in accordance with the ratings set out in Table 2 which are adapted from the CIRIA guidance[1]. It should be noted that where a pollutant linkage has not been identified the likelihood is considered to be zero.

Table 2. Classifications of probability ratings

Classification	*Definition*
High likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable in the long term, or there is evidence at the receptor that an event has occurred
Likely	There is a pollution linkage and all the elements are present and in the right place which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term
Low likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such an event would take place and is less likely in the short term.
Unlikely	There is a pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long term

In accordance with C552 the risk classification for each pollution linkage are classified in accordance with the matrix for consequence and probability set out in Table 3. The definitions for the risk classifications are presented in Table 4.

Table 3. Risk classification matrix

		Consequence			
		Severe	***Medium***	***Mild***	***Minor***
Probability	**High likelihood**	Very High	High	Moderate	Moderate / Low
	Likely	High	Moderate	Moderate / Low	Low
	Low likelihood	Moderate	Moderate / Low	Low	Very Low
	Unlikely	Moderate / Low	Low	Very Low	Very Low

Table 4. Risk classification definitions

Classification	*Definition*
Very High	There is a high probability that severe harm could arise to a designated receptor from the identified hazard or there is evidence that severe harm is currently happening. This risk, if realised, is likely to result in substantial liability. Urgent investigation (if not already undertaken) and remediation are likely to be required.
High	Harm is likely to arise to a designated receptor from the identified hazard. Realisation of the risk is likely to result in substantial liability. Urgent investigation (if not already undertaken) and remediation are likely to be required.
Moderate	It is possible that harm could arise to a designated receptor from the identified hazard. However, it is either relatively unlikely that such harm would be severe or if any harm were to occur it is more likely that the harm would be relatively mild. Urgent investigation (if not already undertaken) is normally required to clarify the potential risk and to determine the potential liability. Some remedial works may be required in the longer term.
Low	It is possible that harm could arise to a designated receptor from the identified hazard, but it is considered likely that this harm, if realised, would at worse normally be mild.
Very Low	There is a low possibility that harm could arise to a designated receptor from the identified hazard. In the event of such harm being realised it is not likely to be severe.