

Report No: 9391/2
Date: May 2007

**REMEDIAL STRATEGY
for land at
KINGS ROAD, WOMBWELL**

**Prepared for
SHELDAL DEVELOPMENTS LIMITED**

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9391/2	Site Features
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Appendix B - Encia Protocol for Importation & Use of Soil Cover

**REMEDIAL STRATEGY
for land at
KINGS ROAD, WOMBWELL**

1 INTRODUCTION**1.1 The Commission and Brief**

- 1.1.1 Encia Consulting Limited (Encia), have been commissioned by Sheldale Developments Limited to prepare a Remedial Strategy for land off Kings Road, Wombwell.
- 1.1.2 Encia Consulting have already issued the following reports:
- Geoenvironmental Appraisal of land at Kings Road, Wombwell. Report No. 9391/1, dated May 2007.
- 1.1.3 This document outlines the remediation objectives necessary to protect environmental receptors, and render the site suitable for the proposed development. A Method Statement should be prepared, in order to detail how the objectives will be achieved.
- 1.1.4 The Method Statement should be accompanied by a Designer's Risk Assessment in accordance with the CDM Regulations, 2007. The Method Statement and Risk Assessment should be submitted to, and approved by, the Engineer.

1.2 The Proposed Development

- 1.2.1 It is understood that consideration is being given to redevelopment of the site with two and three storey domestic dwellings, associated gardens, POS and adoptable roads and sewers. No definitive site layout has been provided at this stage.
- 1.2.2 The houses will be founded on shallow strips. Where foundations cross the cellar and air raid shelters, trench fill or raft foundations are proposed.
- 1.2.3 Access to the development will be from Kings Road in the north east of the site.

2 BACKGROUND**2.1 Site Description**

- 2.1.1 Site details are summarised below.

Detail	Remarks
Location	7 km south east of Barnsley town centre
NGR	SE 400 027
Area	0.8ha (2 acres)
Known services	Underground gas, all other services have been disconnected.

- 2.1.2 A location plan and current salient features are shown on Drawing Nos 9391/1 and 9392/2 in Appendix A.

2.2 Ground Investigation

- 2.2.1 Fieldwork was supervised by Encia on 27th March 2007 and comprised the excavation of 13 trial pits.

Made Ground

- 2.2.2 Made ground was encountered across the whole site, to an average depth of 0.15m; (maximum 0.6m).
- 2.2.3 Buried air raid shelters are present within the centre of the site. These are formed from concrete and brick tunnels, approximately 2.3m deep by 1.5m wide, which 'zig zag', through the centre of the site. The shelters are accessed by manhole covers. The shelters have been exposed and surveyed; the extents of the air raid shelters are shown on Drawing 9391/6 in Appendix A.
- 2.2.4 A cellar, backfilled with rubble is located in the north east of the site. The extents of the cellar could not be determined due to a live unmarked gas main.

Natural Ground

- 2.2.5 Natural ground was encountered in the majority of the exploratory holes, and typically comprised medium dense sandy fine to coarse gravel of sandstone (weathered coal measures). The weathered sandstone is underlain by moderately strong sandstone bedrock (coal measures) at depths between 1.55m and 2.1m bgl.
- 2.2.6 Within TP105 stiff sandy clay to 1.7m was encountered. This was underlain by mudstone bedrock.

Contamination

- 2.2.7 No inorganic contamination has been encountered in the made ground.
- 2.2.8 Where residual made ground remains beneath garden and landscaped areas it is recommended that a 300mm thick surface cover of "clean" soil comprising 200mm subsoil and 100mm topsoil be placed over the made ground (i.e. not beneath hardstanding). This cover is required as the made ground contains unsuitable materials (eg bricks and concrete). This thickness is in accordance with NHBC Standards, Chapter 9.2.
- 2.2.9 Two stockpiles (A & B) of crushed rubble (6F2) are located in the site. 4 samples from each stockpile were screened for asbestos fibres. One sample from Stockpile A (S4) revealed white asbestos fibres, the other 7 samples were free from asbestos.
- 2.2.10 It is recommended that this material is kept wet when moved and placed as fill below hardstanding where it will be isolated from end users
- 2.2.11 Assessment of the site investigation data enabled formulation of a conceptual model, which is presented as Drawing No 9391/5 in Appendix A.

3 REMEDIAL STRATEGY (GENERAL)

3.1 Aims

3.1.1 Remediation aims are:

- Resolve contamination issues in order to protect environmental receptors, and render the site suitable for the proposed development.
- Provide a stable development platform (to agreed levels and gradients) for subsequent construction of the proposed development and associated infrastructure.
- Satisfy requirements of the Local Planning Authority and the National House Building Council (NHBC).

3.2 Overview

3.2.1 The following remedial works are required:

- Excavation and grubbing up of air raid shelters and cellar.
- Backfill of all resultant excavations, with appropriate compaction.
- Preparation of road footprints - excavation of made ground and controlled re-engineering of selected materials in layers to approximately 650mm below final road levels.
- Provision of a minimum 300mm thick cover layer of 'clean' soils in all garden and landscaped areas.

3.3 Site Set-up, Organisation and Safety

- 3.3.1 Site works shall be supervised throughout by a suitably qualified Engineer, who will report to a Project Manager. Supervision may be part-time for certain activities, but must be full-time during the removal of any grossly contaminated soil\fill and any placement of fill to an engineering specification.
- 3.3.2 Site cabins and welfare facilities are to be established at a location to be agreed with the Engineer. All welfare facilities must be established in accordance with the relevant health & safety statutory requirements.
- 3.3.3 All site personnel shall undergo a site-specific health and safety induction prior to commencement of work on site.
- 3.3.4 The Engineer shall be informed prior to any proposed entry of a confined space or deep excavation. Entry must be restricted to suitably qualified and equipped personnel.
- 3.3.5 Works will be carried out with proper regard to current statutory requirements. Reference could be made to Encia Group's Safety Management Systems, Procedure SP2 (Legal Requirements).
- 3.3.6 Access into excavations etc. must be controlled. The atmosphere in shored trenches in excess of 1.2m should be monitored for oxygen and hazardous gas (methane & carbon dioxide), prior to personnel entering such excavations. Monitoring should continue whilst personnel are working in deep excavations.
- 3.3.7 All visitors to site must enter and register at the main Site Office.

3.4 Contractor's Responsibilities

3.4.1 Prior to the commencement of any works the Contractor, in agreement with the Engineer, shall:

- Any requirements of Client's contract documentation.
- Establish the boundaries of the site and the working areas.
- Undertake a dilapidation survey of site boundaries, adjacent properties and highways, via dated photographs or video footage.
- Liaise with the Local Authority regarding working hours, noise\dust\odour control, and protected trees.
- Complete a full services search and liaise with all relevant utility companies regarding work in close proximity to their apparatus.
- Prepare a detailed Method Statement outlining how the objectives of this Remedial Strategy will be achieved (and obtain approvals).
- Inform the Engineer of any risk, identified and assessed, which could impact upon the Engineer's activities.
- Prepare the necessary COSHH statements and Health & Safety Plan in accordance with CDM regulations.

3.4.2 The Contractor shall satisfy the Health & Safety Executive with regard to all matters concerning the health, safety and welfare of persons on the site.

3.4.3 The Contractor shall ensure that:

- Personnel, plant, materials and other equipment related to the contract are confined within the boundaries of the site.
- Any live services lying within the site boundary are marked and protected, or appropriate arrangements made to truncate them.
- Good practices relating to personal hygiene are adopted.
- Suitable precautions are implemented at all times to prevent off-site migration of pollutants via airborne dust and vapours.
- Suitable precautions are taken to prevent the spread of mud and debris on public highways.
- Refuelling of mobile plant is undertaken in a designated area. Above ground oil storage tanks shall comply with the requirements of Pollution Prevention Guideline PPG2. A spill kit shall be kept on site, adjacent to the designated refuelling area.

3.4.4 The Contractor must have reviewed and acknowledged the Encia Group Ltd 'Standard Rules for Sub-Contractors on Safety, Health & Environment' GOP 2; a copy of which can be obtained from Encia Group's Health & Safety Manager.

3.5 Engineering Supervision and Verification

3.5.1 The Engineer will ensure that the requirements of this Remedial Strategy are complied with in a safe and orderly manner.

3.5.2 The responsibilities of the Engineer shall include, but not be limited to, the following:

- Ensuring that all site personnel are suitably qualified and given an appropriate induction at the beginning of their first day.
- Supervision of the remedial and ground preparatory works.
- Advice on the correct handling of materials and conditions encountered.
- Guidance on the appropriate protective clothing and safety equipment that is to be made available and used.
- Ensuring that personal hygiene arrangements are adequate.

- Retrieval of soil and water samples and the subsequent scheduling of appropriate laboratory analysis to enable verification of various aspects of the works, and to advise the Project Manager of progress.
 - Liaison with statutory authorities as required.
- 3.5.3 The Engineer will maintain records of the works to include the following:
- Daily record sheets to include a summary of the day's activities.
 - Date and weather conditions.
 - Plant, personnel and visitors present.
 - Aspects relating to Health and Safety, Environmental Control, or non-compliance with either this Remedial Strategy or the Contractor's Method Statement.
 - Site surveys as necessary to record the locations of excavation and filling activity.
 - Test results.
- 3.5.4 On satisfactory completion of all the works the Engineer will prepare a Verification Report. Copies of the Verification Report will be issued to the Sheldale Developments, the Local Authority and NHBC.
- 3.5.5 The Verification Report will stand as certification that the remedial and ground preparatory works have been carried out in accordance with this Remedial Strategy.
- 3.5.6 The Verification Report will include:
- A summary of the preparatory & remedial works undertaken, including any works associated with unforeseen ground conditions
 - Verification test results associated with proposed source materials for clean cover
 - Moisture content and plate bearing test results associated with ground improvement beneath proposed highways and dwellings
 - Copies of any correspondence with Regulators relating to specific aspects of the remedial works
- 3.5.7 For reasons of practicality, detailed daily records prepared by the Engineer during the works are not appended to the Verification Report, but these can be inspected, by arrangement, at Encia's offices.
- 3.5.8 The Verification Report also provide recommendations with respect to:
- Foundation Solution(s)
 - Placement of Soil Cover
- 3.5.9 The above recommendations will take account of the actual remedial works undertaken, and may differ significantly from recommendations originally presented in the site investigation report.

4 REMEDIAL STRATEGY (SPECIFIC OBJECTIVES)

4.1 Removal of Below Ground Obstructions

- 4.1.1 All foundations associated with existing buildings and other relict structures including air raid shelters and the backfilled cellar will be chased out and grubbed-up, in order to remove potential obstructions to new foundations and infrastructure.
- 4.1.2 Deep excavations for the removal of structures etc will be unstable in the short term and continuous side support will be necessary.
- 4.1.3 Suitable materials derived from grubbing-up shall be stored in a location on site, to be agreed with the Engineer. Any unsuitable materials shall be removed to a suitably licensed landfill site (see Section 4.6).

4.2 Backfill of Excavations

- 4.2.1 Excavations (to remove the cellar and air raid shelters) should be backfilled with suitable materials as agreed with the Engineer, and subjected to appropriate compaction. However, where an excavation conflicts with the footprint of a proposed highway, compaction in accordance with the Specification for Highway Works Table 6/1 will be required (see section 4.5).
- 4.2.2 As a further precaution against differential settlement, it is recommended that a suitable layer of biaxial geogrid be placed in granular engineered fill materials.
- 4.2.3 The stockpiled crushed demolition rubble present on site is suitable for re-use as backfill beneath highways. The demolition crush from stockpile A contains asbestos fibres, it is recommended that this material is kept damp when moved on site.

4.3 Earthworks Levels \Regrade

- 4.3.1 Final site levels will be agreed with Sheldale Developments, via an External Works Drawing, which should show:
 - proposed finished floor levels
 - proposed finished road levels
 - garden & driveway levels and gradients

4.4 Engineering of Fill Materials

- 4.4.1 The following foundation options have been provided in Encia's geoenvironmental appraisal report (ref 9391/1):
 - Strip/trench foundations could be utilised; over-deepened through obstructions (e.g. the cellar or air raid shelters) where necessary.
 - The cellar and air raid shelter base and walls could be removed and the excavation filled with engineered material to allow for raft foundations.
- 4.4.2 Foundation solutions would be finalised when the approved planning layout is overlain on the site survey showing the air raid shelters and obstructions. However at this stage it is considered likely that most plots will be provided with strip/trench fill foundations, over-deepened where they are affected by underground obstructions.
- 4.4.3 The following recommendations relating to engineered fill apply only to plots which may require rafted foundations.

- 4.4.4 Deep excavations to remove the cellar and air raid shelters could result in “hollows” in the natural ground surface. The natural ground around these “hollows” should be overdug in order to ensure that the thickness of fill below each proposed plot does not vary by more than 15%. Where this requires benching of the natural ground, each bench should have a maximum vertical height not exceeding 500mm.
- 4.4.5 Clearly, such works will be undertaken in accordance with the finalised layout, and it is essential that Encia are provided with the most recent (and proposed final) scheme. Any subsequent revisions to the plot layout could result in rafts straddling a ‘high wall’, and Encia should be consulted if any layout revisions are proposed.
- 4.4.6 Where it is not possible to provide an even thickness of fill beneath proposed plots, raft foundations are unlikely to be acceptable, and consideration should be given to an alternative foundation solution.
- 4.4.7 A backfilled cellar is located in the north east of the site. The existing loose rubble backfill is to be replaced with engineered fill. Basement excavations will need to be enlarged to ensure that engineered fill, of even thickness, underlies and extends at least 3.0m beyond house footprints.
- 4.4.8 Prior to placement of engineered fill, the excavation base shall be inspected by the Engineer, and then surveyed.
- 4.4.9 The site surface shall be initially left 300mm below proposed finished garden levels to allow for placement of the cover. In areas of highways the ground surface will be left approximately 650mm below finished road level to ensure CBR values exceed 5%.

4.5 Highways

- 4.5.1 In the footprint of proposed highways, the contractor, under supervision, must ensure that relict obstructions are removed to a minimum of 1.0m below finished road level. In addition, any “cellar fill”, or other unsuitable material, must be removed to its full depth. Any cellar floors/air raid shelters should be punched through to limit the risk of perched groundwater and confirm that loose ground does not exist below the slab. The resultant sub-formation should then be proof rolled, in accordance with the Specification for Highway Works.
- 4.5.2 If any deep excavation beneath a highway, results in sub-formation slopes greater than 1:5 (v:h) , the sub-formation should be stepped (max. 0.5m high) and benched (min. 1m wide). Where excavation works exceed 1m, the footprint of SHW earthworks should be extended beyond the highway footprint a minimum of 1m, plus the depth of excavation. The supervising engineer will keep records of any such work undertaken.
- 4.5.3 The following options are considered suitable for treating the made ground below highways.
- Excavation of the full thickness of made ground and replacement with suitable aggregate in accordance with Series 600 (Earthworks) of The Highways Agency (HA) “Specification for Highway Works” 1998.
 - Excavation of the full thickness of made ground, screening, selection and replacement of **suitable** made ground materials in engineered layers to approximately 650mm below final road levels in accordance with Series 600. Unsuitable materials include any soft or wet materials, biodegradables including topsoil, wood, peat or lignite, scrap metal, frozen material and material which, by virtue of its particle size or shape, cannot be properly and effectively compacted (e.g. oversize material or gravels which are tabular).

- 4.5.4 To prevent damage to the engineered fill, a granular running layer using crushed material (125mm down), shall be placed at formation beneath highways and haulage routes as directed by the Engineer. This running layer shall have a minimum CBR of 2% and extend 1.0m beyond proposed curb lines. This granular running layer shall not constitute a capping layer in terms of highway construction.
- 4.5.5 The Contractor should agree acceptable performance criteria, and an appropriate Specification for any necessary ground improvement, with the Client and the adopting authority.
- 4.5.6 The Contractor will arrange for the necessary compliance testing to be undertaken at formation level on road alignments, as required by the adopting authority and Engineer.

4.6 Export to Landfill

- 4.6.1 Any material exported from site to landfill should be hauled by a registered waste carrier in accordance with the requirements of the Duty of Care Regulations, 1991 and the Landfill (England & Wales) Regulations 2002.
- 4.6.2 A transfer note should be completed, signed and retained by the parties involved. The transfer note should include the volume of waste, the nature of the material and a statement of its chemical composition, details of the source and destination sites, and details of the haulier.
- 4.6.3 In order to provide the landfill facility with information regarding chemical composition of the waste, analysis of any material that requires removal from site will be undertaken.
- 4.6.4 A minimum of 6 samples per material/waste type will be scheduled for: pH, total metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc), PAH, BTEX and TPH.

4.7 Contingency for Unknowns

- 4.7.1 Even after an appropriate preliminary investigation and ground investigation, with exploratory holes on a closely spaced grid (say trial pits at 30m centres), a geoenvironmental appraisal is typically based on inspection of the ground underlying less than 0.5% of the total site area (and much less at depths in excess of about 3.5m). Consequently, there is always a possibility that unanticipated ground conditions will be encountered during the remedial works.
- 4.7.2 If unanticipated ground is encountered during the remedial works, the Contractor should immediately seek further advice from the Engineer.

4.8 Boundary Issues

- 4.8.1 The Client's Designer should ensure that proposed levels tie in with the surrounding infrastructure, and ground levels of adjacent properties (after allowance for the placement of any required soil cover).
- 4.8.2 on road alignments, as required by the adopting authority and Engineer.

4.9 Surveying

4.9.1 The Contractor shall arrange for the following survey work as directed by the Engineer:

- Establishment of profile boards
- Setting-out of estate roads
- Depth and extent of localised areas of overdig (such as those required to remove air raid shelters)
- The ground surface prior to placement of fill to raise site levels/provide clean cover in garden/landscaped areas
- The finished surface

4.9.2 The Contractor should supply the results of this survey work (disc & hard copy) to the Engineer for inclusion in Encia's Verification Report.

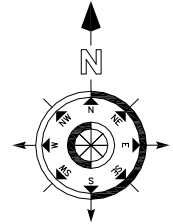
4.10 Placement of Soil Cover

4.10.1 Clean inert fill will be placed over the made ground in proposed garden and landscaped areas (but not beneath hardstanding). This cover layer is to comprise 200mm of "clean" subsoil plus 100mm of topsoil.

4.10.2 It is considered unlikely that a significant volume of subsoil suitable for use as cover material will be sourced on site. Consequently, there will be a need for soil import.

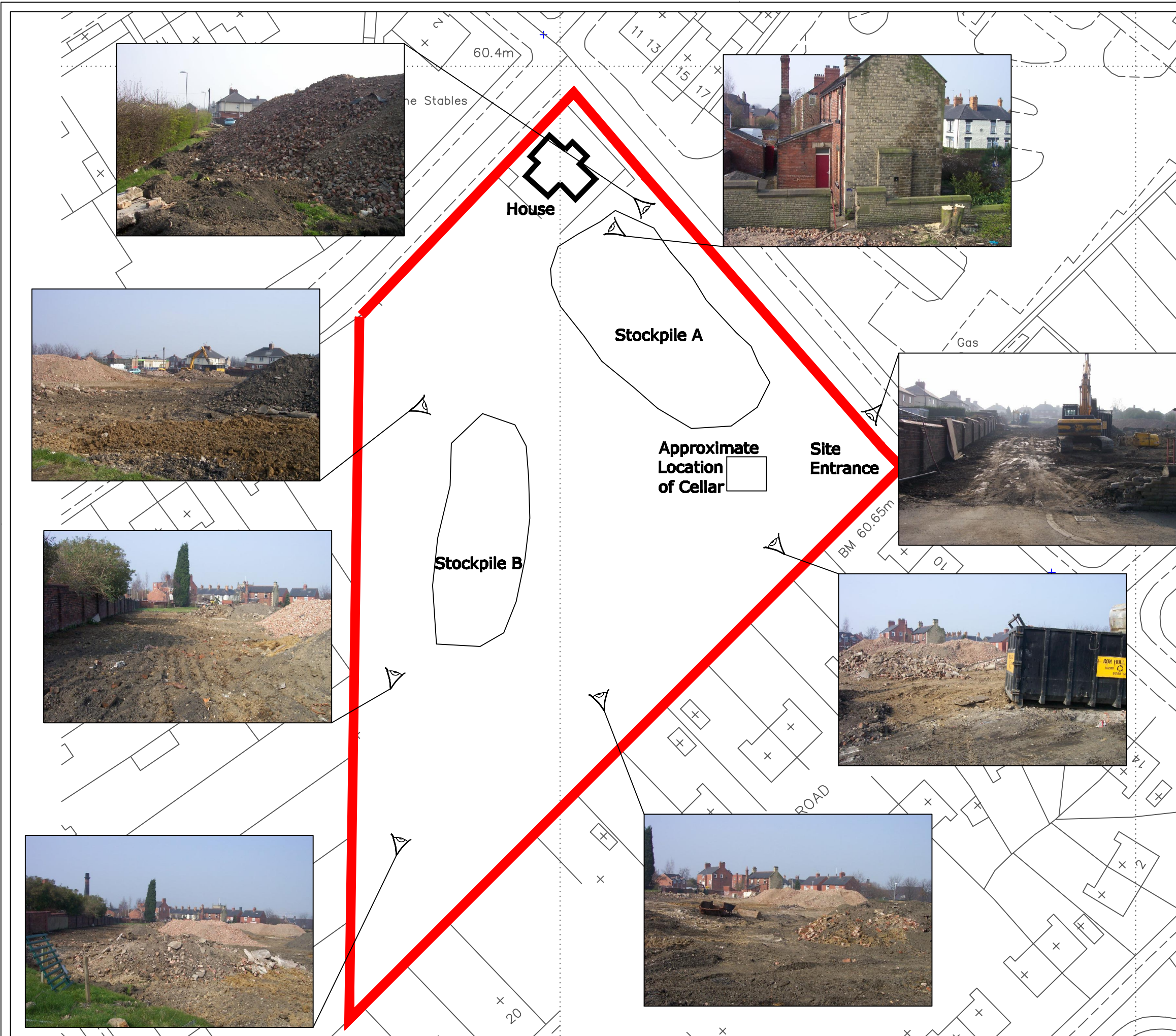
4.10.3 Any material imported for use as cover should be validated in accordance with Encia's Protocol for Soil Importation, copied in Appendix B. This Protocol includes chemical assessment criteria which should not be exceeded.

APPENDIX A DRAWINGS



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		CLIENT SHELDAL DEVELOPMENTS LTD		
		JOB TITLE KINGS ROAD, WOMBWELL		
		DRAWING TITLE SITE LOCATION PLAN		
DRAWN BY JWH	SIGNATURE	DATE 30/04/07	STATUS Final	
APPROVED RLM	SIGNATURE	DATE 30/04/07	SCALE 1:50,000	DRG NO. 9391/1



NOTES

REV.	DESCRIPTION	DATE
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CLIENT

**SHELDAL
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JOB TITLE

**KINGS ROAD
WOMBWELL**

DRAWING TITLE

SITE FEATURES PLAN

DRAWN	SIGNATURE	DATE	STATUS
JWH		27/04/07	FOR COMMENT ☐
APPROVED	SIGNATURE	DATE	FOR APPROVAL ☐
RLM		27/04/07	DRAFT ☐
			FINAL ☒

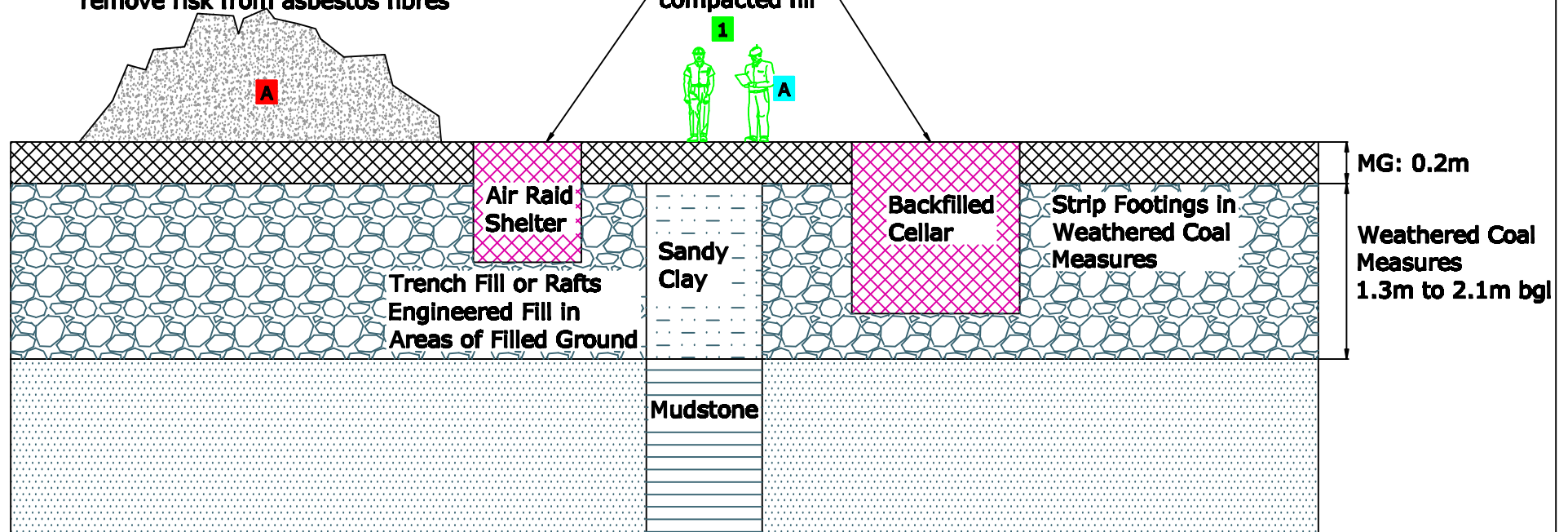
SCALE	SHEET	DRAWING NO.	REVISION
1:750	A3	9391/2	A

South

North

Stockpile of Demolition Crush 6F2)
To be placed under hardstanding to
remove risk from asbestos fibres

To be filled with
compacted fill



KEY

- Made ground
- Weathered Coal Measures
- Coal Measures

SOURCES

- A Asbestos in Stockpile

PATHWAYS

- A Inhalation

RECEPTORS

- 1 Human health

NOTES

REV.	DESCRIPTION	DATE
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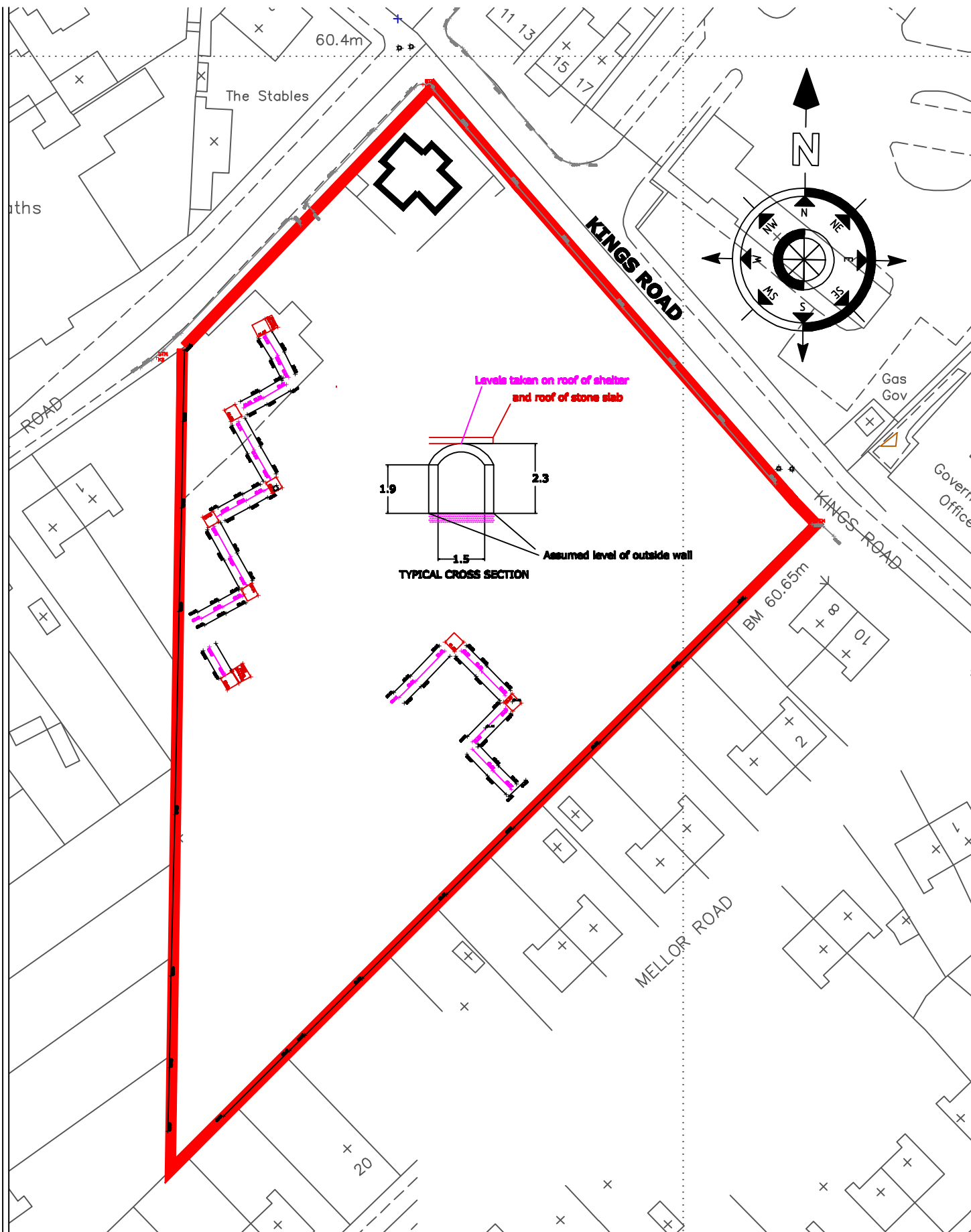
KINGS ROAD
WOMBWELL

DRAWING TITLE

REVISED CONCEPTUAL
SITE MODEL

DRAWN	SIGNATURE	DATE	STATUS
JWH		30/04/07	FOR COMMENT ☐
APPROVED	SIGNATURE	DATE	FOR APPROVAL ☐
RLM		30/04/07	DRAFT ☐
			FINAL ☒

SCALE	SHEET	DRAWING NO.	REVISION
NTS	A3	9391/5	-



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CLIENT

**SHELLDALE
DEVELOPMENTS LTD**

JOB TITLE

**KINGS ROAD
WOMBWELL**

DRAWING TITLE

AIR RAID SHELTERS

DRAWN
JWH

SIGNATURE

DATE
27/04/07

APPROVED
RLM

SIGNATURE

DATE
27/04/07

STATUS
FOR COMMENT ☐

FOR APPROVAL ☐

DRAFT ☐

FINAL ☒

SCALE
1: 750

SHEET
A4

DRAWING NO.
9391/6

REVISION
1

APPENDIX B
ENCIA PROTOCOL FOR IMPORTATION & USE OF SOIL COVER

Introduction.

Isolation of made ground in garden and landscaped areas beneath a cover of “clean” subsoil, and topsoil is often recommended on residential developments where made ground is left in-situ; most notably when it contains some inorganic contaminants at concentrations above guidance threshold values. A cover solution is not generally appropriate for organic contamination (fuels, solvents etc); removal or treatment will probably be required.

The “clean” soil cover blocks potential linkages between the contaminated fill and future residents. Such a cover is only required in proposed garden and landscaped areas underlain by made ground (i.e. not beneath drives, garages or houses).

The thickness of cover is dependant on the nature and degree of contamination (and often the Local Authority whose area the site lies within), but typically between 600mm and 1,000mm is required. However, if the made ground is essentially “clean”, but contains materials generally considered undesirable as a near-surface material in garden areas (colliery spoil, construction\demolition rubble etc) then a 300mm thick cover, in accordance with NHBC Standards, Chapter 9.2, should be adequate. If the made ground is essentially “clean” and comprises reworked natural soil, the only cover likely to be required is topsoil.

The **CML initiative**, which came into force on 1st April 2003, requires house builders to submit to NHBC (or other warranty providers) a validation report confirming the thickness and quality (ie contaminant-free) of the soil cover. Validation reports are normally prepared by independent geoenvironmental consultants such as Encia Consulting.

Soil **quality** is best determined by sampling of the **source** at least 6 working days before importation to the development site. Further, on-site (post-placement) quality testing should not usually be necessary.

Soil **thickness** can only be checked after placement, but should be done before turfing, fencing etc. Thickness could be checked via the excavation of an appropriate number of inspection pits or by survey carried out prior to and immediately after the placement of cover material.

Soil cover is usually placed many weeks after completion of the preparatory\remedial works, and issue of the associated Verification Report. Consequently, site visits, to generate supplementary letter reports, are typically required after soil cover has been placed in the gardens of each plot, or set of plots.

Failure to submit cover validation reports (a **RED** item) promptly will delay NHBC finalling plots – this will delay the release of mortgage funds and hence legal completion – ie the financial implications are very significant.

Given the potential for cross-contamination of soil cover (by excavation arisings, builders rubble etc), it should be validated at a relatively late stage in the construction programme (ideally after scaffolding has been dismantled). However, it is essential that Encia is instructed at least 2 weeks prior to the anticipated finalling date.

Cover material can sometimes be sourced on-site from foundation\drainage excavations in natural in-situ strata, but import is often necessary. The following protocol (testing at source) is recommended.

Protocol for Importation & Use of Soil Cover (Capping)



Protocol (Testing **at Source**)

The materials should be inspected by Encia Consulting **at source**.

Soil material should:

- be clean and free of foreign debris, building waste materials or contaminants;
- not have a stone content of greater than 20% by dry weight and
- have a maximum stone size of 150mm in any one direction.
- not have been sourced from an area within 7m laterally, or 3m vertically, of Japanese Knotweed plants, and not contain any Japanese Knotweed fragments (rhizomes, leaves, stems etc).

Encia should take representative samples of the subsoil material from the proposed source. The number of samples taken will be dependant on the nature of the source and the quantity of material to be imported. However, as a guide, a **minimum** of 6 samples of each subsoil type should be tested, with a further sample for each 300m³ where the quantity exceeds 1,800m³.

A less frequent sampling rate may be appropriate for soils from a greenfield source or where large volumes (say > 5,000m³) of soil are imported from a single, relatively homogenous source.

Each sample taken should be forwarded to an analytical laboratory for testing in accordance with the following schedule:

pH, total metals (copper, nickel, zinc, chromium, arsenic, mercury, selenium, cadmium, and lead), water soluble boron and water-soluble sulphate.

Additional determinands could be scheduled, although if considered necessary, would probably suggest the material is unlikely to be suitable for use as clean cover in gardens.

The analytical testing should be undertaken on a 3 or 5-day turnaround and the Client\Contractor should be notified of the soil's suitability (or otherwise) immediately after receipt of the results. Chemical assessment (Tier 1) criteria for imported soils are tabulated on page iv.

On receipt of written confirmation from Encia, the Client should instruct his Contractor to commence importation. It will probably be necessary to stockpile the cover prior to placement in garden\landscaped areas. Encia should inspect the stockpiled material prior to placement, to confirm that it is the same material as previously tested, or the Contractor should provide the Client with appropriate haulage notes. Further, on-site quality testing should not normally be necessary.

Validation letter reports should be issued by Encia as each plot, or set of plots, is completed.

Imported **topsoil** should be subject to the above protocol, wherever it is *not* being sourced from an approved supplier. In addition, some analysis in accordance with BS3882 may be appropriate.

Protocol for Importation & Use of Soil Cover (Capping)



Protocol (Testing *after Placement*)

Clearly, if soil cover is imported and placed before confirmation of its suitability, we cannot guarantee that our validation work will yield the desired results. In which case, it may be necessary to excavate and export the placed soil cover and/or import further "clean" soil.

The materials should be inspected by Encia Consulting via inspection pits excavated through the entire thickness of placed cover material.

Encia should take representative samples of soil from each pit. It will typically be necessary to retrieve 1 sample per 250m³ (Subsoil), and 1 sample per 50m³ (Topsoil). For a development with "standard" gardens comprising a total area of 100m² (front and rear), and a soil cover thickness of 600mm, this will typically require a minimum of one pit per 4 plots.

Soil material should:

- be clean and free of foreign debris, building waste materials or contaminants;
- not have a stone content of greater than 20% by dry weight and
- have a maximum stone size of 150mm in any one direction.
- not have been sourced from an area within 7m laterally, or 3m vertically, of Japanese Knotweed plants, and not contain any Japanese Knotweed fragments (rhizomes, leaves, stems etc).

Each sample taken should be forwarded to an analytical laboratory for testing in accordance with the following schedule:

pH, total metals (copper, nickel, zinc, boron, chromium, arsenic, mercury, selenium, cadmium, and lead), and water-soluble sulphate.

Additional determinands could be scheduled, although if considered necessary, would probably suggest the material is unlikely to be suitable for use as clean cover in gardens.

The analytical testing should be undertaken on a 3 or 5-day turnaround and the Client/Contractor should be notified of the soil's suitability (or otherwise) immediately after receipt of the results. Chemical assessment (Tier 1) criteria for imported soils are tabulated on page iv.

Validation letter reports should be issued by Encia as each plot, or set of plots, is completed.

Placed **topsoil** should be subject to the above protocol, wherever it is *not* being sourced from a reputable supplier able to provide analytical certificates, in accordance with BS3882.

Protocol for Importation & Use of Soil Cover (Capping)



Chemical assessment criteria for imported soils to the above site to create the soil cover system

Contaminant	Source	Tier 1 Assessment Criteria (mg / kg)	Comments / Notes
		Resi with gdns	
pH	CLEA		Initial assessment only
As	CLEA	20	-
Cd	CLEA	1, 2 & 8	pH variable
Cr	CLEA	130	-
Pb	CLEA	450	-
Hg	CLEA	8	-
Ni	CLEA	50	Assessment of human health risk only
Se	CLEA	35	-
B	ICRCL	3	-
Cu	MAFF	80 to 200	pH variable
Zn	MAFF	200 to 300	pH variable
Water soluble sulphate	BRE SD1	0.5	Units are g/l