



Wilfred Street, Boldon Colliery, Tyne & Wear
Remediation Strategy
For
ISOS Developments Limited

Report Ref	Issue	Prepared by	Date	Reviewed by	Date
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1 INTRODUCTION

1.1 Following the completion of a series of intrusive fieldworks 3e Consulting Engineers Ltd (3e) were commissioned by ISOS Developments Limited to carry out a Remediation Strategy for land to the rear of 15 to 17 Wilfred Street, Boldon Colliery. The proposed development includes the construction of 16 residential properties with associated car parking and soft landscaping as indicated on the site plan in **Appendix A**.

1.2 Although the proposed plan states that 16 properties are to be constructed; it has noted that unit 6 has been withdrawn from the proposed scheme due to this area being a likely location of a proposed drain for the development.

1.3 The site, centred on National Grid Reference 434940 561480, is an area of land currently occupied by a disused building, a former Day Centre with areas of hardstanding and managed grass located off Wilfred Street, Boldon Colliery about 5km north-west of Sunderland City Centre. A site location plan is included as **Figure 1**.

1.4 The location of the existing property is relatively level although the grassed embankment falls away to the River Don, a fall of approximately 4m and which is located adjacent to the southern boundary of the development site.

1.5 Both a Phase I and Phase II Geo-Environmental Assessment Reports have been completed for this site by 3e. Both of these reports should be read in conjunction with this Remediation Strategy:

- 3e Consulting Engineers Ltd, 'Wilfred Street, Boldon Colliery, Tyne & Wear, Phase I Geo-Environmental Assessment' (August 2014). Report Ref: 14689.
- 3e Consulting Engineers Ltd, 'Wilfred Street, Boldon Colliery, Tyne & Wear, Phase II Geo-Environmental Assessment' (December 2014). Report Ref: 14689.

2 SITE HISTORY

2.1 The site was recorded as undeveloped and surrounded by rural land up until 1939 which was then followed by several phases of construction whereby small buildings and possible storage lock ups were present on site until 1975. The existing building was constructed by 1988 along with further storage lock ups although these are no longer present on site.

3 SUMMARY OF GROUND INVESTIGATION

3.1 The investigatory work comprised the completion of mini percussive boreholes and the installation of gas and groundwater monitoring wells as well as soil sampling together with associated laboratory testing.

Soil Profile

3.2 Made ground was encountered across the site to depths of between 0.80m and 2.50m which initially comprised topsoil of either slightly gravelly, sandy and organic clay or slightly clayey, gravelly and organic sand with roots and occasional anthropogenic debris (i.e. brick, dolomite and coal) below which was dolomite 'hardcore', firm and stiff 'reworked' clay with brick, coal, mudstone and dolomite fragments.

3.3 Deeper areas of made ground (i.e. where the site has historically been developed or raised adjacent to the River Don); demolition type materials of gravelly sand with half bricks, dolomite, slate, tile, mortar, concrete, sandstone and ash were identified. In addition; at the location of WS03 only and at a depth of 1.70m (0.40m thick) a relict topsoil layer was recorded.

3.4 The underlying drift deposits generally comprised firm and stiff clay with occasional soft and firm bands. At WS02 which was undertaken within close proximity to the River Don; sandy limestone gravel was noted between 4.40m to 4.75m before encountering very soft clay with occasional limestone gravel.

3.5 Throughout the fieldworks no visual and / or olfactory evidence was recorded to suggest the presence of any onsite contamination.

Chemical Screening

3.6 The ground investigations identified elevated Cadmium, numerous Polycyclic Aromatic Hydrocarbons (PAH's) and the presence of asbestos which may all represent a risk to the proposed end users. All of these have been identified within the topsoil present across the site.

3.7 Although a single elevated leachable lead result has been identified on site it is not considered to represent a risk to the nearby River Don due to the presence of low permeability clay identified below the site which will inhibit groundwater movement.

Ground Gas Assessment

3.8 To date; five monitoring visits have been completed which have indicated that this site falls within a Characteristic Situation CS1 or Green classification (NHBC Traffic light system), suggesting that no gas protection measures are required for the site. In accordance with CIRIA C665, the monitoring for this site is required to be completed over a minimum period of three months with six visits being completed. The final monitoring is scheduled for early February with an addendum report to follow detailing the requirements of any gas protection measures.

4 CONTAMINATION ASSESSMENT

Soils

4.1 Based on the proposed end use being Residential with Home Grown Produce; several analytes including Cadmium, numerous PAH's and asbestos have been identified on site which may potentially represent a risk to the proposed end users as they are in excess of the adopted generic assessment criteria (GAC) within the topsoil materials on site.

4.2 It should be noted that the threshold values outlined in the previously completed Geo-Environmental Assessment have been superseded by the recently published guidance (Jan 2015) and when assessing the previous contamination results, Lead may also represent a risk to the future end users.

Potential risk to human health

4.3 Due to the presence of these elevated analytes which may potentially pose a risk to human health and which includes asbestos, it would be prudent that during any future works it is recommended that conventional dust suppression techniques be employed to reduce the risk of inhalation to construction staff and the general public.

4.4 Following completion of the development, suitable remedial measures will have been undertaken as discussed below to protect any future end users with the pathway to the end user being broken by use of either hardstanding, soft landscaping capping or removal following which the risk is considered negligible.

Remediation Overview

4.5 Due to the presence of the elevated analytes and asbestos it has been identified that the topsoil across the site represents a risk to the future end users and therefore there is a requirement for suitable remedial measures including removal, treatment and / or protection measures. These options include;

- a) Removal of the topsoil, or
- b) Installation of a clean cover system



4.6 Either one of these options are viable although the removal of topsoil may prove to be favourable especially when considering the existing site levels and that these materials are likely to be stripped off to accommodate a piling mat for future foundations.

4.7 All materials removed from site will need to be taken to a suitably licensed waste facility with copies of waste disposal tickets made available to 3e for the completion of a Validation Report.

5 REMEDIATION STRATEGY

Remediation and Validation Requirements

5.1 The following remediation method statement details a method of working that will ensure the site is left in a condition to ensure no further risk is presented to human health associated with the elevated levels identified within the topsoil across the site.

5.2 In summary, the following remedial measures are required and discussed in more detail below;

- Excavation and removal of the topsoil materials from across the site to an appropriate landfill facility. This is the preferable remediation strategy in lieu of providing clean capping layers over the impacted materials.
- Due to the nature of this soil the extent of these materials should be easily identified by visual inspection with the removal witnessed and validated by an appropriately qualified engineer from 3e.
- Following the removal of the topsoil appropriate validation screening may be required by the Local Authority (LA) to confirm the removal of all potentially affected materials although this will need to be verified.
- Any materials brought on to site, including topsoil and subsoil, for use in areas of soft landscaping will require validation testing to confirm the suitability of these materials for use on this site.

5.3 If during the groundwork's, any unidentified areas of gross contamination or soils which differ from those encountered during the fieldworks are encountered then these materials will need to be suitably assessed by a geo-environmental engineer from 3e as well notifying the contaminated land and planning officers. If deemed necessary, appropriate remediation shall be carried out under the supervision of 3e.

Any materials brought on to site should be suitably screened and tested for human health assessment by the source supplier prior to delivery with these results sent to 3e for approval prior to delivery onto site. To confirm the suitability of these materials, validation testing will also be required following emplacement and/or importation onto site.

Off-Site Disposal

5.4 If any arising's are generated for offsite disposal then they should be stockpiled separately and clearly marked from other materials in order to prevent cross contamination.

5.5 Chemical screening of the materials on site indicate generally low levels of contaminants within the samples screened from across the site, when comparing the recorded levels with current guidance for off-site disposal. Taking this into account, the majority of these materials could potentially be considered as non-hazardous waste.

5.6 Any materials that are to be removed from site should be disposed of at a suitable waste disposal facility with appropriate waste transfer notes made available for the Validation Report.

Validation Requirements

5.7 Following completion of the remedial works, a Validation Report detailing these works will be completed and submitted to the LA for their comments.

5.8 Any materials brought on to site for use including topsoil and pile mat materials, will require validation testing to confirm the suitability of these materials for use on this site using the acceptance criteria for imported soil provided below (Table 1).

5.9 As discussed previously; the threshold values outlined in the following table are in accordance with recently published guidance (Jan 2015), and as such may differ slightly from the outlined within the Phase II Geo-environmental Assessment Report.

Table 1 – Imported Soil Acceptance Criteria

DETERMINAND	RESIDENTIAL END USE CRITERIA (mg/kg) IN SOIL ⁽¹⁾
Metals:	
Arsenic	37
Cadmium	11
Chromium	910
Lead	200 ⁽²⁾
Mercury	40
Selenium	250
Copper	2400
Nickel	180
Zinc	3700
PAH compounds:	
Acenaphthene	1100
Acenaphthylene	920
Anthracene	11000
Benzo(a)anthracene	13
Benzo(a)pyrene	3.0
Benzo(b)fluoranthene	3.7
Benzo(g,h,i)perylene	350
Benzo(k)fluoranthene	100
Chrysene	27
Dibenz(a,h)anthracene	0.30
Fluoranthene	890
Fluorene	860
Indeno(1,2,3-cd)pyrene	41
Naphthalene	13
Phenanthrene	440
Pyrene	2000
TPH	
Aliphatic EC 5-6	160
Aliphatic EC >6-8	530
Aliphatic EC >8-10	150
Aliphatic EC >10-12	760
Aliphatic EC >12-16	4300
Aliphatic EC >16-35	110000
Aliphatic EC >35-44	110000
Aromatic EC >5-7	300
Aromatic EC >7-8	660
Aromatic EC >8-10	190
Aromatic EC >10-12	380
Aromatic EC >12-16	660
Aromatic EC >16-21	930
Aromatic EC >21-35	1700
Aromatic EC >35-44	1700
Inorganics:	
Water soluble sulphate	0.5g/l ⁽³⁾
Acidity (pH)	not less than 5
Asbestos	Presence

Notes:

- (1) LQM/CIEH S4UL 2015 guidance value for residential with home grown produce unless otherwise stated
 - (2) DEFRA: Category 4 Screening Levels (C4SL) for residential with home grown produce
 - (3) Upper level for Class 1 concrete (BRE Special Digest:2005)
- Assessment criteria based on 6% soil organic matter

5.10 Prior to importation to site, soils to be used on site will be tested for the determinands listed in Table 1. The frequency of testing shall be as follows in Table 2:

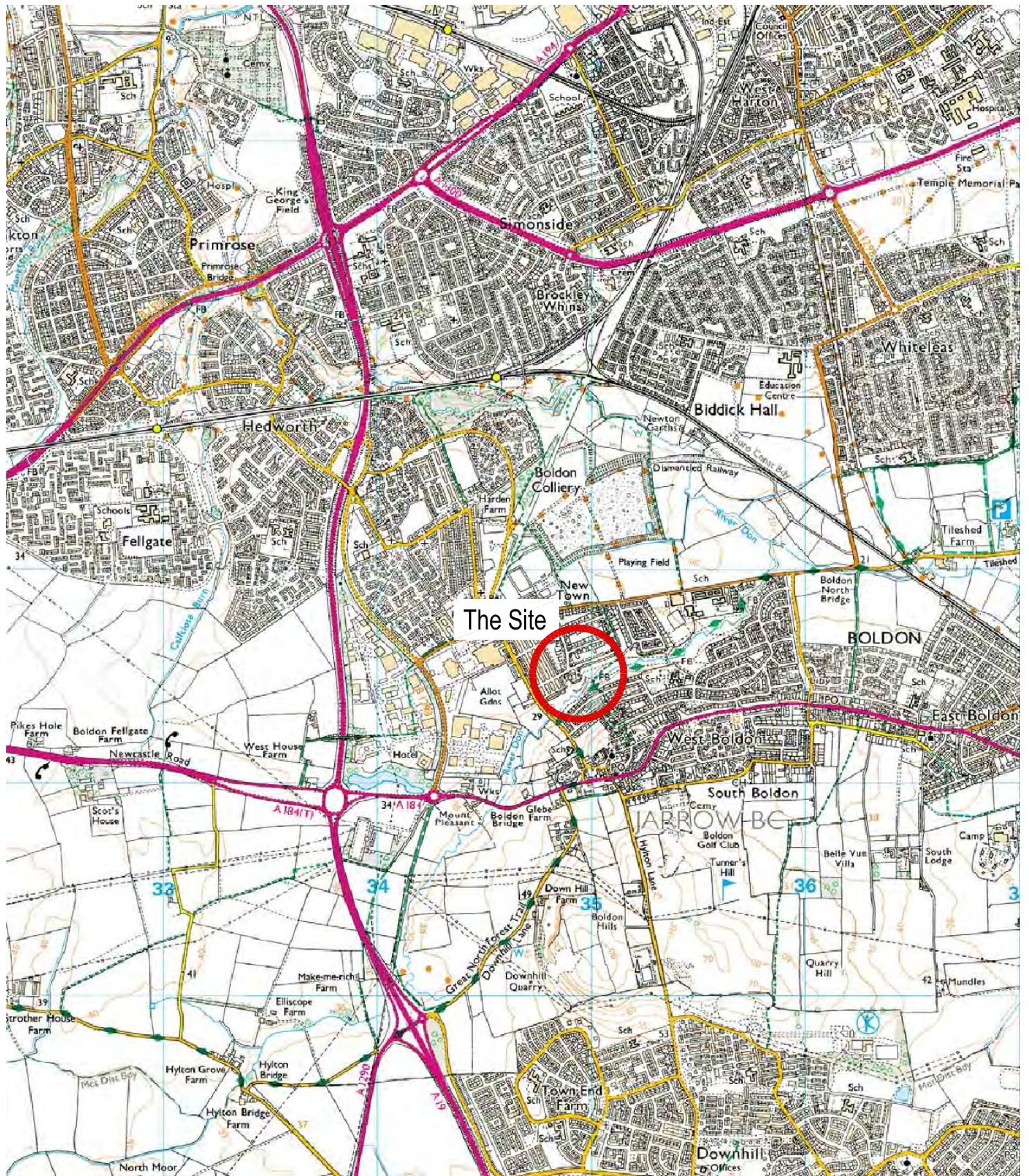
Table 2 – Imported Soil Testing Frequency

Type of material	Frequency of testing	Testing schedule
Crushed hardcore, stone, brick used as capping	Minimum 3 or 1 per 500m ³	<ul style="list-style-type: none"> • Standard metals/metalloids • Speciated PAHs • Asbestos • Leachate analysis
Greenfield Soils	Minimum 3 or 1 per 250m ³	<ul style="list-style-type: none"> • Standard metals/metalloids • Speciated PAHs • Asbestos
Brownfield Soils	Minimum 6 or 1 per 100m ³ (whichever is greater)	<ul style="list-style-type: none"> • Standard metals/metalloids • Speciated PAHs • Asbestos • Banded TPH

5.11 Although the source of the elevated results (i.e. topsoil) is to be removed from site it may be the case that the LA requires an adequate thickness of soil to accommodate growth in areas of soft landscaping (i.e. grass, shrubs etc.). Therefore and if required; the importation and thickness of clean soils may need to be confirmed by a geo-environmental engineer at a rate of one inspection pit per 50m² of capping placed or a minimum of one per three residential plots in areas of soft landscaping.

5.12 On completion of the works a validation report will be prepared. This will outline the works carried out and include any appropriate waste transfer notes and the results of any necessary validation testing.

Figures



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Date	Revision	Checked	Rev.

Project **Wilfred Street, Bardon Colliery**
ISOS Developments Limited

Title **Site Location Plan**

Scale 1:25,000 at A4	Drawn AH	Checked AC	Date August '14
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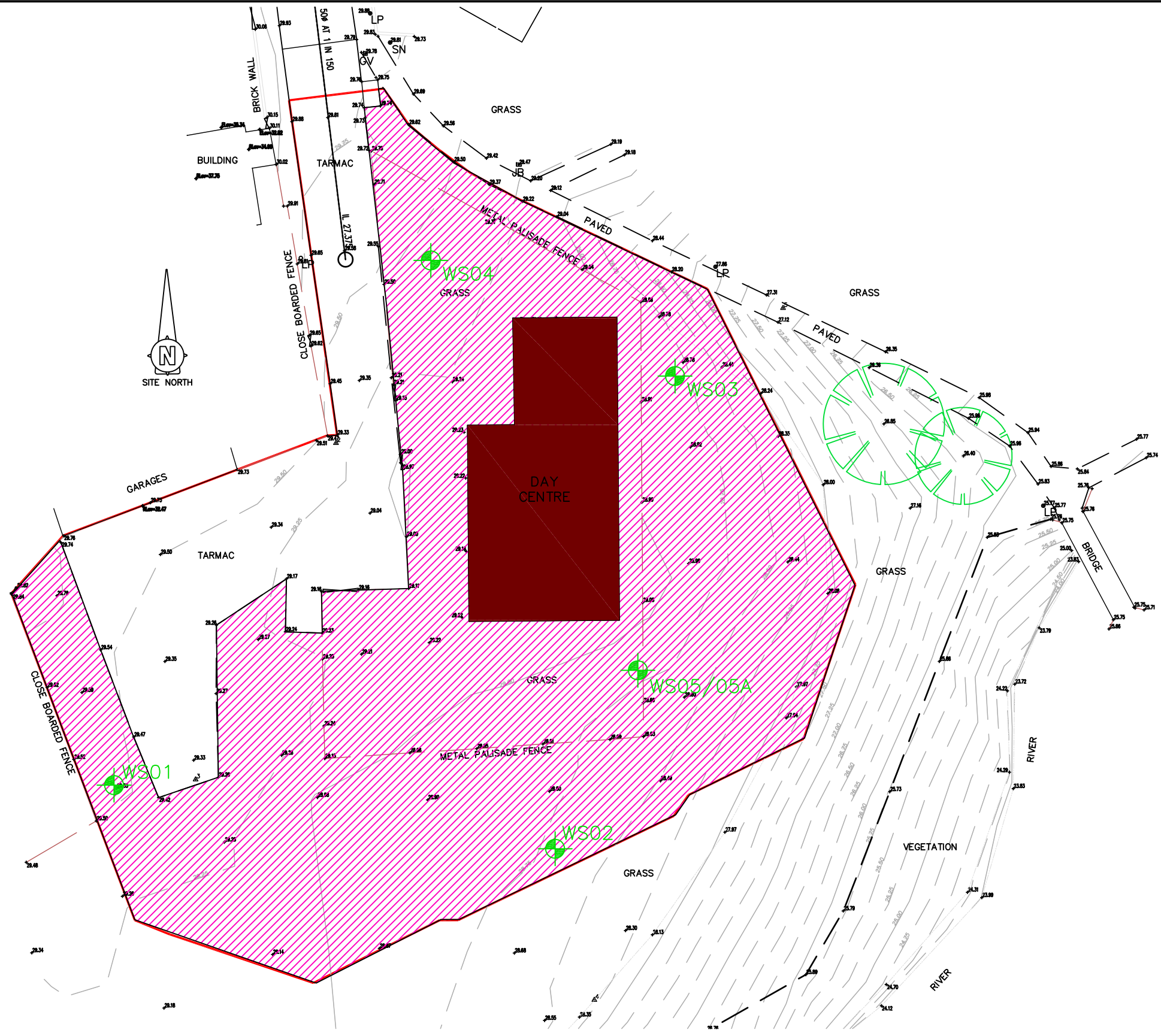
Job No. 14689	Drawing No. Figure 1	Rev 0
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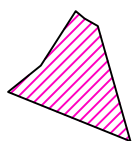
Key:



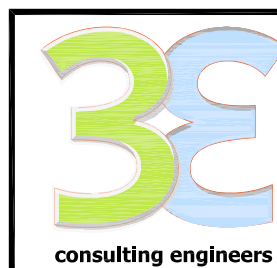
Mini Percussive Borehole Location



Site Boundary



Topsoil materials to be removed



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Project			
Wilfred Street, Boldon Colliery ISOS Developments Ltd			
Title			
Remediation Plan			
Scale	1:300	Drawn	NW
		Checked	AH
Date	Jan '15		Rev
Job No.	14689	Drawing No.	Figure 2
			0

Appendix A

Proposed Development Plan



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Isos Developments
 Wilfred Street,
 South Tyneside.
**Proposed Feasibility
 Layout 1014/016**

1:500 @ A4

1:200 @ A2

November 2014

Grid at 25 metres

Accommodation

16 no in total

7no. 2B Houses @ 75sq.m.

5no. 2B Bungalows @ 61sq.m.

4no. 3B Houses @ 84sq.m. [check area]

