

PJ CAREY (CONTRACTORS) LTD

**Phase 1a Section 3
Graven Hill, Bicester**

**Land Contamination Verification Report for Earthworks Fill
(to assist with discharging original Planning Condition
No 58)**

Job No: 173044

Date of Report: 28th May 2019

Report Ref: 173044/VR/007



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28th May 2019

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Company No. 8474322**

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Draft 28/05/19	For client review and comment

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1.0 INTRODUCTION

Overview of project

- 1.1 AA Environmental Limited (AAe) has been appointed by PJ Carey (Contractors) Limited (hereafter referred to as Careys) to assist with the management of the environmental aspects associated with the redevelopment of land at Graven Hill, London Road, Bicester OX26 6HF.
- 1.2 The site comprises a former Ministry of Defence (MOD) logistics and freight terminal located south of the A41 in Bicester. The site is currently being redeveloped for residential purposes, including associated infrastructure works and leisure/community facilities.
- 1.3 The following reports have been produced for the site by Waterman Infrastructure & Environment Limited (Waterman) and submitted for approval by the local authority to satisfy the associated planning conditions:
- 'Environmental Interpretative Report for Land Transfer Area 1' September 2015 (Report reference: WIB13983-104-R-1-1-7-GH).
 - 'Remediation Options Appraisal and Remedial Strategy Report - Land Transfer Area 1' January 2016 (Report reference: WIB13983-104-R-2-2-3-MA-MACF).
- 1.4 The site is being developed in different sections, as presented on Figure 1 (Careys drawing 3252-PJC/AAe-00S00).

Scope of report

- 1.5 AAe was instructed by Careys to verify chemical compliance of subsoil within areas of earthworks fill against the specification presented in the Waterman Remediation Strategy.
- 1.6 This Verification Report is one a series of documents that verify the land quality of the areas of soft landscaping. This plan specifically covers earthworks completed by Careys within Section 3, as presented on Figure 2.
- 1.7 The agreed Remedial Options Appraisal and Remedial Strategy report was developed following a series of site investigations and contamination assessments. The investigation identified that the majority of the site was uncontaminated and suitable for residential development. As part of the verification regime, Careys as the enabling and earthworks contractor had to test the excavated and imported materials to demonstrate that the material was of a suitable quality. The required quality standards were set out by Waterman¹.
- 1.8 The earthworks cut and fill plans have been provided by Careys. An inspection and testing regime has been undertaken by AAe within areas of earthworks fill to determine compliance against the site specification. Where non-conformances were recorded, corrective actions have been completed by Careys under the supervision of AAe in accordance with the 'Remedial Method Statement for Non-Conforming Works (RMS)' presented at Appendix A.
- 1.9 This report has been prepared to assist in discharging Planning Condition No 58 of 'new' outline consent 18/00325/OUT. In accordance with Planning Condition No 58 this report shall be submitted by Careys to the Local Planning Authority, and their approval in writing obtained. Planning Condition No. 58 states:
- "58 The development of Graven Hill shall not be occupied until:*
- (a) In respect of Phase 0, Phase 1a and Phase 1b as shown on Drawing No: 1982-A-L-572-I, the remedial works have been carried out in accordance with the approved:*

¹ Subsequent to the derivation of the standards, Waterman have advised Careys that asbestos chrysotile fibres are permitted at a level 0.001%.

- *Remediation Options Appraisal and Remediation Strategy Report for Land Transfer Area 1 (ref: WIB13983-104-R-2-2-3-MA-MACF dated January 2016) prepared by Waterman Infrastructure & Environment Ltd.*
- *A verification report that demonstrates the effectiveness of the remediation carried out must be submitted to and approved in writing by the Local Planning Authority.*

(b) In respect of all subsequent phases, if remedial works have been identified in condition 52, the remedial works have been carried out in accordance with the scheme approved under condition 52. A verification report that demonstrates the effectiveness of the remediation carried out must be submitted to and approved in writing by the Local Planning Authority."

Limitations and assumptions

- 1.10 All testing has been completed in line with quality control procedures. All information provided in this report is based on the ground encountered during the investigations. It should be recognised that during any investigation the conditions identified may not be fully representative of the wider conditions.
- 1.11 The purpose of this report is to verify chemical compliance of subsoil within areas of earthworks fill completed by Careys. Inspection and testing by AAe is therefore limited to the specified areas of earthworks fill. A reliance is placed on the provided cut and fill plans to accurately represent the earthworks undertaken by Careys. This report does not verify soil quality in areas of earthworks cut.
- 1.12 This report does not verify geotechnical suitability of materials used as earthworks fill.
- 1.13 It is understood that Careys are contracted to complete the enabling earthworks (including provision of subsoil) to 150 mm below finished level. This report does not verify works completed by third-party contractors or self-builders following handover by Careys. Where follow on contractors/self-builders have operated and/or imported materials this report cannot be relied upon to demonstrate the final land quality.

2.0 VERIFICATION OF EARTHWORKS FILL

Fieldwork

- 2.1 The section has been sub-divided into areas of cut and fill, as presented on Figure 2. To verify the chemical quality of subsoil, trial pits were constructed at locations made available by Careys to be representative of earthworks fill. The trial pits were marked out by the Careys Site Engineer and the ground levels recorded.
- 2.2 Table 2.1 presents the calculated fill volume for the soft landscaping in each sub-area and the required number of tests against the frequency specified within the approved remedial strategy (1 test per 250 m³ site-won fill).

Table 2.1 Section 2 Sub-Areas		
Sub-Area	Fill Volume (calculated by Careys) m ³	Minimum number of tests required to achieve 1 per 250 m ³ of fill.
3-1	<500	2
3-2	<1250	5
3-3	<500	2
3-4	<500	2
3-5	520	2
3-6	N/A Cut	N/A
3-7	N/A Cut	N/A

- 2.3 Trial pits were completed on 18th January, 29th March and 1st April 2019. The location of the trial pits is presented on Figure 2.
- 2.4 AAe inspected the trial pits for any visual or olfactory evidence of contamination and collected representative samples of the subsoil for laboratory testing analysis in accordance with quality control requirements.
- 2.5 Photo plates of the trial pits are presented in Appendix B.

Chemical Results

- 2.6 Table 2.2 presents a summary of the scheduled environmental testing within the verification trial pits in fill areas.

Table 2.2 Summary of environmental testing		
Type of Test	Number	Laboratory Report
Full Environmental Suite (incl. metals, TPHs, PAHs and asbestos screen)	15	19-02098 19-11046 19-11484
Asbestos Bulk ID (Fragments) – F6 and F7 (Plot 176)	2	19-02124
PAH Speciated (16)	5	19-11046

- 2.7 The results of the environmental laboratory testing are presented in Appendix C.

Assessment of Chemical Results

- 2.8 The soil results have been consolidated and compared against the specification provided in the Waterman Remediation Strategy. The consolidated data is presented in Appendix D. Where the testing suite includes determinants for which limiting values for the protection of human health are not included in the Waterman Remediation Strategy, the Soil Guidance Values (SGVs) presented in Appendix G have been adopted. Non-compliances against the specification are summarised in Table 2.3 below and shown on Figure 2.

Table 2.3 Summary of non-compliance with specification	
Location	Non-Compliance
Plot 138 (Rear)	PAH
Plot 150 (Rear)	PAH
Plot 152 (Rear)	PAH
Plot 154 (Rear)	PAH
Plot 157 (Rear)	PAH
Plot 175 (Rear)	PAH, Metals
Plot 176 (Rear)	PAH, Metals, Asbestos (Fragment F7)
Plot 177 (Rear)	PAH
N1	PAH

3.0 REMEDIATION OF NON-CONFORMING AREAS

Strategy

3.1 The strategy for the remediation of non-conforming plots is set out in the 'Remedial Method Statement for Non-Conforming Works (RMS)' presented at Appendix A, and can be summarised as follows:

- Removal of impacted soils from non-conforming areas to 450 mm below finished formation level.
- Placement of a permeable geotextile marker layer over the residual soils.
- Reinstatement with acceptable soils from pre-approved stockpiles only.
- Inspection of the non-conforming areas to verify that the reinstated soil has been constructed to a minimum depth of 450 mm above the geotextile marker layer.

Inspection of remedial works

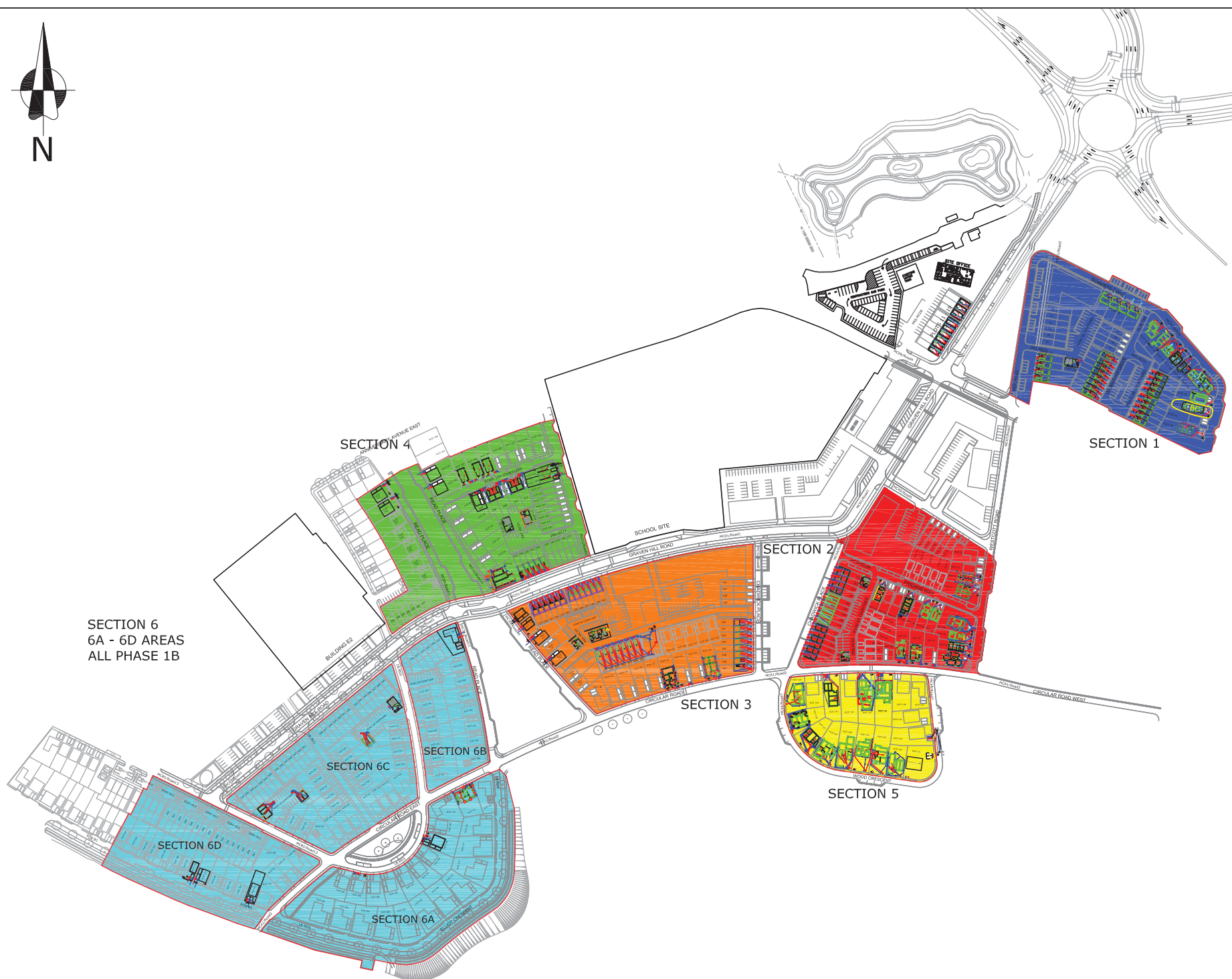
- 3.2 AAe attended site 28th March and 25th April 2019 site to verify the remediation of the non-conforming soft landscaping areas (excluding sub-areas 3-4 and 3-5). Photos of remedial works in Plot 152 on 23rd May 2019 were provided by Careys. The areas of soft landscaping within the specified were fully excavated to the plot boundaries.
- 3.3 Photo plates of the remedial works are presented in Appendix E.
- 3.4 Soils within the non-conforming areas were excavated by Careys to 450 mm below finished formation level. The residual soils were capped with a permeable geotextile marker layer.
- 3.5 The soft landscaping was reinstated with 450 mm acceptable site-won subsoil fill, from the following stockpiles:
- Stockpile 0007 (SPGTP313/314) – Chemtest Report 18-18674 (8 Samples)
 - Stockpile 0008 (SPHTP311/312) – Chemtest Report 18-18546 (7 Samples)
 - Stockpile 0027 (SP6A-1) – Chemtest Report 19-09751 (1 Sample)
- 3.6 Certificates of analysis for the stockpiles are presented in Appendix F.

Exclusions from remedial works

- 3.7 The verification test results recorded exceedances in sub-areas 3-4 and 3-5. These areas are occupied by follow-on contractor compounds, including fuel/chemical/plant storage and imported materials for temporary surfacing. Remedial corrective measures were not completed by Careys in these areas due to the presence of third-party contractors. This report cannot be relied upon to verify the final land quality within these areas.

FIGURES

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THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S ENGINEER'S AND SPECIALISTS' DRAWINGS AND SPECIFICATIONS.

WORKS INDICATED ON THIS DRAWING ARE TO BE MANAGED IN LINE WITH PJC-CE QUALITY ASSURANCE PROCEDURES. DO NOT SCALE FROM THIS DRAWING IN EITHER PAPER OR DIGITAL FORM. USE WRITTEN DIMENSIONS ONLY.

A1	27.06.18	CONSTRUCTION ISSUE	CR
Rev	Date	Description	By
DRAWING STATUS: CONSTRUCTION			

PROJECT ADDRESS:
GRAVEN HILL DEVELOPMENT
ANNIVERSARY AVENUE
BICESTER
OX26 6HF

DRAWING TITLE:
SITE REMEDIATION
STRATEGY - WHOLE SITE,
ALL SECTIONS & AREAS FOR
VALIDATION WITH RED LINE
BOUNDARIES



PROJECT NUMBER: 3252			
Tel: 020 8900 0221 www.careyspk.co.uk			
DRAWN BY: CR	DESIGNED BY: CR	CHECKED BY: KD	DATE: 27.06.18
DRAWING NUMBER: 3252-PJC/AAE - 00S000			SCALE (MM): N/A
			REV: A1




Key:

- Approximate Section Boundary
- E458000
N220000
GL 73.726
2 B
PJC Sample location
- Suspected Asbestos Containing Fragment
Found at Surface
- F4
- Asbestos Fragment or
Asbestos Fibres Found in Trial Pit
- Exceedance of PAH and/or
metals

Section 3 Exceedance Notes

- P138 - Dibenz(a,h)Anthracene 0.51mg/kg versus 0.28mg/kg
- P152 - Benzo[b]fluoranthene 3.80mg/kg versus 3.30mg/kg
- Benzo[a]pyrene 2.80mg/kg versus 2.70mg/kg
- Dibenz(a,h)Anthracene 1.70 mg/kg versus 0.28mg/kg
- P154 - Dibenz(a,h)Anthracene 0.29mg/kg versus 0.28mg/kg
- P157 - Dibenz(a,h)Anthracene 0.31mg/kg versus 0.28mg/kg
- P175 - Lead 270mg/kg versus 200mg/kg
- Benzo[b]fluoranthene 6.20mg/kg versus 3.30mg/kg
- Benzo[a]pyrene 4.60mg/kg versus 2.70mg/kg,
- Dibenz(a,h)Anthracene 1.30mg/kg versus 0.28 mg/kg
- P176 - Beryllium 3.10 mg/kg versus 1.70mg/kg,
- Benzo[a]anthracene 30 mg/kg versus 11 mg/kg
- Benzo[b]fluoranthene 35mg/kg versus 3.30mg/kg
- Benzo[a]pyrene 29mg/kg versus 2.70mg/kg
- Dibenz(a,h)Anthracene 5.20 mg/kg versus 0.28 mg/kg
- P177 -Benzo[b]fluoranthene 12 mg/kg versus 3.30mg/kg
- Benzo[a]pyrene 9.50mg/kg versus 2.70mg/kg
- Dibenz(a,h)Anthracene 2.70mg/kg versus 0.28mg/kg
- N1 - Dibenz(a,h)Anthracene 0.33mg/kg versus 0.28mg/kg
- F7 - Chrysotile cement at surface
- P150 - Dibenz(a,h)Anthracene 0.32mg/kg versus 0.28mg/kg

Rev.	Details	Drawn Chkd.	Date
Project 173044 Graven Hill, Bicester			
Title Earthworks Fill Verification Plan - Section 3			
<div><div><div>AA Environmental Ltd Units 4-8 Cholswell Court Shippon Abingdon Oxon OX13 6HX T:(01235) 536042 F:(01235) 523849 info@aae-llp.com www.aae-llp.com</div></div></div>			
Scale NTS	Date May'19	Drg. No. Figure 2	Rev. A

APPENDIX A

Remedial Method Statement for Non-Conforming Works

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REMEDIAL METHOD STATEMENT FOR NON-CONFORMING EARTHWORKS

**Graven Hill (Land Transfer Area 1)
Bicester. Oxfordshire.**

PJ Carey (Contractors) Limited
Carey House
Great Central Way
Wembley
London
HA9 0HR

Report ref 173044/RMS/001(REV A)

September 2018 (REV A)

1. OVERVIEW

AA Environmental Limited (AAe) were instructed by PJ Carey (Contractors) Limited (Careys) to verify chemical compliance of the top 450 mm of soils within areas of completed soft landscaping against the specification presented in the Waterman Infrastructure & Environment Limited (Waterman) 'Remediation Options Appraisal and Remedial Strategy Report - Land Transfer Area 1'.

This RMS sets out the corrective measures to be adopted to remediate areas of soft landscaping where non-conformances have been identified.

2. REMEDIAL STRATEGY AND CORRECTIVE MEASURES

2.1 Removal of impacted soils from non-conforming areas

Within the specified areas, soils must be fully excavated to 450 mm below finished formation level. The non-conforming soils should be transferred to the designated materials management area and placed in a standalone quarantine stockpile on impermeable sheeting.

The stockpile will be subject to further assessment/testing to determine the suitability for re-use elsewhere on the site and/or for off-site transfer.

The volume of soil transferred and quarantine stockpile location will be recorded by the Careys Site Engineer in accordance with the Careys Materials Management Plan.

2.2 Inspection of excavated areas

Careys Site Engineer will survey the reduced level to verify that soils have been fully removed to 450 mm below finished formation level.

AAe will undertake a visual inspection of the excavated areas to verify that the non-conforming soils have been removed. Photographs of the inspections will be maintained.

In the event any suspected significant contamination is observed within the residual soils below 450 mm, then further testing will be undertaken to determine any additional controls that may be required within the affected area.

2.3 Placement of geotextile marker layer

A permeable geotextile marker layer will be placed over the residual soils. The geotextile should fully cover all residual soils and be installed up the sides of the batters/excavations.

The Careys Site Engineer should maintain photographs of the geotextile placement within each area.

2.4 Reinstatement of soils

The specified areas will be reinstated with acceptable soils (topsoil and/or subsoil) from pre-approved stockpiles only. Stockpiles of site-won or imported soil will be tested in accordance with the Waterman Remediation Strategy. All soils placed within the top 450 mm of soft landscaping areas should comply with the chemical specification presented in Appendix A.

2.5 Inspection of remediated areas

AAe will undertake a final inspection of the areas to verify that the reinstated soil has been constructed to a minimum depth of 450 mm above the geotextile marker layer. Photographs of the completed areas will be maintained.

3. VERIFICATION REQUIREMENTS

The following information and data should be maintained for inclusion within the final verification report:

- Plans showing areas of chemical non-conformance and supporting test results;
- Plans showing areas that have been subject to corrective works and remediation;
- Inspection reports from AAe presenting observations/photographs of the remedial works and any additional testing;
- Survey levels, material tracking forms and photographs of the geotextile placement from Careys; and
- Details of the stockpiles/soils used to reinstate the areas and associated certificates of analysis.

4. HEALTH AND SAFETY

Careys should undertake a health and safety risk assessment in accordance with their standard procedures to ensure that the remedial works do not pose a risk to site operatives and surrounding receptors from the recorded contaminants. Appropriate working controls (such as damping down, dust suppression), respiratory protective equipment (RPE), personal protective equipment (PPE) and quantitative air/dust monitoring should be implemented as necessary.

Author: Matthew Lawman MSc BSc (Hons)
Director

Reviewer: Jack Taylor BSc (Hons)
Principal Consultant

Date: 2nd September 2018 (REV A)

Report produced by:
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Appendix A **Remedial Criteria** **Extract from Watermans Remedial Plan**

Table B1 : Import Criteria for Hardstanding and Landscaping / Private Garden Soils

Determinant	Hardstanding Criteria, mg/kg	Landscaping and Residential Garden Soils Criteria, mg/kg	Source of Value
Arsenic	640	37	DEFRA C4SLs
Beryllium	12	1.7	LQM S4ULs 2015
Cadmium	410	22	DEFRA C4SLs
Chromium (Total)	8,600	910	LQM S4ULs 2015
Copper	68,000	2,400	LQM S4ULs 2015
Lead	2,330	200	LQM S4ULs 2015
Mercury	58	1.2	LQM S4ULs 2015
Nickel	980	180	LQM S4ULs 2015
Selenium	12,000	250	LQM S4ULs 2015
Zinc	730,000	3,700	LQM S4ULs 2015
Free Cyanide	16,000	26	Waterman GAC-CLEA v1.06
Aliphatic EC ₅ -EC ₆	5,900	78	LQM S4ULs 2015
Aliphatic EC ₆ -EC ₈	17,000	230	LQM S4ULs 2015
Aliphatic EC ₈ -EC ₁₀	4,800	230	LQM S4ULs 2015
Aliphatic EC ₁₀ -EC ₁₂	23,000	330	LQM S4ULs 2015
Aliphatic EC ₁₂ -EC ₁₆	8,200	2,400	LQM S4ULs 2015
Aliphatic EC ₁₆ -EC ₃₅	1,000,000	92,000	LQM S4ULs 2015
Aromatic EC ₅ -EC ₇	46,000	140	LQM S4ULs 2015
Aromatic EC ₇ -EC ₈ (Toluene)	110,000	290	LQM S4ULs 2015
Aromatic EC ₈ -EC ₁₀	8,100	83	LQM S4ULs 2015
Aromatic EC ₁₀ -EC ₁₂	28,000	180	LQM S4ULs 2015
Aromatic EC ₁₂ -EC ₁₆	37,000	330	LQM S4ULs 2015
Aromatic EC ₁₆ -EC ₂₁	28,000	540	LQM S4ULs 2015
Aromatic EC ₂₁ -EC ₃₅	28,000	1500	LQM S4ULs 2015
Benzene	47	0.17	LQM S4ULs 2015
Benzo (a) pyrene	35	2.7	LQM S4ULs 2015
Benzo(b)fluoranthene	44	3.3	LQM S4ULs 2015
Benzo(a)anthracene	170	11	LQM S4ULs 2015
Di-benzo(a,h.)anthracene	0.28	3.6	LQM S4ULs 2015
Asbestos	No visible asbestos containing materials (ACMs) and <0.001% fibres	No visible ACM and <0.001% fibres	


Note: Assume a Soil Organic Matter content (SOM) of 2.5%

APPENDIX B


Photo Plates - Verification Trial Pits

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Comment	Project 173044
<u>Strata comprises:</u>	Reference 3 Plot 136
0.00-0.20m Dark greyish brown sandy gravelly CLAY. Gravel is subangular fine of brick, concrete and hardcore. (MADE GROUND)	Date 18/01/19
0.20-0.45m: Dark greyish brown silty CLAY. (PETERBOROUGH MEMBER)	Originator Richard Heath  <div> AA Environmental Limited Units 4-8 Cholswell Court Shippon, Abingdon OX13 6HX T: (01235) 536042 F: (01235) 523849 info@aae-llp.com www.aae-llp.com </div>




Comment	Project 173044
	Reference 3 Plot 136 Arisings
	Date 18/01/19
	Originator Richard Heath
	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: right;"> AA Environmental Limited Units 4-8 Cholswell Court Shippon, Abingdon OX13 6HX T: (01235) 536042 F: (01235) 523849 info@aae-llp.com www.aae-llp.com </div> </div>



Comment	Project 173044
<u>Strata comprises:</u>	Reference 3 Plot 138
0.00-0.10m Dark greyish brown sandy gravelly CLAY. Gravel is subangular fine of brick, concrete and hardcore. (MADE GROUND)	Date 18/01/19
0.10-0.45m: Dark greyish brown silty CLAY. (PETERBOROUGH MEMBER)	Originator Richard Heath
	<div><p>Environmental Consultants</p></div> <div>AA Environmental Limited Units 4-8 Cholswell Court Shippon, Abingdon OX13 6HX T: (01235) 536042 F: (01235) 523849 info@aae-llp.com www.aae-llp.com</div>



Comment	Project 173044
	Reference 3 Plot 138 Arisings
	Date 18/01/19
	Originator Richard Heath
	<div style="display: flex; align-items: center; justify-content: space-between;"> <div style="text-align: center;">  </div> <div style="text-align: right;"> AA Environmental Limited Units 4-8 Cholswell Court Shippon, Abingdon OX13 6HX T: (01235) 536042 F: (01235) 523849 info@aae-llp.com www.aae-llp.com </div> </div>