

Our Ref: D3817/APT  
Linda Worthing  
Bellway House  
Kings Park  
Kingsway North  
Gateshead  
Tyne and Wear  
NE11 0JH

Date: 28<sup>th</sup> October 2016

Dear Linda,

**Inspection of Topsoil thickness – Bellway Apartments Cleadon Vale, King George Road, South Shields.**

Dunelm were instructed by Bellway Homes to visit the above site, measure the depth of the newly placed clean cover layer and ensure that a minimum of 150mm topsoil and 450mm of subsoil has been placed. The placement of the cover layer and/or topsoil will continue to be carried out in stages and this letter report covers the area of the Apartment blocks 359-374.

A detailed remediation strategy was prepared for Bellway Homes (Dunelm Report No. D3817/1).

This report indicates that where made ground containing unsuitable items (such as glass, brick etc.) exists at formation level within garden and landscaped areas, a clean cover layer is provided (comprising 450mm clean sub soil/sand and a minimum of 150mm clean topsoil).

A Dunelm Engineer visited the site on 26<sup>th</sup> July 2016, the 5<sup>th</sup> August 2016, the 20<sup>th</sup> October 2016 and the 27<sup>th</sup> October 2016 and inspected the landscaped areas adjacent to the new apartment blocks. Ten trial pits were excavated within the landscaping, the locations of the trial pits are included on the enclosed drawing.

The following clean cover makeup was encountered:

- Trial Pit 1: 150mm of Topsoil onto at least 450mm of subsoil.
- Trial Pit 2: 200mm of Topsoil onto at least 450mm of subsoil.
- Trial Pit 3: 150mm of Topsoil onto at least 450mm of subsoil.
- Trial Pit 4: 500mm of Topsoil onto at least 150mm of clay subsoil.
- Trial Pit 5: 450mm of Topsoil onto at least 100m of clay subsoil.
- Trial Pit 6: 600mm of Topsoil onto clay subsoil.
- Trial Pit 7: 600mm of Topsoil onto clay subsoil.
- Trial Pit 8: 600mm of Topsoil onto clay subsoil.
- Trial Pit 9: 600mm of Topsoil onto clay subsoil.
- Trial Pit 10: 600mm of Topsoil onto clay subsoil.

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Topsoil was predominantly described as brown clayey slightly gravelly sand (topsoil). gravel was subangular to subrounded fine coarse of sandstone, mudstone and coal.

Clay subsoil was generally described as firm light brown slightly sandy slightly gravelly clay. Gravel is subangular to subrounded fine to coarse of sandstone, mudstone and coal.

Samples of imported topsoil were taken and sent for subsequent chemical analysis at an accredited laboratory. The results (reference 15-51272) are summarised below (the full results certificate is enclosed for reference). The topsoil was noted to be generally free from debris.

The results have been compared to the relevant generic assessment criteria for a residential end use from Atkins ATRISK Database, the GAC for lead has been taken from DEFRA C4SL.

### Inorganic Test Results Topsoil

Contaminant	Units	No. of topsoil samples tested	No. of samples exceeding GAC	Generic Assessment Criteria mg/kg	Max concentration Above GAC mg/kg
pH	-	6	0	pH <5	-
Arsenic	mg/kg	6	0	32	-
Cadmium	mg/kg	6	0	10	-
Chromium (Total)	mg/kg	6	0	14.2	-
Lead	mg/kg	6	0	200	-
Mercury	mg/kg	6	0	170	-
Nickel	mg/kg	6	0	130	-
Selenium	mg/kg	6	0	350	-
Copper (GAC from MAFF)	mg/kg	6	0	135	-
Zinc (GAC from MAFF)	mg/kg	6	0	200	-
Asbestos	-	6	0	Present	None detected.

Values from LQM guidance S4UL's for residential with plant uptake enduse for a 1% SOM

\*Value for lead has been withdrawn, value is based on C4SL by DEFRA.

No significantly elevated concentrations of inorganic contaminants were recorded within the samples of topsoil tested.

An assessment of selected PAH compounds is shown in the following table together with Generic Assessment Criteria (GAC) from the LQM S4ULs.

### Summary of Results for Polynuclear Aromatic Hydrocarbons

Contaminant	Generic Assessment Criteria (mg/kg)	No. of samples tested	No. of samples with value greater than GAC	Max Concentration Above GAC mg/kg
	Resi with plant uptake			
Acenaphthene	210	6	0	-
Anthracene	2400	6	0	-
Benz(a)anthracene	7.2	6	0	-
Benzo(a)pyrene	2.2	6	0	-
Benzo(b)fluoranthene	2.6	6	0	-
Benzo(g,h,i)perylene	320	6	0	-

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Benzo(k)fluoranthene	77	6	0	-
Chrysene	15	6	0	-
Dibenz(a,h)anthracene	0.24	6	0	-
Fluoranthene	280	6	0	-
Fluorene	170	6	0	-
Indeno(1,2,3,-cd)pyrene	27	6	0	-
Napthalene	2.3	6	0	-
Pyrene	620	6	0	-

\*Values from LQM guidance S4UL's for residential with plant uptake enduse for a 1% SOM

No significantly elevated concentrations of PAH contaminants were recorded within the samples tested.

Asbestos was not detected in the samples tested.

In view of the above, Dunelm considered that the requirements set out in Dunelm's Remediation Strategy referenced above have been suitably undertaken within the landscaped areas of the apartment blocks.

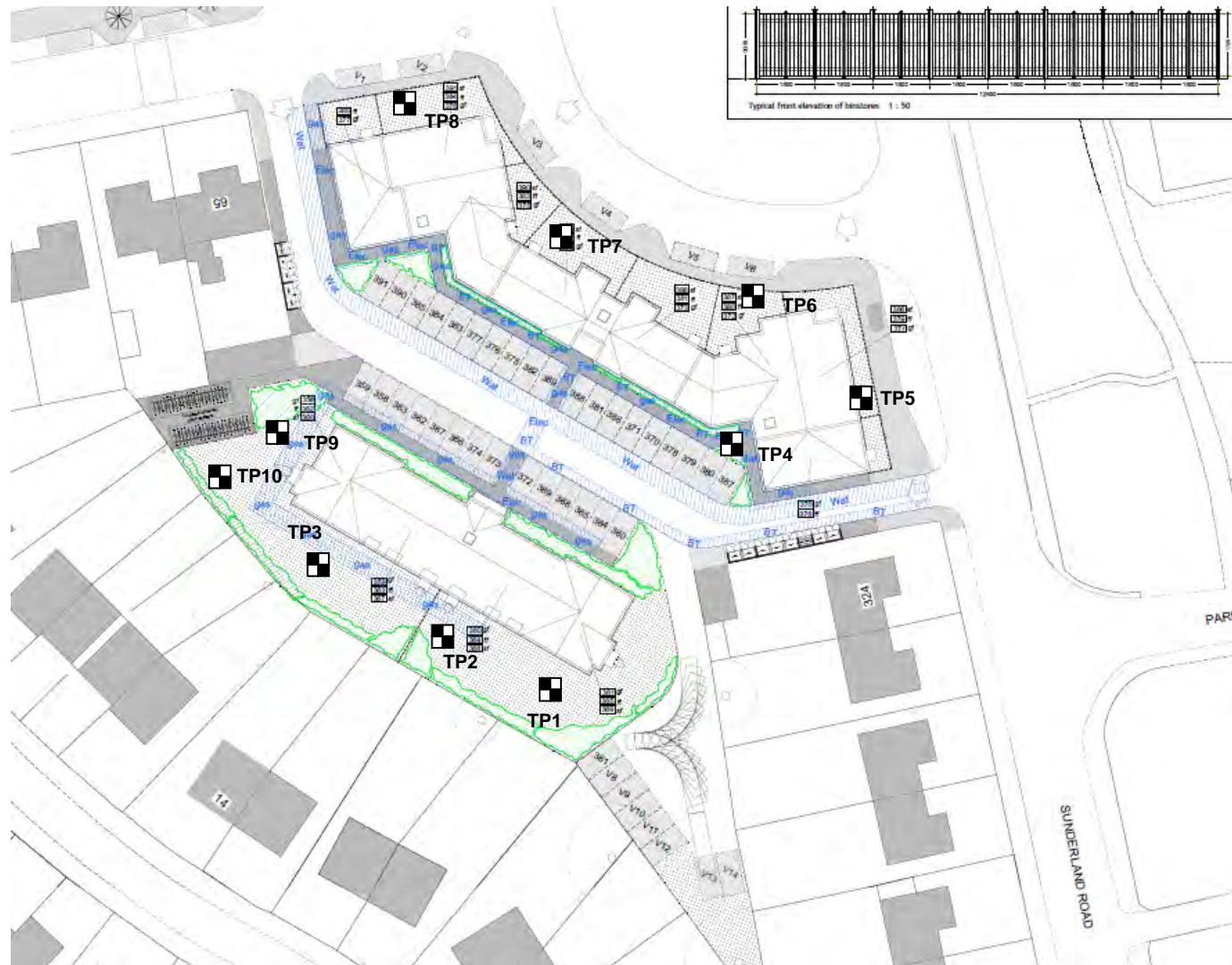
We trust that the above is sufficient for your present needs however, please do not hesitate to get in touch should you require any further information.

Yours sincerely,

James Nairn  
On behalf of Dunelm Geotechnical and Environmental Ltd

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**Contract:**  
Bellway, Cleadon

**Drawing Title:**  
Validation Trial Pit Location Plan

**Drawing No:**  
D3817-02

**Date:**  
October 2016

**Scale:**  
NTS

**Drawn by:**  
JN



## Certificate of Analysis

Certificate Number 15-51272

30-Nov-15

*Client* Dunelm Geotechnical & Environmental Ltd  
Foundation House  
St. John's Road  
Meadowfield  
Durham  
DH7 8TZ

*Our Reference* 15-51272

*Client Reference* D3817

*Order No* 7145jnd3817

*Contract Title* Cleadon

*Description* 6 Soil samples.

*Date Received* 24-Nov-15

*Date Started* 24-Nov-15

*Date Completed* 30-Nov-15

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved By*

A handwritten signature in black ink, appearing to read 'Rob Brown'.

Rob Brown  
Business Manager



# Summary of Chemical Analysis

## Soil Samples

Our Ref 15-51272  
 Client Ref D3817  
 Contract Title Cleadon

Lab No	904429	904430	904431	904432	904433	904434
Sample ID	SP1	SP2	SP3	SP4	SP5	SP6
Depth						
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	20/11/15	20/11/15	20/11/15	20/11/15	20/11/15	20/11/15
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
<b>Metals</b>									
Arsenic	DETSC 2301#	0.2	mg/kg	15	13	16	19	17	18
Cadmium	DETSC 2301#	0.1	mg/kg	0.7	0.9	1.0	0.9	0.8	0.8
Chromium	DETSC 2301#	0.15	mg/kg	36	40	36	37	33	29
Hexavalent Chromium	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	41	37	46	53	46	49
Lead	DETSC 2301#	0.3	mg/kg	75	67	82	87	81	86
Mercury	DETSC 2325#	0.05	mg/kg	0.13	0.13	< 0.05	0.14	0.14	0.17
Nickel	DETSC 2301#	1	mg/kg	28	30	32	37	30	31
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	1.1	0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	150	190	220	200	190	200
<b>Inorganics</b>									
pH	DETSC 2008#			7.7	7.4	7.4	7.7	7.7	7.7
Organic matter	DETSC 2002#	0.1	%	4.9	6.2	6.5	6.1	5.6	7.1
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	52	64	95	72	72	78
<b>PAHs</b>									
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	0.3	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1	0.3	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PAH	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

## Summary of Asbestos Analysis

### Soil Samples

Our Ref 15-51272

Client Ref D3817

Contract Title Cleadon

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
904429	SP1	SOIL	NAD	none	Colin Patrick
904430	SP2	SOIL	NAD	none	Colin Patrick
904431	SP3	SOIL	NAD	none	Colin Patrick
904432	SP4	SOIL	NAD	none	Colin Patrick
904433	SP5	SOIL	NAD	none	Colin Patrick
904434	SP6	SOIL	NAD	none	Colin Patrick

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: \* - not included in laboratory scope of accreditation.

## Information in Support of the Analytical Results

Our Ref 15-51272  
 Client Ref D3817  
 Contract Cleadon

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
904429	SP1 SOIL	20/11/15	GJ 250ml x2, GV, PT 1L		
904430	SP2 SOIL	20/11/15	GJ 250ml x2, GV, PT 1L		
904431	SP3 SOIL	20/11/15	GJ 250ml x2, GV, PT 1L		
904432	SP4 SOIL	20/11/15	GJ 250ml x2, GV, PT 1L		
904433	SP5 SOIL	20/11/15	GJ 250ml x2, GV, PT 1L		
904434	SP6 SOIL	20/11/15	GJ 250ml x2, GV, PT 1L		

Key: G-Glass P-Plastic J-Jar V-Vial T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

### Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

### Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months






Photograph 1: Validation Pit 1



Photograph 2: Validation Pit 1  
ite


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Photograph 3: Validation Pit 1



Photograph 4: Validation Pit 2


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	<b>Client:</b> Bellway Homes			
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Photograph 5: Validation Pit 2



Photograph 6: Validation Pit 2


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	<p><b>Client:</b> Bellway Homes</p>	
	<p><b>Validation Photographs</b></p>	<p>26/07/2016</p>



Photograph 7: Validation Pit 2



Photograph 8: Validation Pit 3


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	<b>Client:</b> Bellway Homes	
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Photograph 9: Validation Pit 3



Photograph 10: Validation Pit 3


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Photograph 11: Validation Pit 3



Photograph 12: View of Site


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Photograph 13: Validation Pit 4



Photograph 14: View of Site


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Photograph 11: Validation Pit 5



Photograph 12: View of Area

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	<b>Client:</b> Bellway Homes	
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Photograph 11: Validation Pit 6



Photograph 12: View of Area

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Photograph 11: Validation Pit 7



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**Validation Photographs**

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Photograph 11: Validation Pit 8



Photograph 12: View of Area


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Photograph 11: Validation Pit 9



Photograph 12: View of Area

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	<b>Client:</b> Bellway Homes		
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Photograph 11: Validation Pit 10



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**Contract:**  
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