



Windroos, Littlehampton

Remediation Validation Report

A111089

Dandara Limited

February 2020

Prepared by WYG Environment Planning Transport Limited.

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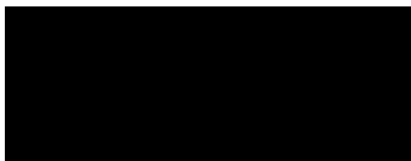
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Contents

1	INTRODUCTION	4
1.1	INSTRUCTION	4
1.2	BRIEF.....	4
1.3	LIMITATIONS	5
1.4	PROJECT TEAM	5
2	SUMMARY OF PREVIOUS REPORTS	7
3	SITE INFORMATION.....	8
3.1	SITE LOCATION.....	8
3.2	SITE HISTORY	8
3.3	GROUND CONTAMINATION	8
4	REMEDIATION STRATEGY	10
5	REMEDIAL ACTIONS.....	12
5.1	SUMMARY OF REMEDIAL ACTIONS.....	12
5.2	PRESENCE OF MADE GROUND IN SOFT LANDSCAPED AREAS	13
5.3	IMPORTED TOPSOIL SPOT CHECK	14
5.4	REACTIVE REMEDIATION STRATEGY.....	14
6	COMPLETION STATEMENT.....	15
	ABBREVIATIONS.....	16

Appendix

Appendix A – Report Conditions
Appendix B - Topsoil Testing Plan
Appendix C – Laboratory Testing Results
Appendix D – Observational Visit Records
Appendix E – Photographic Plates
Appendix F - Results of Topsoil Testing (by supplier)
Appendix G - Imported Soil Chain of Custody
Appendix H – Waste Transfer Notes

1 Introduction

1.1 Instruction

WYG Environment Planning Transport Ltd (WYG) was commissioned by Dandara Ltd to undertake validation works as per the WYG proposal dated 18th October 2018 and outlined in the Remediation Strategy Report dated February 2019. Instructions to proceed were received via email from Christian O'Brien dated 20th November 2019, 11:12.

The individual observation visits were instructed via the following emails:

- ✧ Email from Christian O'Brien dated 16th May 2019 09:43 (Site visit dated 21st May 2019);
- ✧ Email from Christian O'Brien dated 6th August 2019 17:59 (Site visit dated 16th August 2019); and
- ✧ Email from Christian O'Brien dated 12th November 2019 14:03 (Site visit dated 14th November 2019).

1.2 Brief

Conditional Planning Permission for the redevelopment of the former Stuart Lyons Haulage Depot site at Windroos, Littlehampton, has been granted by Arun Council, reference LU/229/10/, dated 28th September 2011.

Planning consent is in place for the development of 84 dwellings with two areas of public open space subject to the discharge of a number of conditions under reserved matters. Condition 5 relates to the measures needed to assess ground contamination prior to development whilst Conditions 6 & 7 relate to the requirement for a Verification Report and management of any contamination identified during development works, as detailed below.

Condition 6 requires that prior to occupation of the development a verification report demonstrating completion of the works set out in the approved remediation strategy and the effectiveness of the remediation shall be submitted and approved in writing by the local authority.

Condition 7 outlines the requirement for the identification and assessment of any contamination identified during the development works including the requirement to seek agreement for any additional works from the local authority.

The ground investigation reports outlined overleaf have been submitted in support of the partial discharge of Condition 5.

- ✧ Eastwood and Partners. June 2013. Geotechnical and Geo-environmental Site Investigation Report. On behalf of Taylor Wimpey Southern Counties.
- ✧ WYG. February 2019. Windroos, Littlehampton, Ground investigation Report on behalf of Dandara Limited.
- ✧ WYG, March 2019. Windroos, Littlehampton, Remediation Strategy Report, on behalf of Dandara Ltd.

This report is intended to support the discharge of Conditions 5, 6 and 7.

This report details the remedial actions undertaken during the development phase including validation of the work undertaken by WYG in order to discharge Condition 6. It includes a review of documentation for the movement of soils on and off-site, and the findings of observational visits to confirm that made ground has been removed from site prior to the placement of imported topsoil to proposed soft landscaped areas.

1.3 Limitations

Information provided from other sources is taken in good faith and WYG cannot guarantee its accuracy.

This report has been prepared in accordance with WYG's quote dated 18th October 2018 and the WYG Remediation Strategy Report dated March 2019. It is subject to the report conditions contained in Appendix A.

The information contained in this report is intended for the use of Dandara Ltd. WYG can take no responsibility for the use of this information by any third party or for uses other than that described in this report or detailed within the terms of our engagement.

1.4 Project Team

The parties involved in the project along with their roles are listed in Table 1-1 below.

Table 1-1 Summary of Project Team and Roles

Role	Company	Key Contact
Client	Dandara Limited Roman House South Hampshire Industrial Estate Eddystone Road Totton SO40 3SA	Christian O'Brien Engineering Manager 02382 124 061
Former Site Operator (Regional Project Manager)	Stuart Lyons Haulage Limited Toddington Nurseries Lake Lane Barnham Bognor Regis PO22 0AQ	Stuart Lyons Owner

Role	Company	Key Contact
Real Estate Agent	N/A	N/A
Demolition Contractor	Hughes & Salvidge Limited 11 Flathouse Road Portsmouth Hampshire PO1 4QS	Ian Martin Director [REDACTED]
Principal Contractor (Construction)	Dandara Limited Roman House South Hampshire Industrial Estate Eddystone Road Totton SO40 3SA	Paul Ebbs Production Director [REDACTED]
Ground works contractor	Mackoy Limited 10 Monks Brook Industrial Park School Close Chandler's Ford Eastleigh Hampshire SO53 4RA	Danny Bowers Construction Director [REDACTED]
Environmental consultants	WYG	Caroline Anderson
Regulator (Planning Officer)	Arun District Council Arun Civic Centre Maltravers Road Littlehampton West Sussex BN17 5LF	Richard Castro-Parker Case Officer [REDACTED]
Regulator (Scientific Officer, Housing and Environmental Health)	Arun District Council Arun Civic Centre Maltravers Road Littlehampton West Sussex BN17 5LF	Kate Giddings Senior Technical Officer, Environmental Health [REDACTED]

2 Summary of Previous Reports

The results of previous site investigations and risk assessments are presented in the following reports:

- ✧ Eastwood & Partners Consulting Engineers, Windroos Nursery, Worthing Road, Toddington, June 2013, for Taylor Wimpey Southern Counties.
- ✧ Ground & Water Ltd, Soakaway Testing Results Letter (ref GWPR1624) for Windroos, Worthing Road, date unknown, for Stuart Lyons Haulage Ltd c/o Paul Basham Associates.
- ✧ WYG, Windroos, Littlehampton, Interpretive Ground Investigation Report V2, February 2019, for Dandara Ltd.
- ✧ WYG, Water Supply Pipe Preliminary Risk Assessment, dated 23rd January 2019 for Dandara Ltd.
- ✧ WYG, Windroos, Littlehampton, Remediation Strategy Report, V1. March 2019 for Dandara Ltd.

The Remediation Strategy Report included a summary of the site contamination setting based on the findings of the previous ground investigations by WYG and Eastwood & Partners, with an outline of the strategy required to address any outstanding contamination risks in order to discharge Condition 6.

Recommendations included local excavation or importation of clean topsoil if made ground was encountered within areas of proposed soft landscaping, a reactive remediation strategy for contamination encountered during the construction process, if any, and recommendations for re-use of materials on the site. The report also provided a validation plan to discharge planning conditions 5.3 and 5.4.

3 Site Information

Details of the site location; historical activity and environmental setting are included in the aforementioned WYG Geoenvironmental Interpretive Report. A site location plan is included as Figure 1 and a site layout plan prior to commencement of redevelopment works is presented as Figure 2 including WYG investigation locations.

3.1 Site Location

The former site layout included a central depot area with a two-bay storage unit in the centre of the site. This was surrounded by a concrete and tarmac forecourt, with two empty residential buildings to the south. The entrance to the site is from the south east, via the A259, Worthing Road. An access track runs through the centre to the northern portion of the site. The surrounding areas of the site area are predominantly open ground.

3.2 Site History

Eastwood & Partners carried out a geotechnical and geo-environmental site investigation (report ref 35747-001R(I2), dated June 2013). As part of the investigation, a desk study was carried out and the findings are summarised below.

Historical maps indicate that prior to 1969, the site was undeveloped and formed open fields. After that time, the site appears to have been used as a nursery with glasshouses in the early 1970s, which were demolished over time. At the time of the investigation, the site was in use as a haulage facility. Planning history indicates a boiler house and refrigeration unit may have existed on the site after 1964.

3.3 Ground Contamination

Two phases of ground investigation have been undertaken on the site (Eastwood and Partners, June 2013, & WYG, 2019), the findings of which are summarised below.

- Made Ground was encountered in all locations during the WYG investigation with the exception of WS04. The general thickness of Made Ground varied between 0.05m and 0.60m, increasing locally to 1.45m associated with a former in ground tank and 3.40m in TP08 associated with former inground structures.

- ✧ Additional stockpiles of Made Ground and topsoil were also present on the site in locations identified in Figure 2.
- ✧ Made ground deposits generally comprised brown to dark brown slightly gravelly fine to coarse sand and sandy gravelly clay with brick concrete and tile fragments.
- ✧ Underlying natural strata of the River Terrace Deposits were observed to consist of soft and firm brown sandy clay and gravelly clay. The New Pit Chalk Formation was encountered underlying the River Terrace Deposits in four locations at depths ranging from 2.90m and 3.80m.
- ✧ The risk assessment presented in the WYG Ground investigation report (WYG, 2019) identified that the Made Ground deposits present on the site posed a potential risk to future site users within the context of a residential development due to the presence of elevated concentrations of:
 - Aromatic hydrocarbons (C12-16 & C16-21);
 - Polycyclic aromatic hydrocarbons (PAH): Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, naphthalene, phenanthrene
 - Lead;
 - Asbestos.
- ✧ The identified contamination on the site was not considered to pose a significant risk to the wider environment.
- ✧ Within the context of site construction workers, the risks associated with short term exposure to on-site contamination could be controlled through the use of appropriate PPE/RPE and good on-site hygiene practices.
- ✧ The analysis of three samples from the Made Ground identified the presence of asbestos containing materials in the form of loose fibres and within material described by the laboratory as 'material typical of bitumen'. Additional risk management procedures for construction workers were outlined.

4 Remediation Strategy

The remediation strategy identified the following requirements.

TABLE 2 – SUMMARY OF POLLUTANT LINKAGES REQUIRING REMEDIAL ACTION

Source	Pathway	Receptor	Remedial Action
Elevated concentrations of aromatic hydrocarbons, PAH, lead and asbestos within Made Ground	Direct contact, ingestion, inhalation	Site Construction Workers Future Site User	Either: Local excavation of Made Ground material from site and off-site disposal or re-use within areas of the site beneath areas of hardstanding / structures (subject to confirmation of suitability for re-use) Or: Importation of clean capping material to ensure that any Made Ground material is located at an adequate depth below final formation levels. Subject to the agreement of Arun District Council it is envisaged that the required depth of clean cover will be 600mm in private garden areas. Thicknesses within areas of public open space may be reduced to 450mm in conjunction with a no dig membrane, subject to agreement with Arun District Council.

In areas of the site where Made Ground is absent, no risk management procedures were considered necessary.

In addition to the management of the pollutant linkages noted above, the following management procedures were also recommended:

- Reactive Remediation Strategy setting out the procedures to identify, assess and manage any previously unidentified areas of contamination which are encountered during the development phase.
- If it is intended to re-use excavated soils within the development, a Material Management Plan, should be put in place to provide a record of material movement on the site in line with the guidance outlined in the CL:AIRE Code of Practice¹. This should be reviewed by a qualified person and a declaration should be provided to the Environment Agency prior to use of materials.

¹ CL:AIRE, March 2011. The Definition of Waste: Development Industry Code of Practice. Version 2.

- » The remediation strategy should be submitted and approved by the Planning Authority prior to development proceeding in accordance with the planning consent in conjunction with the relevant ground investigation reports.

The Remediation Strategy outlined the following records to be provided as part of the validation process:

- » Details of the actions taken to store, contain, treat, dispose or re-use any contaminated materials encountered during groundworks deemed unsuitable for use on the site;
- » Validation records from the extent of any excavations, confirming the residual material is suitable for retention on the site;
- » Results of any additional contamination testing in the event that unexpected contamination be identified during ground works, including laboratory quality assurance accreditation information;
- » Results of testing of all soils proposed for import, including information on the source location and quantity imported. Laboratory test results are to be approved by a competent person before the soils are brought to site.
- » Chain of custody documentation for any soils imported to site;
- » Records of disposal of any unsuitable soils or hazardous / contaminated materials, including waste transfer documentation if applicable;
- » Records of health, safety and environmental controls and variations to the original strategy / specification;
- » Copies of all relevant correspondence with regulatory authorities during the course of the works;
- » Confirmation that Made Ground is not present within the top 600mm of final ground levels in private gardens / 450mm in areas of public open space (subject to approval from Arun District Council) through either;
 - Record of post-remediation verification thickness of soil (if applicable) within areas of soft landscaping or;
 - Confirmation of the removal of Made Ground.
- » Photographic records as required.

5 Remedial actions

5.1 Summary of Remedial Actions

A summary of records / comments by Dandara and WYG actions to address the required remedial actions is outlined in Table 3.

TABLE 3 – SUMMARY OF REMEDIAL ACTIONS

Remedial Action Required	Dandara Comment (email dated 10th January 2020) and WYG actions
Details of the actions taken to store, contain, treat, dispose or re-use any contaminated materials encountered during groundworks deemed unsuitable for use on the site.	None encountered by the Groundworker.
Validation records from the extent of any excavations, confirming the residual material is suitable for retention on the site.	Not Applicable.
Results of any additional contamination testing in the event that unexpected contamination be identified during ground works, including laboratory quality assurance accreditation information.	Not Applicable.
Results of testing of all soils proposed for import, including information on the source location and quantity imported. Laboratory test results are to be approved by a competent person before the soils are brought to site.	Refer to the pdf '19-68247-1 North Barn Farm, Worthing, BN12 6NZ GL6101 – Copy' which is from the Groundworker's supplier called Eurogreen, Address: North barn farm, Titnore lane, Worthing, West sussex BN12 6NZ. Please also see .jpg for import top soils. (See Appendix G)
Chain of custody documentation for any soils imported to site.	Please also see .jpg for import top soils. (See Appendix G) WYG action: Topsoil sampling was undertaken by WYG on 21st January 2020 to provide an impartial 'spot-check' of imported clean topsoil. (Details below).
Records of disposal of any unsuitable soils or hazardous / contaminated materials, including waste transfer documentation if applicable	Not applicable. WYG clarification: No evidence of contamination was encountered, however made ground was encountered and was removed from site where encountered in areas of soft landscaping. Waste transfer documentation is appended.
Records of health, safety and environmental controls and variations to the original strategy / specification.	Not applicable.
Copies of all relevant correspondence with regulatory authorities during the course of the works.	Not applicable.
Confirmation that Made Ground is not present within the top	See WYG records following site observational visits

Remedial Action Required	Dandara Comment (email dated 10th January 2020) and WYG actions
600mm of final ground levels in private gardens / 450mm in areas of public open space (subject to approval from Arun District Council) through either;	(Appendix D).
Record of post-remediation verification thickness of soil (if applicable) within areas of soft landscaping or; Confirmation of the removal of Made Ground.	WYG action: Four observational visits to confirm the absence of made ground within areas of proposed soft landscaping. (Details below). Not applicable. The groundworker has not encountered any contaminated made ground and their waste haulage company was issued with the various ground investigations and associated soil samples and left the site as 'Soils and Stones Non-Haz' – documents shown in the attached pdf. (See Appendix H). WYG clarification: No evidence of contamination was encountered, however made ground was encountered and was removed from site where encountered in areas of soft landscaping.
Photographic records as required.	Not applicable.

Further visits will be required in order to validate topsoil placed in the remaining areas of soft landscaping detailed in Appendix B.

Further observational visits will be required at the two outstanding areas detailed in Appendix D.

5.2 Presence of Made Ground in Soft Landscaped Areas

The final development proposals for areas of soft landscaping comprised the removal of all made ground from site, such that imported topsoil would be placed directly on to natural soils. Validation of the absence of made ground was made through four observational visits by WYG as areas of soft landscaping were made available on the following dates:

- 21st May 2019
- 16th August 2019
- 14th November 2019

- 21st January 2020

All areas made available for inspection to-date are confirmed by WYG to be free of made ground and records of the observational visits are shown in Appendix D.

Two areas have not yet been validated in terms of made ground removal due to access restrictions, including Plots 14 to 18 and the communal soft landscaped area in the north. It is understood that these will be validated separately and reported as an addendum.

5.3 Imported Topsoil Spot Check

A single 'spot-check' visit was made by WYG to take two samples of imported topsoil for validation purposes on 21st January 2020, in accordance with the WYG Remediation Strategy which recommends one sample per 200m³ of topsoil imported. Topsoil had been placed at plot numbers 1 to 11 only at the time of the visit (see SKT-004, Appendix B) and two samples of topsoil were taken from representative volumes of roughly 400m³ of topsoil for the purpose of contamination testing.

Two shallow hand-excavated inspection pits were excavated in areas of newly imported topsoil representing Plots 1 to 11 in the southeast of the site. The samples were screened against the testing criteria outlined in the WYG Remediation Strategy report (ref A111089 V1, dated March 2019).

The results did not indicate elevated concentrations of contaminants when compared with the Residential with Plant Uptake Acceptance Criteria listed in Appendix C of the Remediation Strategy with the exception of a single sample with an elevated pH level. The alkaline level of 12.1 was encountered within sample ES1 and was sampled from Plot 10 in the south of the site. Although this falls outside of the guideline values, it is not considered to represent a risk to human health. The laboratory test results are presented in Appendix BC.

5.4 Reactive Remediation Strategy

As part of the Remediation Strategy document, the requirements for a Reactive Remediation Strategy was outlined setting out the procedures to be adopted in the event that previously unidentified contamination was encountered during development works. This set out requirements for a proactive 'watching brief' and the need to contact a suitably qualified geo environmental engineer at the earliest opportunity to ensure the associated risks were fully assessed and appropriate risk management procedures were put in place.

WYG were not contacted during the development process and understand that no previously unidentified contamination was encountered during the ground works.

Discharge of Condition 7 is therefore not required.

6 Completion statement

Based on the observations made on site and the information provided to us, and accepted in good faith, WYG consider the remedial works have been carried out in accordance with the WYG Remediation Strategy Document dated March 2019.

- WYG, Windroos, Littlehampton, Remediation Strategy, V1. March 2019 for Dandara Ltd.

The exposure pathway between the contamination identified within the Made Ground and the future site users has been effectively removed by excavation and disposal of made ground in soft landscaped areas from site. Two areas of soft landscaping require validation through observational visits and the results of these visits will be discussed in an addendum to this report.

WYG understand that no other areas of previously unidentified contamination were encountered during the groundworks.

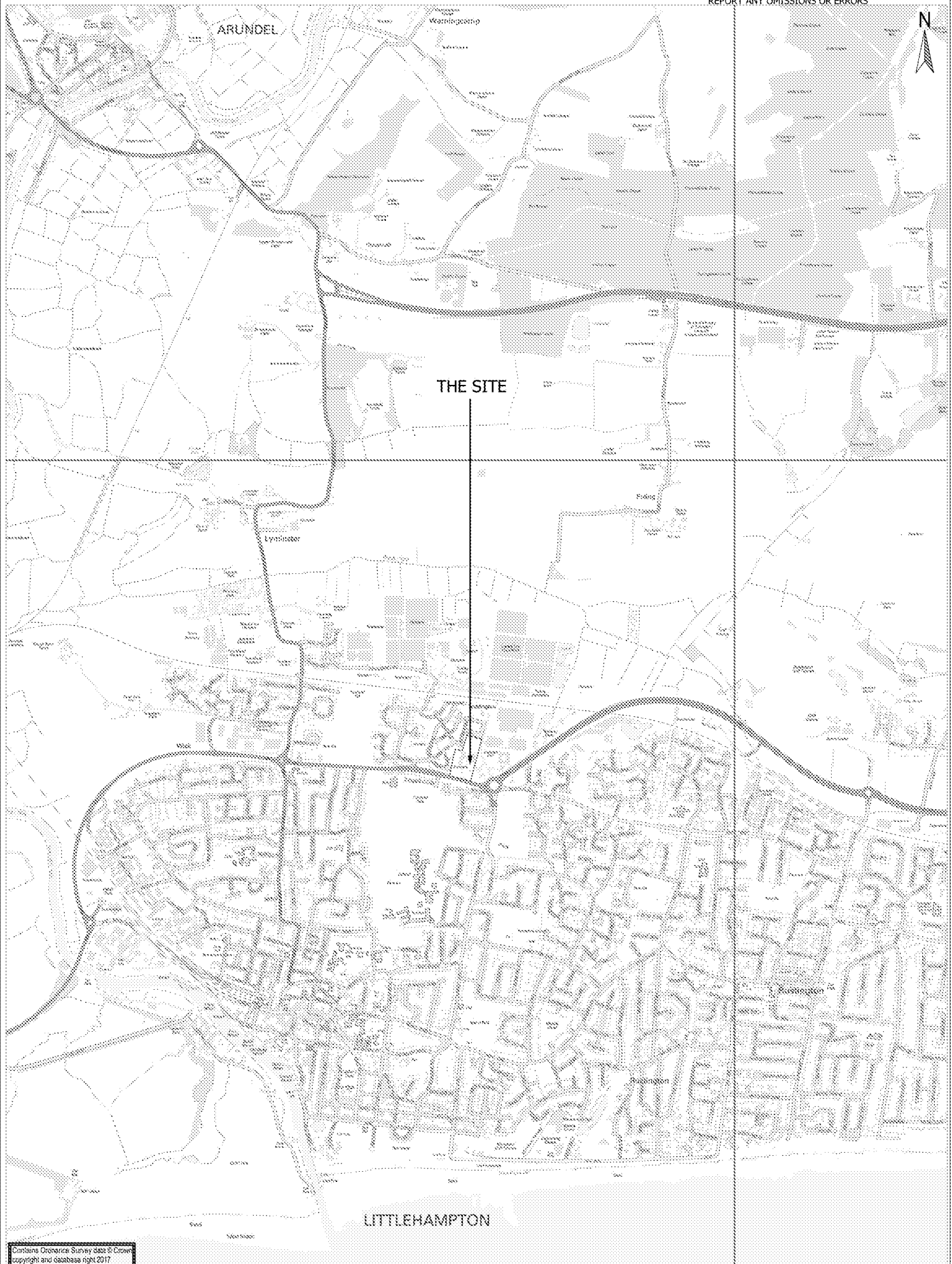
The single elevated level of pH within a single sample of imported topsoil is not considered to represent a contaminant risk to future end users, however, the pH level could inhibit plant growth at this location. Conditioning of the soil to lower the pH level could be undertaken by adding appropriate acidifying material. Advice should be sought from a qualified soil scientist.

Additional topsoil validation visits will be required once the topsoil has been placed.

Abbreviations

AOD	above Ordnance Datum
bgl	below ground level
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
DRO	Diesel Range Organics
EPH	Extractable Petroleum Hydrocarbons
EQS	Environmental Quality Standards
FOC	Fraction Organic Carbon
LOD	Limit of detection
OS	Ordnance Survey
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PPE	Personal Protection Equipment
ppm	parts per million
PRO	Petroleum Range Organics
SGV	Soil Guideline Values
SOM	Soil Organic Matter
SVOC	Semi-volatile organic compounds
TPH	Total Petroleum Hydrocarbon
VOC	Volatile Organic Carbon
VPH	Volatile Petroleum Hydrocarbons

Figures



Contains Ordnance Survey data © Crown
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REV	DESCRIPTION	BY	CHK	APP	DATE
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5th FLOOR
LONGCROSS COURT
47 NEWPORT ROAD
CARDIFF
CF24 0AD
TEL: +44 (0)29 2062 5200
FAX: +44 (0)29 2065 3371



DANDARA LTD (SOUTHERN)

Project:
WINDROOS, LITTLEHAMPTON

Drawing Title:
SITE LOCATION PLAN

Scale	Drawn	Date	Checked	Date	Approved	Date
A4	PP	08.01.19	3M	08.01.19	CA	08.01.19
Project No.	Sheet	Type	Drawing No.	Revision		
A111089	CDF	N	1	00		

Appendices

Appendix A – Report Conditions

APPENDIX A - REPORT CONDITIONS GROUND INVESTIGATION

This report is produced solely for the benefit of Dandara Ltd and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.

This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the site.

This report is based on a visual site inspection, reference to accessible referenced historical records, information supplied by those parties referenced in the text and preliminary discussions with local and Statutory Authorities. Some of the opinions are based on unconfirmed data and information and are presented as the best that can be obtained without further extensive research. Where ground contamination is suspected but no physical site test results are available to confirm this, the report must be regarded as initial advice only, and further assessment should be undertaken prior to activities related to the site. Where test results undertaken by others have been made available these can only be regarded as a limited sample. The possibility of the presence of contaminants, perhaps in higher concentrations, elsewhere on the site cannot be discounted.

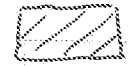
Whilst confident in the findings detailed within this report because there are no exact UK definitions of these matters, being subject to risk analysis, we are unable to give categorical assurances that they will be accepted by Authorities or Funds etc. without question as such bodies often have unpublished, more stringent objectives. This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to WYG. In time improved practices or amended legislation may necessitate a re-assessment.

The assessment of ground conditions within this report is based upon the findings of the study undertaken. We have interpreted the ground conditions in between locations on the assumption that conditions do not vary significantly. However, no investigation can inspect each and every part of the site and therefore changes or variances in the physical and chemical site conditions as described in this report cannot be discounted.

The report is limited to those aspects of land contamination specifically reported on and is necessarily restricted and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents. The opinions expressed cannot be absolute due to the limitations of time and resources imposed by the agreed brief and the possibility of unrecorded previous use and abuse of the site and adjacent sites. The report concentrates on the site as defined in the report and provides an opinion on surrounding sites. If migrating pollution or contamination (past or present) exists further extensive research will be required before the effects can be better determined.

Appendix B – Topsoil Testing Plan

AREAS VIEWED ON 21/1/20

-  = Made ground (M/G)
 = Natural
 = Area Previously Validated

-  = Top soil's garden viewed.
 ES = Topsoil Sample Collected.

VALIDATION

AS SEEN 21/01/20

NOTES

- ① Top soil sample (ES1) collected from plot 10 garden. Imported for plots 1-2, 9-11.
- ② Topsoil sample collected from stockpile imported for plots 3-8 (ES2).
- ③ Plots 27 & 28 (inc. gardens) shown at natural surface.
- ④ Plots 14-18 are still M/G (the site campaign).
- ⑤ Northern Public space is still M/G.

- LEGEND**
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WINDROOS
AMOS9
SKT-004

 paulbryson
 landscape architects

 dandara

DATE	21/01/20
BY	ARUN DISTRICT COUNCIL
FOR	ARUN DISTRICT COUNCIL
PROJECT	ARUN DISTRICT COUNCIL
LOCATION	ARUN DISTRICT COUNCIL
SCALE	ARUN DISTRICT COUNCIL
STATUS	ARUN DISTRICT COUNCIL
REVISION	ARUN DISTRICT COUNCIL
DATE	21/01/20
BY	ARUN DISTRICT COUNCIL
FOR	ARUN DISTRICT COUNCIL
PROJECT	ARUN DISTRICT COUNCIL
LOCATION	ARUN DISTRICT COUNCIL
SCALE	ARUN DISTRICT COUNCIL
STATUS	ARUN DISTRICT COUNCIL
REVISION	ARUN DISTRICT COUNCIL

Appendix C – Laboratory Testing Results

WINDROOS - TOP SOIL VALIDATION

Sample Identity	England and Wales (mg/kg) where		ES1	ES2
Depth (m bgt)	Soil Organic Matter <1%		Surface	Surface
Reference	Screen Value		200123-113	200123-113
Sample Date	Units	Below Buildings & Hardstanding	Garden & Soft Landscaping	21/01/2020
pH		<5, >9	<5, >9	7.2
Cyanide, Easily liberatable (low level)	mg/kg	24	24	<0.5
ASBESTOS	%	<0.001%	Presence	
Chrysotile (White) Asbestos				Not Detected
Amosite (Brown) Asbestos				Not Detected
Crocidolite (Blue) Asbestos				Not Detected
Comments				
HEAVY METALS/METALLOIDS				
Arsenic	mg/kg	37	37	11.3
Cadmium	mg/kg	22	22	0.2
Chromium (III)	mg/kg	910	910	16.2
Chromium (VI)	mg/kg	21	21	<0.6
Lead	mg/kg	200	200	102
Mercury (Inorganic)	mg/kg	40	40	<0.14
Nickel	mg/kg	180	pH <6 = 60, pH 6-7 = 75, pH >7 = 110	13.6
Selenium	mg/kg	250	250	<1
Beryllium	mg/kg	1.7	1.7	0.516
Boron	mg/kg	290	290	1.16
Vanadium	mg/kg	410	410	27.6
Copper	mg/kg	2,400	pH <6 = 100, pH 6-7 = 135, pH >7 = 200	28.3
Zinc	mg/kg	3,700	pH <6 = 200, pH 6-7 = 200, pH >7 = 300	109
US EPA PRIORITY PAHS				
Acenaphthene	mg/kg	210	210	0.353
Acenaphthylene	mg/kg	170	170	0.11
Anthracene	mg/kg	2,400	2,400	0.488
Benzo(a)anthracene	mg/kg	7.2	7.2	1.51
Benzo(b)fluoranthene	mg/kg	2.6	2.6	1.85
Benzo(k)fluoranthene	mg/kg	77	77	0.836
Benzo(g,h,i)perylene	mg/kg	320	320	0.972
Benzo(a)pyrene	mg/kg	5.0	5.0	1.52
Chrysene	mg/kg	15	15	1.37
Di-benzo(a,h)anthracene	mg/kg	0.24	0.24	0.154
Fluoranthene	mg/kg	280	280	3.49
Fluorene	mg/kg	170	170	0.284
Indeno(1,2,3-cd)pyrene	mg/kg	27	27	1.2
Naphthalene	mg/kg	2.3	2.3	0.195
Phenanthrene	mg/kg	95	95	1.73
Pyrene	mg/kg	620	620	3.01
TPH				
TPH Aliphatic >C5-6	mg/kg	42	42	0.0197
TPH Aliphatic >C6-8	mg/kg	100	100	0.048
TPH Aliphatic >C8-10	mg/kg	27	27	0.0726
TPH Aliphatic >C10-12	mg/kg	130	130	<1
TPH Aliphatic >C12-16	mg/kg	1,100	1,100	1.7
TPH Aliphatic >C16-35	mg/kg	65,000	65,000	3.17
TPH Aliphatic >C35-44	mg/kg	65,000	65,000	2.9
TPH Aromatic >EC5-7 (Benzene)	mg/kg	0.2	0.2	<0.01
TPH Aromatic >EC7-8	mg/kg	130	130	<0.01
TPH Aromatic >EC8-10	mg/kg	34	34	0.048
TPH Aromatic >EC10-12	mg/kg	74	74	<1
TPH Aromatic >EC12-16	mg/kg	140	140	3.38
TPH Aromatic >EC16-21	mg/kg	260	260	29.7
TPH Aromatic >EC21-35	mg/kg	1,100	1,100	80.4
TPH Aromatic >EC35-44	mg/kg	1,100	1,100	16.6
BTEX				
Benzene	mg/kg	0.2	0.2	<0.009
Toluene	mg/kg	130	130	<0.007
Ethylbenzene	mg/kg	47	47	<0.004
m-Xylene	mg/kg	59	59	<0.01
o-Xylene	mg/kg	60	60	<0.01
p-Xylene	mg/kg	56	56	<0.01

Appendix D – Observational Visit Records

 = Made Ground (M/G)
 = Natural
 = Area Previously Validated

 = Top soil
Garden viewed.

* ES * = Topsoil Sample
Collected.

AS SEC 21/01/20

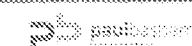
No Reg

- ① Top soil sample (ES1) collected from plot 10 garden. Imported for plots 1-2, 9-11.
- ② Topsoil sample collected from stockpile imported for plots 3-8 (ES2).
- ③ Plots 27 & 28 (inc. gardens) shown at natural surface.
- ④ Plots 14-18 are still M.C. (fine site campaign).
- ⑤ Northern Public Space is still M.C.

LEGEND

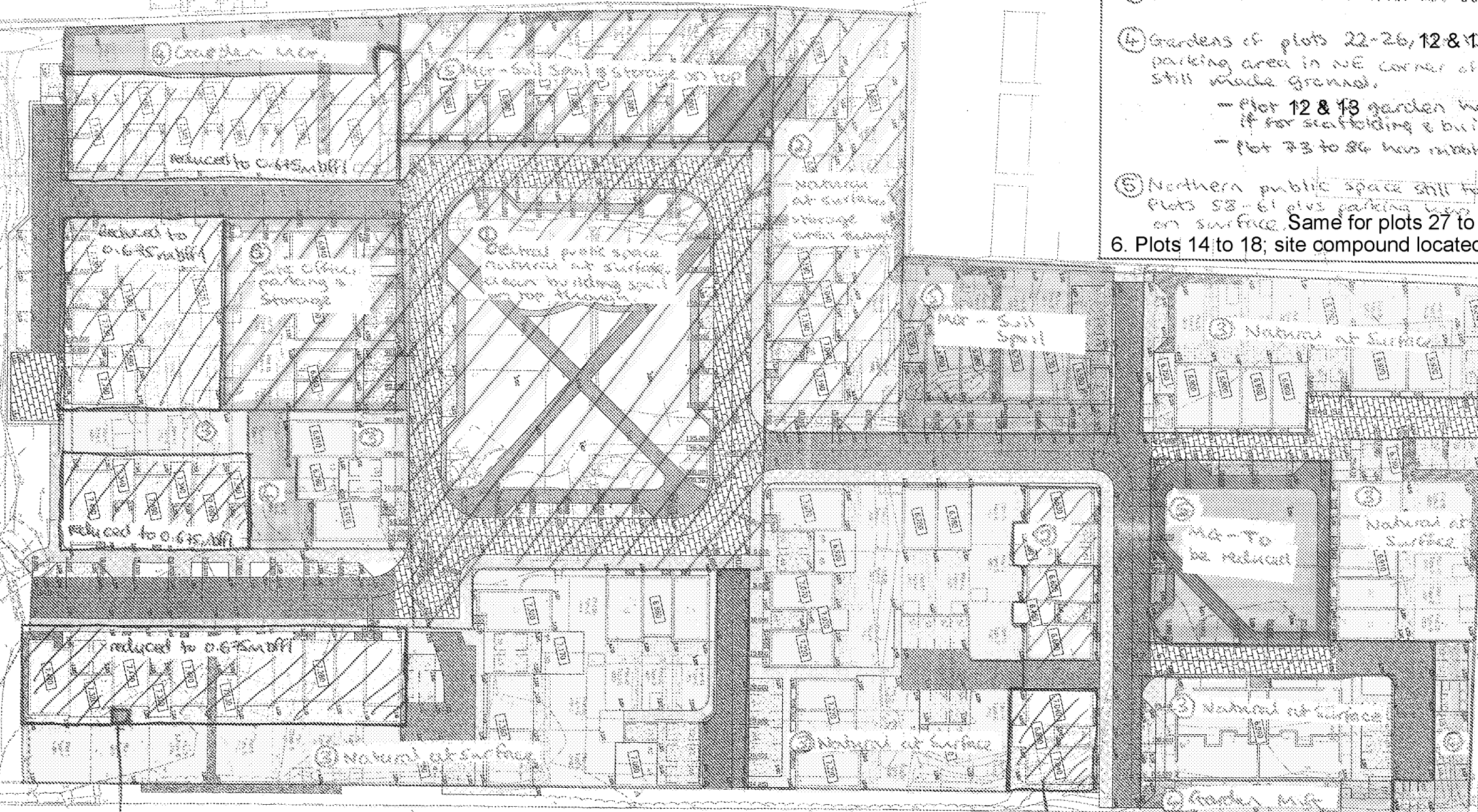
- [illegible]

WADROES
AM089
SET-004

[illegible][illegible]

Notes

- ① Central public space has been cleared to natural. Storage of building material on top. Soutaway trench in area contains material (photos taken).
- ② Plots 32-38, a house areas of plots 53-55 are cleared to natural storage currently at/on surface.
- ③ Areas are all natural at surface.
- ④ Gardens of plots 22-26, 12 & 13, 73-84, & parking area in NE corner of site are still made gravel.
 - Plot 12 & 13 garden has crush on it for scaffolding & building works
 - Plot 73 to 84 has rubble on surface
- ⑤ Northern public space still to be cleared. Plots 58-61 plus parking top soil spoil on surface. Same for plots 27 to 31
6. Plots 14 to 18: site compound located on top



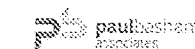
Old cesspit filled in in
early July. New built
over.

Raised to
0.675, off
with natural
spot from
green being
reduced.

WIND ROOS
AUG 89

SKT-002

5	EXPENSE TO ADJUST	11/02/00	62
6	EXPENSE TO ADJUST - SEE LINE 10000000	11/02/00	62
7	EXPENSE TO ADJUST	11/02/00	62



~~✂~~ dandara

PROCEED NUMBER			
NUMBER SEARCHED			
SERIALS			
PRINTED BY			
DATE	TIME	BY	REMARKS
63	04 02 10		6402
TOTAL COUNT		(200)	MTK 01
147-5001-113			C

 = Boundary of Area previously Validated

Notes

- ① Could not validate plots = 14-18 due to it being the site compacted location.
- ② Still Made Ground at surface: North Public Space, Plots 27 & 28. Both locations have soil stockpile on surface
- ③ Validated that surface was natural at surface:
Plots 22-26 gardens, Plots 29 to 31 (including gardens), Plots 32 to 38 (including gardens), Plots 58 to 61 (including gardens), Plots 53 to 55, Landscape strip behind Plots 73 to 84, parking in north-east site corner, & Gardens of Plots 12 & 13.

[illegible][illegible][illegible]

WINDROOS
A111089
SKT_003

C	ANSWER TO COMMENTS	11.01.19	02	A3
E	DESIGN UPDATE - SITE LEVELS ADJUST	20.01.19	02	A3
S	DESIGN UPDATE	12.01.18	02	A3

p paul bashem
associates

For more information, contact:
Kathleen C. Bashem, Esq., Southwestern Property
Attorney at Law
For a free consultation, call 1-800-451-4444

 dandara

WINDPROOF NURSERY		
POD ALIGNMENT OVERVIEW		
PRELIMINARY		
AG	04.02.19	CU 04.02.19
POD ALIGNMENT	1.000	(AT AG-02E)
147.500.011		C

Appendix E – Photographic Plates



Plate 1 21st May 2019 - Looking South to the site entrance from centre east of site.



Plate 2 21st May 2019 - Looking to the North of the site from the centre of site

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Plate 3

21st May 2019 - Plot 1 visible at natural surface.



Plate 4

21st May 2019 - Plot 2 visible at natural surface.

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Plate 5 21st May 2019 - Cesspit located on plot 2 still visible on this visit.



Plate 6 21st May 2019 - Plots 3 to 8 visible on this visit.

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Plate 7 21st May 2019 - Plots 9 to 11 visible at natural surface.



Plate 8 21st May 2019 - Plots 19 to 21 visible at natural surface. Including gardens.

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Plate 9 21st May 2019 - Plots 22 to 25 looking West, natural at surface.



Plate 10 21st May 2019 - Plots 22 to 25 looking Northwest, natural at surface.

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Plate 11

21st May 2019 - Plot 26 visible at natural surface.



Plate 12

21st May 2019 - Plots 56 and 57 raised with natural cover.

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Plate 13 16th August 2019 - General Site - Plots 1 to 8 being built.



Plate 14 16th August 2019 - Central Public Space is visible at natural surface beneath the site storage.

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Plate 15

16th August 2019 - Soakaway trenches dug in to Central Public Space show natural strata.



Plate 16

16th August 2019 - Plots 1 to 8 Gardens visible at natural surface.

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Plate 17 16th August 2019 - Plot 9 to 11 Gardens visible at natural surface.



Plate 18 16th August 2019 - Plots 14 to 18 have site compound built upon them

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Plate 19

16th August 2019 - Plots 39 to 44 looking Southeast visible at natural surface. Including gardens.



Plate 20

16th August 2019 - Plots 39 to 44 looking North visible at natural surface. Including gardens.

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Plate 21

16th August 2019 - Plots 45 to 52 looking North visible at natural surface. Including Gardens. Plots 53 to 55 gardens also.



Plate 22

16th August 2019 - Plots 45 to 52 looking Southeast visible at natural surface. Including Gardens. Plots 53 to 55 gardens also.

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Plate 23 16th August 2019 - Plots 62 to 67 looking North visible at natural surface. Including Gardens.



Plate 24 16th August 2019 - Plots 68 to 72 looking Southeast visible at natural surface. Including Gardens.

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Plate 25

16th August 2019 - Plots 73to 84 visible at natural surface.



Plate 26

14th November 2019 - Front access area of site.

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Plate 27 14th November 2019 - Plots 1 to 3 have houses built.



Plate 28 14th November 2019 - Plots 12 and 13 Gardens visible at natural surface.

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Plate 29

14th November 2019 - Plots 22 to 26 Gardens visible at natural surface.



Plate 30

14th November 2019 - Plots 29 to 31 visible at natural surface. Including gardens.

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Plate 31 14th November 2019 - Plots 32 to 38 visible at natural surface.



Plate 32 14th November 2019 - Plots 32 to 38 gardens visible at natural surface.

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Plate 33

14th November 2019 - Plots 53 to 55 visible at natural surface.



Plate 34

14th November 2019 - Plots 58 to 61 visible at natural surface. Including gardens.

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Plate 35

14th November 2019 - Close up of Plots 58 to 61 at natural surface.



Plate 36

14th November 2019 - Carpark in the Northeast corner of site is visible at natural surface (in back corner of photograph).

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Plate 37 14th Novemeber 2019 - Landscape area of Plots 73 to 84 visible at natural surface.



Plate 38 14th November 2019 - Northern Public Space is covered by a stockpile.

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Plate 39

21st January 2020 - Plots 27 and 28 at natural surface.

Plate 40

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Appendix F – Results of Topsoil Testing (by supplier)



Timon Greenwood
Southern Testing Laboratories Ltd
Keeble House
Stuart Way
East Grinstead
West Sussex
RH19 4QA

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD16 8XS

Analytical Report Number : 19-68247

Project / Site name:	North Barn Farm, Worthing, BN12 6NZ	Samples received on:	25/10/2019
Your job number:	GL6101	Samples instructed on:	25/10/2019
Your order number:	GL6101-1	Analysis completed by:	05/11/2019
Report Issue Number:	1	Report issued on:	05/11/2019
Samples Analysed:	1 soil sample		

Signature

Dr Cl
Quality Manager

For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.