

DRAFT_{Rev01}

Helix Partnership Homes Ltd

Remedial Method Statement and Verification Plan

**LAND TO THE WEST OF NURSERY MEWS,
GRAVESEND,
KENT,
DA11 7BU**

Report No: 25-02-17

March 2025

DOCUMENT RECORD

Report Title Remedial Method Statement and Verification Plan

Project Address Land to the West of Nursery Mews, Gravesend, Kent, DA11 7BU

Project Number 25-02-17

Client Name Helix Partnership Homes Ltd

Issue No Date	Status	Prepared by	Checked by
1 March 2025	Draft Report	Fiona White B.Sc. M.Sc. F.G.S. Engineering Geologist	Lee Ashworth B.Sc. M.Sc. F.G.S. Engineering Geologist
2 March 2025	Draft Report Rev01		

© This Report is the copyright of Geo-Integrity Ltd. Any unauthorised reproduction or usage by any person other than the addressee is strictly prohibited.

CONTENTS

1	FACTUAL	9
1.1	INTRODUCTION	9
1.2	DEVELOPMENT PROPOSALS	10
1.3	SITE SETTING	10
2	PREVIOUS INVESTIGATION BY GEO-INTEGRITY (REF. 24-06-12)	11
2.1	GROUND CONDITIONS	11
2.2	GEO-ENVIRONMENTAL TESTING AND ASSESSMENT	11
2.2.1	<i>Risk to End Users</i>	11
2.2.2	<i>Risk to Construction Workers</i>	12
3	REMEDIAL MEASURES REQUIRED	13
3.1	SOIL COVER LAYER	13
3.1.1	<i>Objectives</i>	13
3.1.2	<i>Criteria</i>	13
3.1.3	<i>Management</i>	14
3.2	PROTECTION OF WORKERS AND PUBLIC DURING CONSTRUCTION PHASE	15
3.2.1	<i>Objectives</i>	15
3.2.2	<i>Criteria</i>	15
3.2.3	<i>Management</i>	16
3.3	REQUIREMENT FOR MONITORING AND MAINTENANCE OF THE REMEDIAL SCHEME	16
4	WATCHING BRIEF	17
4.1	OBJECTIVES	17
4.2	CRITERIA	17
4.3	MANAGEMENT	17
4.3.1	<i>Implementation</i>	17
4.3.2	<i>Validation</i>	17
5	REFERENCES	18

APPENDICES

APPENDIX A –Figures

-  Site Location Plan
-  Cross Section of Cover System
-  Plan Showing Cover System Requirement

EXECUTIVE SUMMARY

Site Location	Land To The West Of Nursery Mews, Gravesend, Kent, DA11 7BU
OS Grid Reference	TQ 65166 71447
Objectives	 Briefly summarise the previous phased site investigations  To describe all works to be undertaken.  To describe the proposed remediation objectives and remediation criteria.  To set out the timetable of works and site management procedures.
Ground Conditions of the site	Made Ground was encountered across the site, from ground level to depths ranging between 0.20m bgl to 0.40m bgl. General Made Ground was encountered within areas of soft landscaping, and sub-base Made Ground was encountered beneath the hardstanding. Superficial Deposits were encountered beneath the Made Ground in all locations except CT 2 and SA B, and were present to depths between 0.50m bgl to 0.80m bgl. These were generally encountered as firm brown very gravelly silty dry clay, with gravel of chalk and flint. The Lewes Nodular, Seaford and Newhaven Chalk Formation (Undifferentiated) was encountered beneath the Made Ground and Superficial Deposits, to a maximum depth of 5.00m bgl where the deepest exploratory holes terminated. The chalk was generally encountered as Grade Dc to depths between 2.00m bgl and 3.00m bgl, and was underlain by Grade Dm chalk to a maximum depth of 5.00m bgl. SPT tests were undertaken within the CT boreholes, and revealed N values ranging from 14 to 35, with values generally increasing with depth. Additionally Super Heavy Dynamic Probes (DPSH) undertaken from 5.00m bgl to depths of 8.00m bgl and 10.00m bgl did not indicate any zones of weakness or dissolution features. Six samples were tested from the soils across the whole site and screened against the relevant GAC for “Residential with the consumption of home-grown produce” land use scenario, with exceedances of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene and Dibenz(a,h)anthracene in CBR 101 at 0.20m bgl and CBR 102 at 0.10m bgl.
Remediation Required	 Installation of a soil cover layer within soft landscaped areas of the site.  Protection of workers and public during construction phase.
Items to Remember	

Soil Cover Layer	 Diagrams in the appendix show x-section and area of cover layer.  Photographic evidence and spot levels before placing soil.  Ensure soil is tested before placing, (chemical suite and threshold values included in report).  Documentation (e.g. waste transfer notes) should be kept detailing the waste materials removed off site, to be included within the validation report.
Protection of workers and public during construction phase	The developer/landowner is to ensure that suitable welfare facilities are included and to ensure all ground workers have included/incorporated the risk from dermal contact of Impacted soils within their RAMS.

This executive summary must be read in conjunction with the full report text, and with the previous Geo-Integrity report (ref. 24-06-12).

REMEDIAL SCHEME REPORT

1 FACTUAL

1.1 INTRODUCTION

Geo-Integrity Ltd were commissioned by Helix Partnership Homes Ltd via email instruction on the 19th of February 2025 to produce a Remedial Method Statement for the site at Land To The West Of Nursery Mews, Gravesend, Kent, DA11 7BU.

The site is located at OS Reference TQ 65166 71447.

Previously a Phase I and Phase II Geo-environmental and Geotechnical Ground Investigation was undertaken by Geo-Integrity Limited, ref. 24-06-12, dated August 2024; this report should be referred to. The report identified that there may be a risk to Human Health (including End Users and Construction Workers) due to elevated levels of PAHs within areas of Made Ground at the site. Therefore, to break the pollutant linkage, this material needs to be excluded from the end users, and special control measures need to be in place to protect the surrounding residents and construction workers.

This remedial method statement describes the work required to bring the site to a condition suitable for the intended use by removing unacceptable risks to human health.

The objectives of this remedial scheme report are:

-  Briefly summarise the previous site investigation and desk study work undertaken.
-  To describe all works to be undertaken.
-  To describe the proposed remediation objectives and remediation criteria.
-  To set out the timetable of works and site management procedures.

The scheme has been designed with reference to BRE 465, 'Cover Thickness Design for Regeneration' (2004), The National Contaminated Land Officers Group (NCLOG) "A Regulator's Guide to Cover Systems and their Verification"; BS8485:2015; CIRIA C735:2014; HSE Document, "Protection of Workers and the General Public during Development of Contaminated Land" and LCRM.

1.2 DEVELOPMENT PROPOSALS

From the development plans provided (drawing no. 100 rev. K of job no. 7289, dated 02/07/24, from ECE Architecture) it can be seen that there will be the erection of 6no. affordable residential dwellings, emergency access / pedestrian / cycle route with associated parking and landscaping.

1.3 SITE SETTING

A site walkover was undertaken by Geo-Integrity Ltd on the 2nd of July 2024 as part of the Geo-environmental and Geotechnical Investigation (ref. 24-06-12 dated August 2024); the site description was reported as follows:

“The site is situated within a largely residential area within the town of Gravesend, Kent, and is accessed from Nursery Mews to the east. The site is roughly triangular shaped, and is generally flat-lying. The majority of the site is covered by concrete and tarmac hardstanding, with small areas of overgrown soft landscaping on the east, northwest, and running along the northern boundary. At the time of the walkover survey and site investigation, the site was disused, with a small amount of debris/refuse encountered across the majority of the site, and a parked car on the west of the site.

The site is surrounded by both metal and wooden fencing on its boundaries, except on the east of the site where it is accessed. Mature trees were present beyond and adjacent to the northern boundary of the site, and also on the west of the site.

To the north of the site is a primary school, to the west are residential dwellings, to the south is a gymnastics club and car parking, and to the east is another school and further residential dwellings.”

Site location plans and site photographs are included within the Geo-environmental and Geotechnical Investigation Report and its Appendix.

2 PREVIOUS INVESTIGATION BY GEO-INTEGRITY (REF. 24-06-12)

Information relevant to the Remedial Scheme has been summarised below, but further information on the site can be found in Geo-Integrity Ltd.'s report and should be referred to.

2.1 GROUND CONDITIONS

Made Ground was encountered across the site, from ground level to depths ranging between 0.20m bgl to 0.40m bgl. General Made Ground was encountered within areas of soft landscaping, and sub-base Made Ground was encountered beneath the hardstanding.

Superficial Deposits were encountered beneath the Made Ground in all locations except CT 2 and SA B, and were present to depths between 0.50m bgl to 0.80m bgl. These were generally encountered as firm brown very gravelly silty dry clay, with gravel of chalk and flint.

The Lewes Nodular, Seaford and Newhaven Chalk Formation (Undifferentiated) was encountered beneath the Made Ground and Superficial Deposits, to a maximum depth of 5.00m bgl where the deepest exploratory holes terminated.

The chalk was generally encountered as Grade Dc to depths between 2.00m bgl and 3.00m bgl, and was underlain by Grade Dm chalk to a maximum depth of 5.00m bgl. SPT tests were undertaken within the CT boreholes, and revealed N values ranging from 14 to 35, with values generally increasing with depth. Additionally Super Heavy Dynamic Probes (DPSH) undertaken from 5.00m bgl to depths of 8.00m bgl and 10.00m bgl did not indicate any zones of weakness or dissolution features.

2.2 GEO-ENVIRONMENTAL TESTING AND ASSESSMENT

Six samples were tested from the soils across the whole site and screened against the relevant GAC for "Residential with the consumption of home-grown produce" land use scenario. The exceedances were recorded as follows:

-  Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene and Dibenz(a,h)anthracene: CBR 101 at 0.20m bgl and CBR 102 at 0.10m bgl.

None of the samples tested identified Asbestos Containing Material (ACM).

2.2.1 Risk to End Users

Given the results of the desk study, intrusive investigation and laboratory testing, a source-pathway-receptor linkage has been identified at the site in the form of PAHs in the granular sub-base Made Ground soils of CBR 101 at 0.20m bgl and CBR 102 at 0.10m bgl, via the inhalation/ingestion of soil dust.

March 2025

Report No.: 25-02-17

To break the pollutant linkage, the impacted soils need to be excluded from End Users of the site, and special control measures need to be in place to protect the surrounding residents and construction workers.

2.2.2 Risk to Construction Workers

For the construction workers, remedial measures would not be in place when they undertake the site work and therefore different measures should be taken to reduce the risk of coming into contact with the soil and break the pollutant linkage with these receptors.

Further details on methods to reduce the risk to construction workers are provided in Section 3.2 below.

3 REMEDIAL MEASURES REQUIRED

3.1 SOIL COVER LAYER

3.1.1 Objectives

The laboratory testing of the Made Ground at the site identified that samples taken from the granular sub-base Made Ground of CBR 101 and CBR 102 had elevated levels of PAHs, and it has been established that this will provide a risk to end users of the site (should a pathway be available) and to construction workers during the groundworks. The main pathway of concern for these contaminants has been shown to be direct soil ingestion/inhalation and dermal contact.

To break the pathway between the PAHs impacted sub-base Made Ground and end users of the site, a cover system could be engineered in the areas of proposed soft-landscaping and communal planting in the areas of CBR 101 and CBR 102. Such a cover system would require a 600mm layer of clean cover, consisting of at least 150mm of topsoil. This cover system is not required in areas of hardstanding (car parks, patios and under the building), where this will break the pathway between contaminated soils and site users.

3.1.2 Criteria

The cover system would require a 600mm layer of clean cover consisting of at least 150mm of topsoil (British Sugar Landscape²⁰ is recommended); as mentioned above, a reduced thickness of 300mm could be utilised in communal areas, dependent on the agreement of the Local Authority.

Fig. 1 in the Appendices is a cross section of what the construction of the cover system should be. Reference to Fig. 2 in the Appendices indicates the areas where the clean cover system is required. Imported soils should be tested before being delivered on site for the suite of chemicals set out below. The threshold values that must be achieved are indicated besides the determinants below:

DETERMINANT	THRESHOLD VALUE (mg/kg)
Arsenic	37
Cadmium	11
Chromium	910
Copper	2400
Mercury	40
Nickel	180
Lead	200
Selenium	250
Zinc	3700
Chromium (Hexavalent)	6
Asbestos	None Present
TPH >C5-C6	42
TPH >C6-C7	70
TPH >C7-C8	100
TPH >C8-C10	27
TPH >C10-C12	74
TPH >C12-C16	140
TPH >C16-C21	260
TPH >C21-C35	1100
Naphthalene	15
Acenaphthylene	170
Acenaphthene	210
Fluorene	170
Phenanthrene	95
Anthracene	2400
Fluoranthene	280
Pyrene	620
Benzo[a]anthracene	7.2
Chrysene	15
Benzo[b]fluoranthene	2.6
Benzo[k]fluoranthene	77
Benzo[a]pyrene	5
Indeno(1,2,3-c,d)Pyrene	27
Dibenz(a,h)Anthracene	0.24
Benzo[g,h,i]perylene	320

3.1.3 Management

3.1.3.1 Implementation

The cover system will be installed by a suitably qualified groundworker appointed by the landowner/developer.

During the development it is recommended that this process of placing the cover layer is tightly monitored and recorded.

3.1.3.2 Validation

This process will be validated by Geo-Integrity Ltd. upon completion of the soft landscaping. This will be undertaken by the excavation of a suitable number of investigatory holes across the soft landscaping and communal planting areas on the site. Evidential logs and photographs will be presented in a validation report, along with confirmatory chemical testing.

Documentation (e.g. waste transfer notes) should be kept detailing the waste materials removed off site, to be included within the validation report.

Condition 8 of the planning permission stipulates the validation report to be submitted within 3 months of the accepted Remedial Method Statement. However, installation of the cover system is proposed to take place at the end of the development project to avoid disturbance during construction, and this is likely to exceed 3 months given the timescales for the works. Verification of the cover system will take place once installed.

After completion of the validation report, as the scheme either removes the source or is a physical barrier, there is no need for maintenance or monitoring of this part of the project.

3.1.3.3 Requirement for monitoring and maintenance of remedial scheme

As the remedial scheme put forward involves a physical barrier, there is no need for maintenance or monitoring of this after or during the construction phase.

3.2 PROTECTION OF WORKERS AND PUBLIC DURING CONSTRUCTION PHASE

3.2.1 Objectives

To reduce the risk to as low as reasonably practicable for the construction workers and surrounding public.

3.2.2 Criteria

It is recommended that high standards of personal hygiene should be maintained amongst the site personnel at all times. All personnel coming into contact with the soil, ground workers in particular, should be instructed to use gloves when on site to avoid dermal contact and restrict inadvertent hand-to-mouth ingestion. Washing facilities should be provided for the site staff to use and should be used prior to eating or smoking.

Reference should be made to CDM 2015, which requires the provision of suitable welfare facilities on site, and the HSE Document, "Protection of Workers and the General Public during Development of Contaminated Land".

3.2.3 Management

3.2.3.1 Implementation

The Developer/landowner is responsible for the Construction Phase Plan for the project, for ensuring that the groundworkers RAMS includes potential risks associated with contact of Made Ground on site and its mitigating measures (outlined above) and provision of suitable welfare facilities.

3.2.3.2 Validation

The Developer/landowner will ensure that their groundwork sub-contractors put their RAMS into operation throughout their time on site.

3.3 REQUIREMENT FOR MONITORING AND MAINTENANCE OF THE REMEDIAL SCHEME

As the remedial schemes put forward involves a physical barrier, there is no need for maintenance or monitoring of these after or during the construction phase. As such, it is recommended that this report be referred to and agreed by the Local Authority at the earliest convenience during the Planning stages.

4 WATCHING BRIEF

4.1 OBJECTIVES

To ensure that if any previously undiscovered contamination or sources of contamination are encountered during the construction phase, these are dealt with correctly so as not to create a long-lasting risk to human health, controlled waters or the environment.

4.2 CRITERIA

It is also recommended that a watching brief for undiscovered contamination is included in the Works Method Statement. Given the long human history of the site area, it is always possible that some previously undiscovered contamination may be encountered or possible underground structures (such as fuel tanks or pipes). If this is the case, the area should be isolated and contact be made to a suitably qualified professional for further advice. The remedial strategy should be carried out as agreed, this is particularly important if the contamination is possibly ACM or liquid based.

Documentation (e.g. waste transfer notes) should be kept detailing the waste materials removed off site, to be included within the validation report.

4.3 MANAGEMENT

4.3.1 Implementation

The Developer/landowner is responsible for the Works Method Statement for the project, and for ensuring that the groundworkers' method statement includes the procedure of the discovery strategy. The suitably qualified engineer and any sub-contractors are responsible for implementing the remedial strategy.

4.3.2 Validation

The suitably qualified engineer and any sub-contractors will be responsible for validating any remedial works undertaken. The need for maintenance or monitoring will depend on the subsequent remedial strategy.

5 REFERENCES

National House Building Council (NHBC) Standards, Chapter 4.1 Land Quality – Managing Ground Conditions. 2011.

The National Contaminated Land Officers Group (NCLOG) “A Regulator’s Guide to Cover Systems and their Verification” 2024

Health and Safety Executive (HSE), “Protection of Workers and the General Public during Development of Contaminated Land” HS(G) 66. HMSO London 1991.

Environment Agency, ‘Human Health Toxicological Assessment of Contaminants in Soil’, August 2008

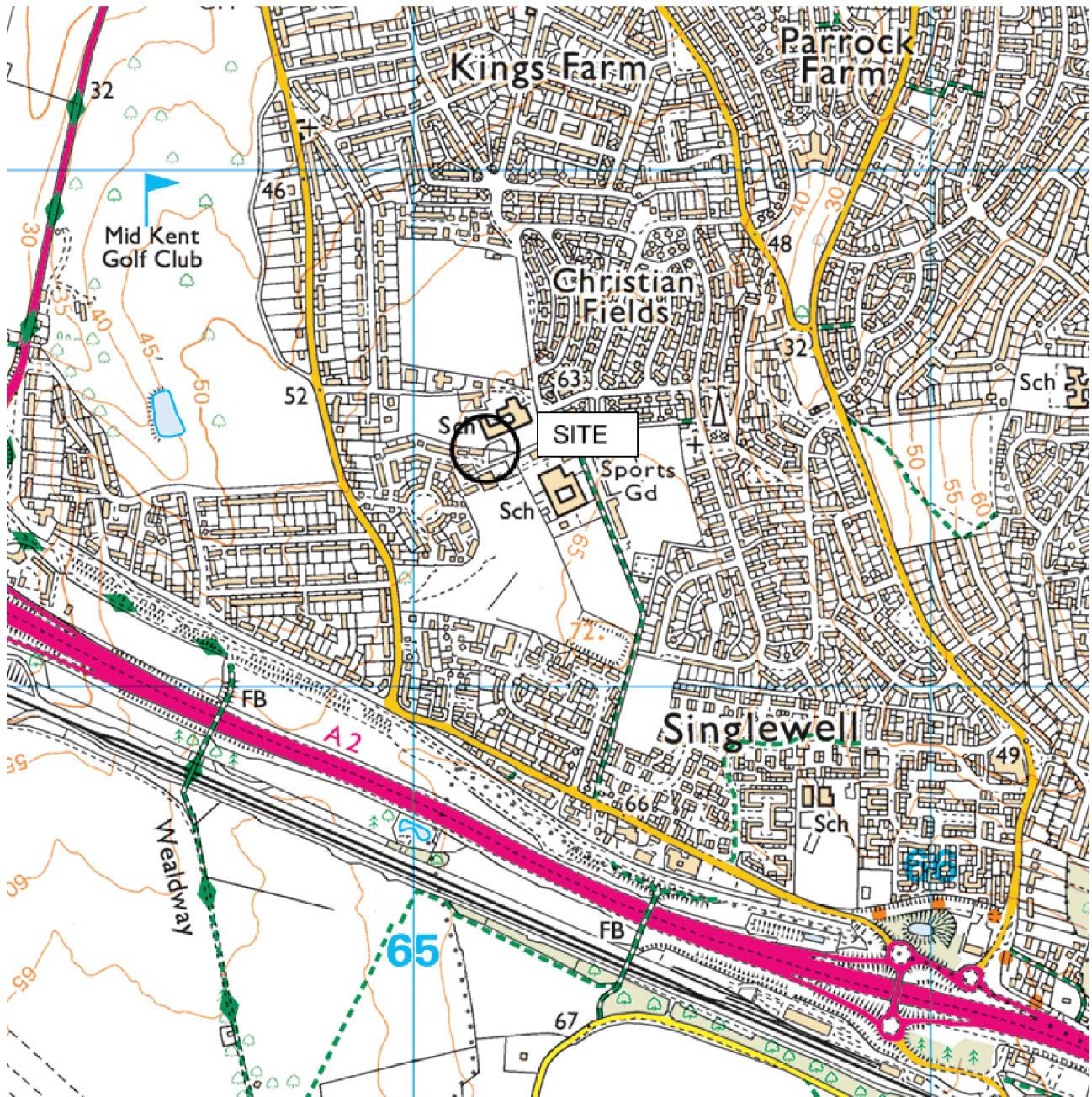
BS 1377 : 1990 : Methods of test for soils for civil engineering purposes. British Standards Institution.

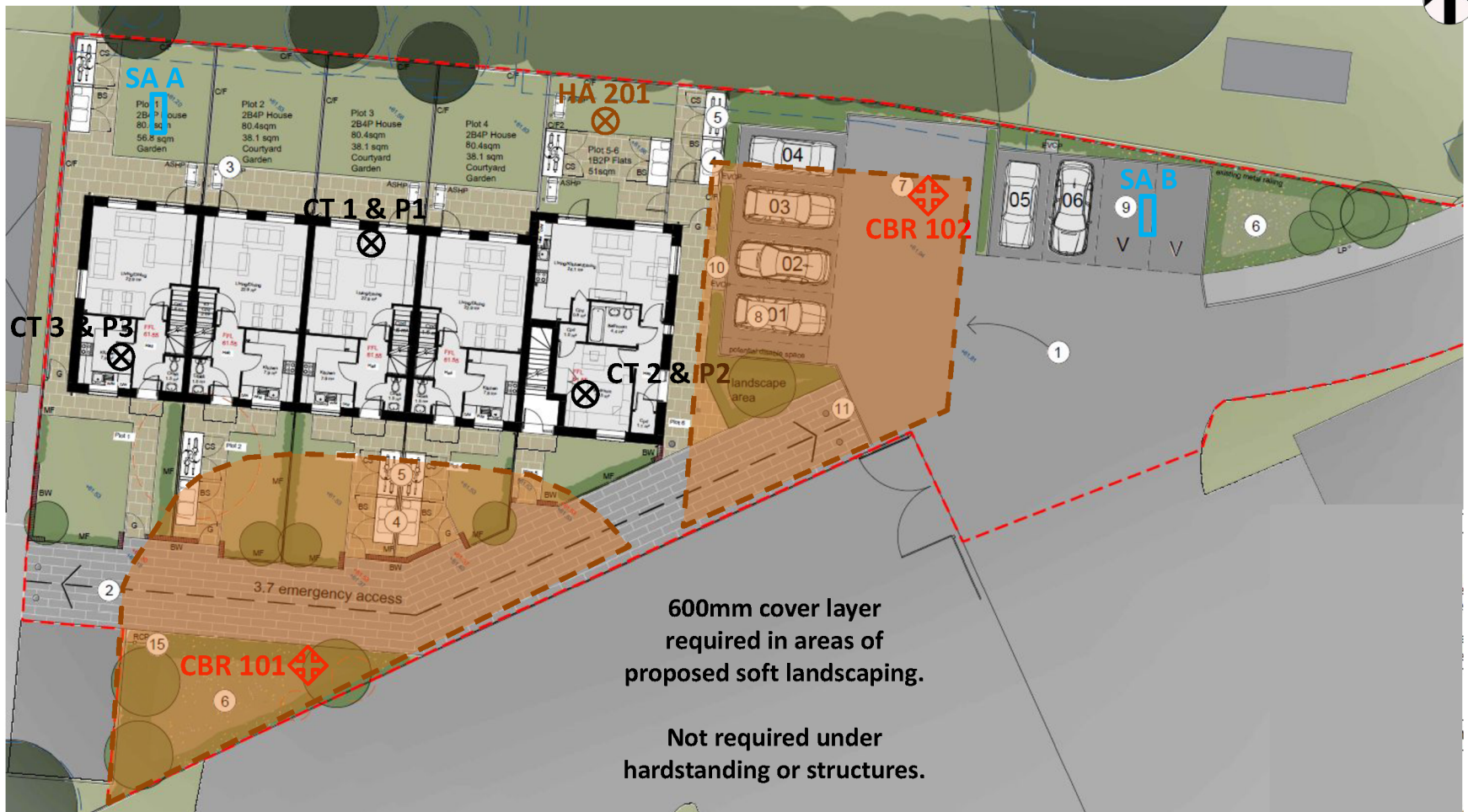
BS 5930 : 2015 : Code of practice for ground investigations. British Standards Institution.

G Card and S Wilson, An Alternative Approach for Ground Gas Risk Assessment, 2011.

BS EN ISO 14688-2:2004+A1 : 2013 : Geotechnical investigation and testing - Identification and classification of soil - Part 2 Principles for a classification. British Standards Institution. Investigation of Potentially Contaminated Sites – Code of Practice, BS10175, 2011

APPENDIX A





600mm cover layer
required in areas of
proposed soft landscaping.

Not required under
hardstanding or structures.

Key



Area where cover
layer is required;
where granular
sub-base is
encountered
beneath
hardstanding.

Cover System Plan

JOB NO.: 25-02-17

Tel:- 01280 816409
Mob:- 07858 367 125
www. geo-integrity.co.uk

SITE: Land to the west
of Nursery Mews,
Gravesend, DA11 7BU

CLIENT: Helix
Partnership Homes Ltd

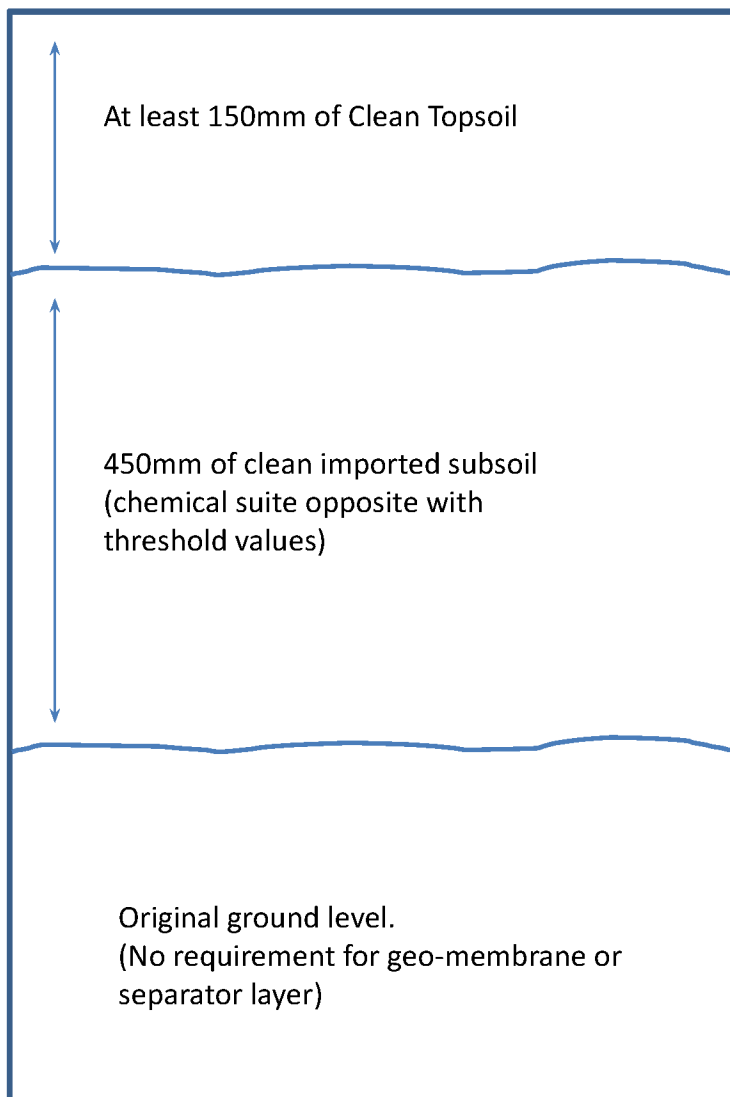
4 Church Street
Maids Moreton
MK18 1QE

Drawn
FW

Checked
LA

Scale: Not To Scale, for
indicative purposes only





DETERMINANT	THRESHOLD VALUE (mg/kg)
Arsenic	37
Cadmium	11
Chromium	910
Copper	2400
Mercury	40
Nickel	180
Lead	200
Selenium	250
Zinc	3700
Chromium (Hexavalent)	6
Asbestos	None Present
Total TPH >C5-C35	27
Naphthalene	2.3
Acenaphthylene	170
Acenaphthene	210
Fluorene	170
Phenanthrene	95
Anthracene	2400
Fluoranthene	280
Pyrene	620
Benzo[a]anthracene	7.2
Chrysene	15
Benzo[b]fluoranthene	2.6
Benzo[k]fluoranthene	77
Benzo[a]pyrene	5.0
Indeno(1,2,3-c,d)Pyrene	27
Dibenz(a,h)Anthracene	0.24
Benzo[g,h,i]perylene	320



4 Church Street
Maids Moreton
MK18 1QE

Tel:- 01280 816409
Mob:- 07858 367 125
[www. geo-integrity.co.uk](http://www.geo-integrity.co.uk)

Cover System Cross Section

SITE: Land to the west
of Nursery Mews,
Gravesend, DA11 7BU

JOB NO.: 25-02-17

CLIENT: Helix
Partnership Homes Ltd.

Drawn
FW

Checked
LA

Scale: Not To Scale, for
indicative purposes only