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Land off Military Road, Folkestone, CT20 3SP

REMEDIATION STRATEGY REPORT

On behalf of Jenner (Contractors) Ltd

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air quality assessment contaminated land ecology environmental audits noise assessment
environmental impact assessments flood risk assessments geotechnical engineering ground investigation
hydrogeology noxious weeds remediation design risk assessments waste management

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1 INTRODUCTION

Ground and Environmental Services Ltd (GES) were commissioned by Jenner (Contractors) Ltd to provide a formal Remediation Strategy Report for the proposed redevelopment site off Military Road, Folkestone.

On site remediation including the importation of suitable growth media was deemed necessary following the findings of the Geo-Investigation Report by GES (Ref: 11479) in 2015, which should be read in conjunction with this report.

The methodology proposed for the remediation work required is based on previous experience during the remediation of similar sites with similar levels of contaminants.

It is understood that the proposed redevelopment of the site would comprise the demolition of an existing single storey education centre and the construction of 40 residential units comprising a mix of flats and houses set over two storeys.

This remediation method statement report includes a brief précis of the site setting and summarises the results of the contaminated land and groundwater risk assessments previously undertaken. Details of the remedial work to be undertaken prior to the proposed development are discussed in full below.

2 SITE BACKGROUND

The proposed development site is located off Military Road at the junction with North Road and is centred on approximate ordnance survey grid reference centre: TR 200 358, and is shown to be underlain by a Principal Aquifer in the Folkestone Formation. The site is located within Groundwater Source Protection Zone III (Total Catchment).

It was reported by GES that the site was dominated to the west by a single storey brick structure formerly used as an education centre, with a tarmac-covered car park to the east, containing a small garage block to the south. To the east of the car park the ground cover was generally soft landscaped with grass, shrubs and trees.

The site had previously been in use as an artillery barracks since approximately 1870 until around 1970, when it was developed to its current use as an education centre. The sites immediate vicinity has been in use as light industrial/commercial land since approximately 1970.

Analytical testing of soils across the proposed development site was undertaken as part of the GES Geo-Environmental Investigation. The analytical results generally did not reveal significantly elevated contaminant concentrations of toxic metals when compared to current guideline values. However, significantly elevated levels of PAH and TPH, including Benzo(a)Pyrene, were encountered in various locations across the site.

The results of the gas risk assessment proved that the soil gas concentrations at the site were low and that passive gas control measures need not be included in the proposed new buildings.

3 REMEDIAL WORKS METHODOLOGY

3.1 Generic Remedial Measures

3.1.1 Enabling Works

Enabling works will be required as part of the remediation of soil contamination to ensure that the subsequent development of the site can proceed with continuity and minimise risks to programme delivery.

3.1.2 Material Handling Protocols

The remediation and redevelopment of the site will involve the excavation and removal of surplus soils for disposal off-site at an appropriately licensed facility. In order to ensure compliance with the requirements of the Landfill Regulations 2002 [and variously amended] a programme of waste segregation and classification would need to be implemented at source, to ensure that any contaminated soils are managed and disposed of appropriately. The following Soils Materials Handling Protocol would be implemented if the need arose.

Soils Materials Handling Protocol #1 – Contaminated Soils Removal	
STEP 1	Initial Segregation Plan - On the basis of the existing body of analytical data, a zonation / segregation plan will be developed. Identified pockets / hotspots will be recorded on a plan together with any discrete layers of contamination identified within the fill. This will then be used as a tool to manage and plan the excavation and removal of the fill materials to reduce the risk of intermixing / cross contamination of 'clean' and contaminated materials, and ensure that all wastes are authorised / accepted at the respective intended disposal facilities.
STEP2	Watching Brief - The excavation / sorting of soils will be undertaken under the supervision of a suitably qualified and experienced consultant / engineer to ensure that: ○ All contamination soils are classified and managed appropriately; Any contamination not previously identified is inspected, classified and managed appropriately.
STEP 3	Quarantine Area - A secure area lined with polythene sheet or skip and appropriate warning signage will be established to quarantine any suspected hazardous materials / soils. Polythene sheeting will also be available to cover any quarantined materials [when encountered] to minimise the risk of potentially contaminated run-off or hazardous effluvia being generated. Representative samples of such materials will be recovered and submitted to a UKAS and MCERTS accredited laboratory for chemical analysis including WAC testing to ensure that the materials are suitable for disposal at an appropriately licensed facility and to evaluate whether or not any form of pre-treatment is required if appropriate.
STEP 4	Verification Sampling & Testing - Samples of fill / soils will be recovered by the supervising consultant and submitted for testing by a UKAS & MCERTS accredited laboratory to ensure the correct waste classifications are assigned to contaminated materials. Once excavation and

Soils Materials Handling Protocol #1 – Contaminated Soils Removal	
	removal of contaminated soils is in progress and essentially complete, verification samples may be recovered at formation level from proposed garden areas to confirm the successful removal of identified contamination and ensure that no potentially significant contamination remains. Where reduced level excavations are required across private garden areas to facilitate the incorporation of clean soil cover layers, validation samples may be recovered from the base and sides of the excavation. Samples will be recovered at a rate of at least one sample per plot, or greater where potentially significant contamination hotspots were encountered.
STEP 5	Copies of all waste transfer notes / consignment notes for material removed from site will be collated and retained for inclusion within the validation report.

The following Soils Materials Handling Protocol will be implemented for the imported clean soils which will be required as growing medium within the proposed private garden and communal soft landscaped areas on site.

Soils Materials Handling Protocol #2 – Clean Import	
STEP 1	Initial Review of Candidate Sources Candidate sources of clean backfill / soils for soft landscaped areas will be identified. Copies of the latest soil quality reports will be obtained for review from established registered Soil Manufacturing Facilities. If the source site(s) do not comprise registered soils manufacturing facilities a review of the site history and any information relating to ground conditions will be undertaken to establish potential suitability.
STEP 2	Verification Inspection & Sampling – Source End Samples of candidate soils will be recovered at a rate of at least one sample for every 100m3 of imported soil at source for analysis by a UKAS / MCERTS accredited laboratory. In terms of soils for landscaped areas a single sample per container or planter would be sufficient and, the suitability of the soils will be assessed for compliance against 'P20' derived SSTLs defined to protect underlying groundwater in the aquifer and either appropriate Soil Guideline Values for a residential end use or the appropriate GAC threshold criteria where no SGVs exist.
STEP 3	Verification Inspection & Sampling – Receiving End Following delivery at the site, 'clean' import will be stockpiled and sampled for additional chemical analysis to ensure the chemical quality of the imported materials is consistent with the materials sampled at source. The analytical report will then be reviewed by an Environmental Scientist / Engineer to ensure that there is no significant deviation in soil quality. Once the materials have been approved, they will then be deemed suitable for use and placed within the proposed soft landscaped areas where clean soil / fill is required.
STEP 4	Verification Inspection & Sampling – Following Placement Following placement of the clean soil cover, samples will be recovered at a suitable rate and submitted for analysis by a UKAS / MCERTS accredited laboratory follow as a final level of verification.
STEP 5	Verification Report All information relating to the verification inspection, sampling and testing described above will be collated for inclusion within the Remediation Verification Report.

To minimise the risk of occupant exposure to identified ground contamination it will be necessary to provide clean soil cover systems where encountered ground contamination coincides with proposed private and communal gardens. Details of how the identified contamination will be managed together with proposals for sourcing suitable clean soils as backfill have been described in the aforementioned tables. Other specifics relating to provision of Clean Cover Systems are described below.

3.2 Growth Media

Based on the measured concentrations of TPH and PAH found in near-surface samples from the Made Ground of WS2 and WS11, it has been recommended that the contaminated Made Ground is excavated, and subsequent soil validation of the remaining in-situ soils are undertaken.

With regards to the areas which may be set to garden in the proposed development, it is noted that given the absence of suitable growth media on the site, such would need to be imported for the garden areas. GES would consider that a simple cover system would be considered suitable for the soft landscaped areas incorporating shallow rooting species such as shrubs and grasses. Based on the measured concentrations of B(a)P, approximately 550mm of soils would be required to sever the linkage of pollutants in the soil below the proposed garden areas, based on the worst-case contamination recorded on-site. It should be noted that this would be considered a conservative approach since the majority of contaminated made ground indicated in this area would be removed as part of the site enabling works. The topsoil/subsoil should comprise a minimum of 150mm top soil over approximately 400mm clean free draining subsoils. Where deep rooting trees are proposed in any landscaping it may be necessary to locally deepen the clean cover to accommodate a healthy root bowl.

In areas which are to be covered by either buildings or hardstanding, no such clean cover layer is required to sever the contaminant source to receptor pathway. However, during the enabling works the surface layer will be removed pending either off-site disposal or for reuse below buildings and hardstanding across other areas of the site.

All imported material will be from a known source, with haulage certification provided to confirm collection and delivery addresses. The material should be tested at source to confirm it is suitable for placement in areas of both private and communal gardens. The specification for the imported soils is detailed below.

3.2.1 In Situ Soils Testing

Following the placement of the imported growth media, GES will attend site to profile the depth of imported soils and retrieve any final validation test samples to be reported in the subsequent verification report.

3.2.2 Growth Media Specification

All clean imported material would be subject to analytical testing to determine its suitability for use in any private gardens or areas of soft landscaping. The soils would be tested for a range of metals and metalloids and speciated TPH and PAH. The results would be compared against the relevant C4SL.

Top soil analyses comprising tests to determine the levels of nitrogen, phosphorus, potassium and magnesium will be undertaken on the material to show its suitability as growth media.

The specifications of BS3882 regarding textural classification, loss on ignition result and maximum stone content will be met for the material including it being free of hazardous material. The major determinants proposed and respective guideline values are tabulated below.

PARAMETER	Residential		Allotment	Sources
	With Plant uptake	Without Plant uptake		
Inorganics - mg/kg unless stated				
Arsenic (inorganic)	37	40	49	DEFRA C4SL
Beryllium	1.7	1.7	35	LQM/S4USL
Boron	290	11,000	45	LQM/CIEH
Cadmium	22	150	3.9	LQM/S4USL
Chromium III	910	910	18,000	LQM/CIEH
Chromium VI	21	21	170	LQM/S4USL
Copper	2,400	7,100	520	LQM/CIEH
Lead	200	310	80	DEFRA C4SL
Mercury (Inorganic)	40	56	19	LQM/CIEH
Nickel	180	180	230	LQM/CIEH
Selenium	250	430	88	LQM/CIEH
Vanadium	410	1,200	91	LQM/CIEH
Zinc	3,700	40,000	620	LQM/CIEH
Total sulphate	2400	2400	2400	BRE (2005)
Water-soluble sulphate (g/l)	0.5	0.5	0.5	BRE (2005)
pH	<5	<5	<5	-

	LQM CIEH Generic Assessment Criteria (mg/kg dry weight soil)								
	Residential						Allotment Land Use		
	With Plant Uptake			Without Plant Uptake					
SOM %	1	2.5	6	1	2.5	6	1	2.5	6
Aliphatic									
EC 5 – 6	24	40	80	24	40	80	752	1730	3900
EC > 6 – 8	52	110	250	52	110	250	2304	5580	13000
EC > 8 – 10	13	30	70	13	30	70	321	770	1700
EC > 10 – 12	60	150	360	60	150	360	2153	4300	7150

In addition, testing will be carried out to classify the material according to its type and texture and to ensure conformity to the following ranges,

- ### 3.3 Service Runs

Elevated levels of organic contaminants were generally not detected at depths corresponding to likely service run depths across the site, however certain PAH concentrations did exceed stringent UKWIR target concentrations. Contaminated near surface Made Ground is likely to be removed from the site as part of the site enabling works. As such, the risk to services from residual contamination degrading pipes is considered low to moderate. It is considered prudent to confirm with the statutory providers whether it will be necessary to protect services, notably potable water, on this site.

Suitable systems include barrier pipe, iron ductile pipework or placement in trenches backfilled with clean imported material. It is recommended that the advice of the service provider is sought regarding the most suitable options for this site.

In the event that any stained material or material showing olfactory evidence of contamination, in either the soil arisings or service trench sides/base, is discovered during the excavation of the service runs then such material would be chased out to its origin. Regardless of whether any contamination is noted in these trenches the backfill material would be an engineering grade aggregate material likely to be single size gravel material.

3.4 Site Derived Dust

In order to mitigate site derived wind-blown dust water suppression sprays will be used during construction works to dampen soils to limit the potential for dust generation.

3.5 Asbestos

Whilst asbestos containing material (ACM) has not been found to date it is considered possible that asbestos containing material may be present in hardcore underlying the existing site buildings.

In the event that suspected asbestos containing material or soils are encountered during the demolition/enabling works then the extent of such will be delineated under the supervision of a suitably competent consultant/engineer and the material will be removed from site in accordance with the hazardous waste regulations. If asbestos-containing material is found on site, then all the documentation regarding its remediation including duty of care and waste transfer notes would be forwarded to Jenner (Contractors) Ltd.

4 DISCOVERY STRATEGY

In light of the results of the chemical testing undertaken to date on site it is considered that sources of contamination, in the form of discrete hotspots may be present on the site, which were not detected during the previous intrusive investigations. Should such contamination be identified or suspected during the site clearance or the ground works, these should be dealt with accordingly, by informing all parties involved with the site and drafting new contamination proposals if necessary. A number of options are available for handling any such material, which include:

- The removal from site and disposal to a suitably licensed landfill of all material suspected of being contaminated.
- Short-term storage of the suspected material while undertaking verification testing for suspected contamination. The storage area should be a contained area to ensure that contamination does not migrate and affect other areas of the site. Depending upon the amounts of material under consideration, this could be either a skip or a lined area.

- Treatment of the identified contamination as discussed above.
- Having a suitably experienced Environmental Engineer either on-call or with a watching brief for the visual and olfactory assessment of the material, and sampling for verification purposes. Given the nature of the site and the contaminants encountered during the site investigation, this option would likely be considered the most viable.

GES will provide a suitably qualified member of staff to act as the watching brief. The watching brief will then inspect the exposed underlying soils for any visual evidence of soil contamination. A walkover will also be carried out with a Flame-Ionising Device, or FID, which will identify the presence, if any, of any volatile organic compounds in the sub soils. In the event that potentially contaminated material is identified during this site walkover, samples will be taken for subsequent laboratory analysis. Should any groundwater be discovered, samples would be recovered for testing.

Should a new source of contamination be suspected or identified then the local Contaminated Land Officer would be informed. A report indicating the nature of contamination and how this is to be dealt with would be submitted to their department and for their agreement. Any necessary remediation would then be detailed and verified in a remediation statement.

GES can confirm that such a watching brief exists on this site and should any contamination or potentially contaminative sources be discovered during the proposed demolition/enabling works all site works would cease and suitably competent consultants/engineers will attend site.

5 REMEDIATION VERIFICATION REPORT

Following the implementation of the remedial measures recommended and the subsequent imported soil validation testing proposed a detailed Remediation Verification Report will be prepared and presented to the pollution team at Shepway District Council.

This report will include a full description of the site works and remediation undertaken complete with photographic evidence, duty of care documentation pertaining to any soils which are removed from site and chemical test results confirming the suitability of the remaining soils on site for the intended site end use.

6 COMMENTS

Significant levels of mobile contamination were not proven on site. However, low level contamination was found in the form of B(a)P. The only areas on site which could present such a pollutant to receptor pathway would be the private garden and soft landscaped areas. The importation of appropriately certified clean growth media to such areas will sever the linkage and the remaining links to future site users would be considered to be low.

Land off Military Road, Folkestone, CT20 3SP

Remediation Strategy



The protection of services, notably potable water, may be required on this site. Suitable systems include barrier pipe, iron ductile pipework, or placement in trenches backfilled with clean imported material. It is recommended that the advice of the service provider is sought regarding the most suitable options for the site.

Based on the nature of the proposed development the site would not be considered to pose a potential risk of significant harm to human health in the context of Part 2A following the remediation highlighted above.

Following the implementation of the remedial measures recommended, a detailed Remediation Verification Report will be prepared and presented to Shepway District Council.