

Appendix D - Sampling Procedures

- Soil Sampling Procedure
- VOC Sampling Procedure
- Crop Sampling Procedure

Remediation Services

Grenfell Stage 2 Soil Sampling Protocol

1. Purpose and Scope

This document describes the standard field procedure to be used by AECOM Remediation Services personnel to collect soil samples for project 60632092. It relates specifically to the collection of soil samples from the following types of location:

- Surface or near-surface soil (primarily 0-2cm, maximum depth of 5cm where thick turf root zone prevents 0-2cm depth)
- Sub-surface soil to a maximum depth of 60cm.

The soil samples are to be collected for subsequent laboratory analysis, and for the logging of the soil conditions encountered.

The objective is to collect a sample that is representative of the soil condition at the chosen sample location, including both the chemical composition and the geological consistency of the material.

Identified sample locations will be either discrete random sample locations chosen within the target area, or locations positioned on a systematic (regular) grid pattern.

The individual random samples should be of ground that appears to be representative of the typical ground conditions in the area being sampled. If there is visual and/or olfactory evidence of localised potentially contaminated soil, an additional targeted sample should also be taken in a visually/olfactorily uncontaminated location.

In all cases, care needs to be taken not to change the chemistry of the sample. This means minimising the disturbance of the soil and minimising the time taken to take the sample as far as reasonably practicable. It also means storing and transporting the sample as per the guidelines below.

2. Procedure

1. **Decontaminate equipment.** prior to first use each day and after collection of each sample, all equipment that comes into contact with samples should be decontaminated (see AECOM FP07 Decontamination of Equipment). This should involve the use of de-ionised water and plant-based detergent.
2. **Prepare sample containers.** Ensure that all necessary laboratory sample containers are available and correctly labelled. Minimum information should include project code, sample code (including depth if relevant), and time/date. Refer to laboratory chain of custody for full information requirements. If sample pre-coded barcodes are being used, check that barcodes refer to correct sample code.
3. **Identify sample location.** Sample locations will be indicated in the sampling plan. These are indicative locations and are subject to site conditions and constraints. If on the day of sampling specific locations are not accessible, alternative locations can be chosen. Consult with the Project Manager if this situation arises. Sampling locations should be consistent with the overarching aims of the sampling and consistent with the location details listed in Table 06 of the Grenfell Stage 2 Detailed Design.
4. **Photograph sample location.** Sampling locations should be photographed using a trial pit board / pre printed sheet with size and colour scales. The sample location code must be as per the sample plan, and the sample location should be recorded using GPS coordinates and/or by surveying or by reference to a detailed site plan, so that the locations can be re-visited if necessary. If a GPS is used, its calibration must be checked by recording the coordinates of at least two known site features (such as corners of major buildings).
5. **Wear dedicated disposable gloves at each location.** Use a dedicated clean pair of disposable nitrile (powder free) gloves should be worn at each location and all reasonable measures taken when conducting the work to avoid cross-contamination of samples.

6. **Damp down sample area.** If the ground is damp, no further damping down is required. If the ground is dry and dusty, damp down the ground before and during sampling using a hand-held water mister. This helps minimise the generation of airborne dust (and asbestos fibres if present) during sampling. Avoid excessive use of water which would make sample more difficult to handle.
7. **Clear sampling area.** Remove vegetation and surface debris that is not to be sampled. Sampling area should be a minimum of 50cm x 50cm square. Lay down an approximate 70cm x 70cm piece of clean unused plastic sheeting next to the sample location, on which the soil targeted for sampling will be placed.
8. **Confirm sampling depth requirements.** Samples need to be taken (dependent on specific location) at either:
 - a. 0-2cm for turfed areas and undisturbed bare soil (e.g. soil beds with perennials and trees). If impractical due to thick turf, this may be extended to 0-5cm;
 - b. 0-5cm for areas of disturbed bare soil (e.g. in flower beds where annuals are grown).
 - c. 0-20cm for soil samples in areas where edible crops are grown
 - d. 50-60cm where deeper soil samples are required
 - e. At the root zone of the paired plant being sampled, typically in the 0-20cm depth horizon.
9. **Confirm requirement for duplicate sample at sample location.** Duplicate samples are required at 5% of locations. The requirement for a duplicate sample is specified in Table 06 of the Grenfell Stage 2 Detailed Design.
10. **Remove overburden soils to reach target sampling depth.** Using a decontaminated unpainted stainless-steel hand trowel a square area 50cm x 50cm of soil should be cleared to the required sample depth. If turf is present and a 0-2cm soil sample is required, carefully remove as much soil as possible from the turf [note step 11 below for VOC samples – a core should be taken through the turf for the VOC sample if possible]. The soil removed from the turf should form as much of the 0-2cm sample as possible. Overburden soil should be carefully placed to the side of the sample location for subsequent use as backfill to restore the sample location once the required soil sample has been recovered.
11. **Collect soil sample.** Samples for VOC testing must be taken before the soil at the designated sampling depth is disturbed. The sample vial for VOC laboratory analysis should be filled immediately to minimise volatile losses and the sampling must be done in accordance with BS10176:2020. This requires the use of methanol containing vials and the use of dedicated miniature corers/plungers to extract the required soil plug. Where the soil is too coarse or non-cohesive for the use of the corer/plunger, soil should be sampled using the trowel. If the use of a trowel is required, ensure soil disturbance is kept to a minimum and that the soil is placed in the methanol containing vial as quickly as possible. **Refer to FP27 for further details on the specific method for VOC samples.** After the VOC sample has been taken, using a decontaminated unpainted stainless-steel hand trowel a square area 50cm x 50cm of soil should be removed from the required depth interval and placed on to the clean piece of plastic sheeting in preparation for taking the remainder of the required samples for laboratory analysis.
12. **Mix soil sample and fill required pre-labelled laboratory sample containers.** Plant roots and other debris should be removed as far as is reasonably practicable from the remainder of the sample. If the soil is sufficiently granular, the resulting soil should be thoroughly mixed on the sheet using the hand trowel before being placed in the required laboratory sample containers (see below for laboratory sample container requirements). See AECOM FP24 Soil Sample Volume Reduction and Sub-sampling by Cone and Quartering for a method for sample mixing. If the sample is cohesive and cannot be easily mixed this should be noted in the field records and the sample transferred to the sample containers without mixing.
13. **Duplicate samples.** Where specified in the sampling plan these samples should be taken following the cone and quartering of the original sample, not by taking a further sample from the ground adjacent to the original sample.
14. **Record oversize fraction that could not be sampled.** Oversize fractions of sample that cannot be sampled in the required containers should be described in the field notes for each individual sample.
15. **Record logging description of soil.** A written record of the soil strata encountered should be made using AECOM's soil logging proforma. Soil descriptions should be in accordance with BS590:2015+A1:2020 and AGS guidance on the description of anthropogenic materials.

16. **Photograph sampled location and filled sample containers.** Photograph the filled sample containers alongside the sampled location. Use the same trial pit board / pre printed sheet with colour and size scale as per Step 4.
17. **Secure samples for transportation.** Samples should be securely packaged for transportation as soon as possible using the appropriate packaging containers provided by the laboratory. Samples should be stored and transported according to the analytical laboratory guidance provided, including sealing to prevent evaporative losses and maintenance of a stable temperature (generally in the range 0-4 degrees C where practicable to do so).
18. **Reinstate sample location.** Backfill sample hole using excavated soil and replace turf (if originally present). Compress soil lightly in layers by foot when backfilling to minimise future depression of soil in area of sampling (not applicable in raised beds used for growing crops). A bagged supply of certified topsoil should be available to complete reinstatement as necessary. If further reinstatement or turf replacement is required, this will be recorded in the site notes for subsequent implementation.
19. **Photograph reinstated location.** This photograph should aim to replicate that taken in Step 4 and should be sufficient to show that reinstatement is satisfactory.
20. **Complete and check sample Labelling and Chain of Custody.** Ensure all required information is provided on sample labels and chain of custody (see Step 2). Sample time and sample location are not entered on the Chain of Custody for duplicate samples. This information must be recorded with the site personnel's notes or on a detailed plan for future QA/QC procedures.

3. Responsibilities

It is the responsibility of the Project Manager to produce and communicate the Sampling Plan to field staff and ensure that this Sampling Protocol aligns with that Sampling Plan.

It is the responsibility of field staff to understand and comply with the Sampling Plan and this Sampling Protocol.

4. Equipment

- a. 1 x small clean stainless-steel (unpainted) trowel
- b. 1 x set of laboratory sample containers as per Sample plan requirements, including:
 - i. 1 x 950ml plastic tub.
 - ii. 2 x 270ml amber glass jar.
 - iii. 5 x 74ml amber glass jar.
 - iv. 2 x 40ml glass liquid vial.
- c. 1 x clean plastic sheeting
- d. 1 x chilled sample container
- e. 1 x container of de-ionised water (plus detergent if required)
- f. 1 x hand held or backpack-type water sprayer (if ground conditions are expected to be dry and dusty).
- g. 1 x disposable cleaning cloths
- h. 1 x camera
- i. 1 x digital device to record and submit field notes, soil log, and chain of custody

5. Terms and Definitions

Not required.

6. References

- a. AGS Guide to Environmental Sampling, Association of Geotechnical and Geoenvironmental Specialists, 2019
- b. AGS Guidance on the Description of Anthropogenic Materials – A Practitioners’ Guide, Association of Geotechnical and Geoenvironmental Specialists, 2018
- c. BS5930:2015+A1:2020 Code of practice for ground investigations, British Standards Institution, 2020
- d. BS 101075:2011+A2:2017 Investigation of potentially contaminated sites – Code of practice, British Standards Institution, 2017
- e. BS 10176:2020 Taking soil samples for determination of volatile organic compounds (VOCs) – Specification, British Standards Institution, 2020
- f. BS ISO 18400-102:2017 Soil quality – Sampling. Part 102: Selection and application of sampling techniques, British Standards Institution, 2017
- g. BS ISO 18400-105:2017 Soil quality – Sampling. Part 105: Packaging, transport, storage and preservation of samples, British Standards Institution, 2017
- h. BS ISO 18400-201:2017 Soil quality – Sampling. Part 201: Physical pretreatment in the field, British Standards Institution, 2017
- i. BS ISO 18512:2007 Soil Quality – Guidance on long and short-term storage of soil samples, British Standards Institution, 2007
- j. AECOM Soil Logging Guide version 2, 2019
- k. AECOM Field Procedure FP24 Soil Sample Volume Reduction and Sub-sampling by Cone and Quartering, Version 1.1, June 2019
- l. AECOM Field Procedure FP27 Soil Sampling for VOCs, Version 1.0, September 2020

7. Records

- a. Laboratory Chain of Custody
- b. Soil logging record
- c. Photographic record
- d. Daily field diary

8. Appendices

- a. Attachment 1 – Soil logging forms

9. Change Log

List the change history pertaining to this document including if it was identified differently throughout its life-cycle:

Rev #	Change Date	Description of Change	Location of Change

Attachment 1

Stage 2 Grenfell Potential Land Contamination Soil Sampling Proforma

Project Reference: 60632092		Date:	
Sample Area Name:			
Sample Area No.:		Time Start:	Time complete:
Weather Conditions:			
Field team:			
Soil Sample number			Sample taken (tick)
GTCS2 - S			
Photo subject	Photo taken (tick when taken)	Photo checked (tick when checked)	Photographer name (camera ID if different)
1 st undisturbed sample location			
2 nd sample excavated on plastic sheeting			
3 rd sample in sampleware			
4 th sample location reinstated			
Sample log			
Observed CoPC: (note of any ash etc.)			
Further reinstatement required (Yes or No)			
Sample location marked on attached map with measurements (tick)			
Tools decontaminated after sampling and reinstating (tick when decontaminated)			
Additional Notes			

Stage 2 Grenfell Potential Land Contamination Soil Sampling Proforma – deeper samples

Project Reference: 60632092		Date:			
Sample Area Name:					
Sample Area No.:			Sampling Time :		
Weather Conditions:					
Field team:					
Soil Sample number			Sample taken (tick)		
GTCS2 - S			0 - 0.2m	0 - 0.5m	0.5 - 0.6m
Photo (<i>tick in box when done</i>)	Photo taken 0 - 0.2m	Photo taken 0 - 0.5m	Photo taken 0.5 - 0.6m	Photos checked	Photographer name (camera ID if different)
undisturbed sample location					
samples excavated on plastic sheeting					
samples in sampleware					
sample location reinstated					
Sample log					
Observed CoPC: (note of any ash etc.)					
Further reinstatement required (Yes or No)					
Sample location marked on map with measurements (tick)					
Tools decontaminated after sampling and reinstating (tick when decontaminated)					
Additional Notes					

Soil Sampling for VOC Analysis Using Methanol Preservation

1. Purpose and Scope

The purpose of this procedure is to set out the default approach to sampling soil for VOC analysis in accordance with BS10176:2020. This procedure is only applicable to sampling for VOCs, not for other less volatile contaminants. It does include analysis for VOCs, BTEX (and potentially GRO, subject to laboratory capabilities and requirements).

The procedure is mainly applicable to fine to medium grained cohesive or moderately cohesive soils that can be sub-sampled using a miniature coring device. Exclusions are set out for coarse and non-cohesive soils.

The principal procedure adopts the use of methanol as a sample preservative. There are alternatives set out in BS10176, including the use of sodium hydrogen sulphate or water as preservatives, or the use of sealed cores.

It is imperative that the specific requirements of the chosen laboratory are known prior to the field work commencing as these requirements may vary from lab to lab.

2. Procedure

The steps below outline the procedure to take when using 40ml methanol preservative sample vials. The alternative procedure for coarse soils is detailed in Section 3. Further detail on this option is provided in BS10176 Clause 6.6.

- Safety.** Methanol is a toxic and flammable liquid. Refer to the project-specific SHE Plan for further details. Note that these details should include the provision of appropriate PPE and access to washing and first aid facilities. Methanol containing vials should only be used in well ventilated areas. Additional care should be taken to avoid spillage/breakage of the methanol-containing vials. Surplus vials containing methanol should be returned with the samples to the originating laboratory in a safe and secure manner using the appropriate transportation packaging provided by the laboratory.
- Applicability.** Sampling using miniature corer-type device and 40ml vials should only be used if the maximum grain size is less than 3mm. For coarser materials, refer to the alternative method in section 3.
- Set out sampling station.** Establish a good working environment where the material to be sampled can be accessed, the sampling equipment can be laid out, the sampling equipment can be cleaned or decontaminated if necessary, the soil samples can be safely transferred to the required laboratory sample containers, the samples can be packaged for transportation, and all field notes and observations can be recorded. As a minimum this can be provided by a clean sheet of plastic laid on the ground next to the sampling location. Methanol has a high affinity for organic compounds so ensure that the sampling location and sampling station is not affected by external contamination sources such as vehicle exhaust emissions.
- Check sample vials.** Inspect the pre-weighed methanol-filled vials prior to use. Look for evidence of damage or obvious loss of methanol. Do not use any vials that appear damaged or appear to have lost some/all of the methanol. The vials should be pre-labelled with all the required sample identification information.
- Collect laboratory sample.** Using the required corer device supplied by the laboratory, extract the required core size/mass required by the laboratory. This could be 5-10g of soil – check for lab-specific requirements. The sample should be collected immediately after accessing the soil from the windowless sample core, hand auger core or from breaking open a bulk soil sample from an excavator bucket. The pre-filled vial should be opened only when the transfer of the sample core is ready to avoid methanol losses to atmosphere. The miniature corers are typically designed to take either 5g or 10g samples and should have markings to indicate when the required sample volume/mass has been collected. Take care to avoid splashing the methanol when transferring the soil to the vial. Clean the threads on the vial top and seal the vial with the septum cap as soon as possible. Do not add any additional labels or markings to the vial.

6. **Duplicate sample.** Duplicate samples are required for every sample. Not all of these need to be tested (refer to the project-specific sampling plan for details on the number of duplicates requiring testing). These duplicate samples should be collected as per the original sample.
7. **QA/QC samples.** In addition to duplicate samples, field and trip blanks are required. Refer to the project-specific sampling plan for further details.
8. **Sample storage.** Immediately after the sample has been taken the vial should be placed in the required chilled storage/transportation container. The target storage temperature according to the British Standard is 4+/-2°C. It is recognised that this is impractical in most instances. The vials must remain upright during transit – this is best achieved using dedicated packaging inserts.
9. **Collect non-preserved sample for moisture content.** Collect a separate sample for soil moisture content using the sample container specified by the laboratory. No additional VOC-specific considerations are necessary. The sample can be obtained using the conventional method (i.e. a trowel).
10. **Decontaminate.** Decontaminate re-usable sampling equipment using de-ionised water and a plant-based detergent or Decon90.
11. **Field notes and chains of custody.** Complete all necessary field notes and chain of custody.

3. Alternative procedure for coarse soils

3.1 Fine and medium grained non-cohesive soils

For fine and medium grained non-cohesive soils for which the corer devices provide poor recovery, use a traditional sampling device (for example a small narrow width clean stainless-steel trowel) to collect the required soil size and transfer to the methanol-containing vial. Soil disturbance when collecting the sample should be kept to a minimum and transfer to the vial should be done as quickly as possible to minimise volatile losses to atmosphere. Use an electronic balance to determine when the required sample mass has been achieved. Laboratories are typically requiring 5g soil to 10ml of methanol (a ratio of 1:2 compared to the ratio of 1:1 required by the standard and reflects the fact that a 1:1 ratio (i.e. addition of 10g of soil) does not provide adequate coverage of methanol over the soil sample).

3.2 For coarse grained materials

For material with a grain size that does not fit into a 40ml glass vial, Annex C of BS10176 permits the use of unpreserved amber glass jars. In using this alternative approach, volatile losses to atmosphere should be minimised as far as reasonably practicable by:

- Sample the material as soon as reasonably practicable after extraction from the sampling point.
- Avoid incorporation of roots or stones as far as possible.
- Fill container as tightly as possible and compact to minimise headspace within the container.
- Keep samples at low temperatures and out of direct sunlight.
- Ship samples to the laboratory as soon as possible after sampling.

4. Equipment

- a. 1 x core sampler
- b. 1 x small clean stainless-steel (non-painted) trowel
- c. 1 x electronic weighing scale
- d. 2 x pre-filled methanol vials
- e. 1 x 60g amber glass jar for the determination of moisture content
- f. 1 x square of clean plastic sheeting
- g. 1 x camera

- h. 1 x electronic device for recording digital field notes and chain of custody
- i. 1 x container of de-ionised water (and detergent if required)
- j. 1 x disposable cleaning cloths
- k. 1 x chilled sample storage container

5. Terms and Definitions

- a. Soil Includes natural soils, made ground and fill material
- b. VOC Volatile Organic Compound

6. References

- a. AGS Guide to Environmental Sampling, Association of Geotechnical and Geoenvironmental Specialists, 2019
- b. AGS Guidance on the Description of Anthropogenic Materials – A Practitioners’ Guide, Association of Geotechnical and Geoenvironmental Specialists, 2018
- c. BS5930:2015+A1:2020 Code of practice for ground investigations, British Standards Institution, 2020
- d. BS 101075:2011+A2:2017 Investigation of potentially contaminated sites – Code of practice, British Standards Institution, 2017
- e. BS 10176:2020 Taking soil samples for determination of volatile organic compounds (VOCs) – Specification, British Standards Institution, 2020
- f. BS ISO 18400-102:2017 Soil quality – Sampling. Part 102: Selection and application of sampling techniques, British Standards Institution, 2017
- g. BS ISO 18400-105:2017 Soil quality – Sampling. Part 105: Packaging, transport, storage and preservation of samples, British Standards Institution, 2017
- h. BS ISO 18400-201:2017 Soil quality – Sampling. Part 201: Physical pretreatment in the field, British Standards Institution, 2017
- i. BS ISO 18512:2007 Soil Quality – Guidance on long and short-term storage of soil samples, British Standards Institution, 2007
- j. AECOM Soil Logging Guide version 2, 2019
- k. AECOM Field Procedure FP03, Soil Sampling, Version 2.1m, December 2018
- l. AECOM Field Procedure FP24 Soil Sample Volume Reduction and Sub-sampling by Cone and Quartering, Version 1.1, June 2019

7. Records

List of the official records that are generated and support this procedure. List using ‘Alpha List’ option from the AECOM Procedure List dropdown on the Home tab.

- a. Laboratory Chain of Custody
- b. Soil logging record
- c. Photographic record
- d. Daily field diary

8. Appendices

- a. Attachment 1 – Examples of sampling corer devices and use.

9. Change Log

List the change history pertaining to this document including if it was identified differently throughout its life-cycle:

Rev #	Change Date	Description of Change	Location of Change

Attachment 1 (courtesy of ALS)

EasyDraw® Syringe Sampling Kit for Methanol Preservation

The EasyDraw Syringe (EDS) sampling kit allows 5 g of soil to be collected and immediately extruded into a pre-weighed, pre-preserved 40 ml VOC vials containing 10 ml of methanol.

EDS sample equipment and containers

1 x EDS sampler

2 x pre-filled methanol vials

1 x 60g jar for the determination of moisture content

Note – the blue PowerStop Handle is not supplied by the laboratory



Collecting a soil sample

Step 1

Insert the syringe into the 5 g position. Use the heavy position for dense clay, the light position for sandy soil and the medium position for all other soil types.



Step 2

Push the EDS into freshly exposed soil. Continue pushing until the soil inside the syringe has forced the plunger to the stopping point. Wipe all debris from the outside of the EDS. The intact core of soil should be flush with the mouth of the sampler. Remove any excess soil that extends beyond the mouth of the sampler.

Step 3

Remove the syringe from the PowerStop Handle. Insert the syringe into the open end of a pre-tared, pre-filled methanol vial. Extrude the sample into the vial by pushing the syringe plunger.

**Step 4**

Repeat the procedure above for the second vial.

Step 5

Place the vials in the foam inserts provided for storage and transportation.

Terra Core® Sampling Kit for Methanol Preservation

The Terra Core kit is provided and allows 5 g of soil to be collected and immediately extruded into a pre-weighed, pre-preserved 40 ml VOC vials containing 10 ml of methanol.

Terra Core sample equipment and containers

- 1 x Terra Core sampler
- 2 x pre-filled methanol vials
- 1 x 60g jar for the determination of moisture content

Collecting a soil sample

Step 1

With the plunger seated in the handle, push the Terra Core sampler into exposed soil until the sample chamber is filled. A filled chamber will deliver 5 grams of soil.



Step 2

Wipe all soil from the outside of the Terra Core sampler. The soil plug should be flush with the mouth of the sampler. Remove any excess soil that extends beyond the mouth of the sampler.

Step 3

Rotate the plunger that is seated in the handle top 90° until it is aligned with the slot in the body. Place the mouth of the sampler into the 40 ml vial and extrude the sample by pushing the plunger down again. Quickly place the cap on the 40 ml vial.



Step 4

Repeat the procedure above for the second vial.

Step 5

Place the vials in the foam inserts provided for storage and transportation.

Remediation Services

Grenfell Stage 2: Crop sampling Procedure

1. Purpose and Scope

The purpose of this field procedure is to set out the process for sampling crops for analysis in a laboratory for potential contamination. It relates specifically to the collection of crop samples from the following types of location:

- a. community kitchen gardens;
- b. allotments; and
- c. informal cultivation of home-grown crops.

This procedure applies to AECOM staff in the UK and Ireland, including subcontractors working on AECOM's behalf. The procedure should be read and understood by both field staff and project managers undertaking the work.

There are no formal standards or guidance for sampling and testing fruit and vegetables from public allotments or private domestic gardens. However, in order to ensure that crop samples obtained provide representative, reliable and relevant data the collection of crop samples for chemical analysis has been guided by EC Regulation 333/2007. The principles of the approach are in general accordance with EC Regulation 333/2007 but given the size of the sampling areas the full application of methodology and approach is unachievable and cannot and will not be applied.

2. Procedure

Crop samples are to be collected for subsequent laboratory analysis with their condition and type documented. Samples will be collected that are representative of the crops being grown at the chosen sample location, with soil samples from the growing medium root zone being taken at the same time. The soil sampling will follow the Grenfell Stage 2 Soil Sampling Protocol with soil samples collected across the 0-0.2m depth interval.

In all cases, care needs to be taken to maintain the condition of the crop sample. This means minimising the disturbance of the crop during removal and transport and minimising the time taken to take the sample as far as reasonably practicable. It also means storing and transporting the sample as per the guidelines below. Wherever possible, the sampling will be carried out when the crops are ready for eating.

2.1 Steps

1. **Decontaminate equipment.** prior to first use each day and after collection of each sample, all equipment that comes into contact with samples should be decontaminated (see AECOM FP07 Decontamination of Equipment). This should involve the use of de-ionised water and if necessary plant-based detergent.
2. **Prepare crop sample containers.** Ensure that all necessary laboratory sample containers or bags are available and correctly labelled. Minimum information should include project code, sample area, sample ID, sample type and date. Refer to laboratory chain of custody for full information requirements.
3. **Identify crops to sample.** Sample areas will be indicated on maps in the detailed design document. These are indicative areas and are subject to availability and permission being granted by the land owner/crop grower to harvest the crop sample. If on the day of sampling specific locations are not accessible, alternative locations can be chosen. Consult with the Sampling Manager or Project Manager if this situation arises.

Crop sampling should avoid locations where the soil has been changed or greatly added to since June 2017 to be consistent with the overarching aims of the sampling.

4. **Photograph crop sample location.** Crops should be photographed using a trial pit board / pre-printed sheet with size and colour scales prior to harvesting. The sample location and code must be exactly as per the sample plan.

5. **Record sample location.** Using GPS coordinates and/or by surveying or by reference to a detailed site plan, so that the locations can be re-visited if necessary. If a GPS is used, its calibration must be checked by recording the coordinates of at least two known site features (such as corners of major buildings).
6. **Wear dedicated disposable gloves at each location.** A dedicated clean pair of disposable nitrile (powder free) gloves should be worn to collect each sample and all reasonable measures taken when conducting the work to avoid cross-contamination of samples (clean plastic sheeting may be used to assist with cross-contamination minimisation).
7. **Confirm requirement for duplicate crop sample at sample location.** Duplicate samples are required at 5% of locations. The requirement for a duplicate sample in an area will be specified in the sampling plan and subject to quantity of crop available.
8. **Collect crop sample.**
 - a. For roots and tubers: Using a decontaminated unpainted stainless-steel hand trowel or garden fork carefully dig up the individual crop.
 - b. For green vegetables: Either pick by hand or using decontaminated unpainted stainless-steel secateurs carefully harvest the individual crop.
 - c. For tree, herbaceous or shrub fruit: Either pick by hand or using decontaminated unpainted stainless-steel secateurs carefully harvest the individual crop.

If necessary place crop on to a clean piece of plastic sheeting.

9. Clean and prepare crop sample. Any excess surface soil should be removed using a soft brush and deionised water as necessary. For carrots, potatoes and turnips etc, the inedible plant tops should be removed. For strawberries, rhubarb etc the stem or leaves should be removed. For woody stem herbs the inedible stem should be removed.
10. **Weigh individual crop sample.** Using clean portable scales weigh each individual crop sample (recording weight on the sampling sheet). The sample quantity required is dependent on the analytic testing suite the sample is to be tested for.
 - a. For Lead and PAHs aim to collect a **minimum of 200g**. The laboratory defined minimum is 100g*
 - b. For persistent organic pollutants (POPs)**, aim to collect a **minimum of 800g**. The laboratory defined minimum is 400g*

***Where the water content of a crop is high, a greater sample weight should be harvested**

(** POP suite includes polychlorinated dioxins/furans, polychlorinated biphenyls, polybrominated diphenylethers, polybrominated biphenyls, polybrominated dioxins/furans, mixed bromo-chloro dioxins/furans, mixed bromo-chloro biphenyls)

11. **Bag and label crop samples.** Place the sample in a labelled freezer bag (individual items which together will make up one sample, such as several beans or plums, can be bagged together), and zip lock or tie the bag. Double bag the samples by placing this bag into a second labelled freezer bag, and zip lock or tie the bag.
12. **Photograph wrapped and bagged crop sample.** Crop samples should be photographed using a trial pit board / pre-printed sheet with size and colour scales (as item 4).
13. **Record description of crop sample.** A written record of the crop sampling should be completed on the sample proforma sheet for each crop sample including any key observations. Complete the 'Stage 2 Grenfell Potential Land Contamination, Crop and Root Zone Soil Sampling Proforma' sheets for each sample (Appended as Attachment 1).
14. **Secure samples for transportation.** Samples should be securely packaged for transportation as soon as possible using the appropriate packaging containers agreed by the laboratory. Samples should be stored and transported according to the analytical laboratory guidance provided, which includes sealing to prevent evaporative losses, maintenance of a stable temperature (generally in the range 0-4 degrees C) using ice packs and not freezing samples prior to or during transit.
15. **Complete and check sample labelling and Chain of Custody.** Ensure all required information is provided on sample labels and chain of custody (see Step 2). Crop sample time and crop sample location are not

entered on the Chain of Custody for duplicate samples. This information must be recorded with the site personnel's notes or on a detailed plan for future QA/QC procedures. Chain of Custody must also include a notification to FERA that **all samples need to be frozen immediately on arrival at the laboratory**, and where crops require laboratory pre-treatment prior to freezing (due to the crop water content) FERA are to advise and discuss with AECOM the appropriate preparation (such as peeling / coring).

16. **Photograph completed chain of custody.** Email photo to FERA on day of collection to prewarn of the sample quantity and type arriving the next day. The sheets should be placed inside cool box with samples, and cool box sealed and addressed.
17. **Courier to laboratory.** Transport to laboratory using an overnight courier service, whenever possible dispatching on day of sampling. Notify laboratory of sample dispatch and expected arrival time.

2.2 Crop Sample Types

There are six different types of crop listed in the CLEA guidance, these are detailed in the table below with examples. Wherever possible AECOM will aim to collect as many different crop types as possible from each of the crop sampling areas, with the ideal being one of each type from each sampling area.

Crop Type	Examples
Green Vegetables	Runner beans / peas / cabbage / cauliflower / kale / spinach / lettuce / chard / squash / courgette / broccoli
Root vegetables	Carrot / parsnip / beetroot / horseradish / swede / turnip / radish / onions
Tuber vegetables	Potato / Jerusalem artichoke / yam
Herbaceous fruit <i>(none wooded stems)</i>	Strawberries / rhubarb / soft stem herbs (basil, parsley, mint)
Shrub fruit <i>(perennial woody plant)</i>	Blackcurrant / gooseberry / blackberry / raspberry / wooded stem herbs e.g. rosemary and thyme
Tree Fruit	Apple / pear / plum / fig / lemon

2.3 Crop Sample Areas

Twelve areas have been identified during the site walkovers as potential crop sampling locations. Wherever possible AECOM will aim to collect up to six different samples from each of the crop sampling areas (ideally one of each crop type group detailed in the table above). The areas are listed in the table below along with the detail of the type of growing area at each location.

Potential Crop Sample Area	Details
Allom House and Barlow House	Raised beds within communal garden
Bramley House	Raised beds within communal garden
Equal People (x 2 areas)	Raised beds within courtyard at St Charles Square, and Community kitchen garden with raised beds at the St Charles Centre for Health and Wellbeing

Potential Crop Sample Area	Details
Eynham Road	Communal garden with fruit trees, raised and ground level beds
Henry Dickens Court	Community kitchen garden, and orchard area within communal garden
Moreland House and Talbot Grove House	Raised beds within communal garden
Hurstway, Grenfell, Testerton and Barandon Walks	Raised beds within communal garden
Longstone Avenue allotments	Allotment Gardens
Portland Road and Nottingwood House	Portland -Community kitchen garden with raised and ground level beds Nottingwood - Raised beds within communal garden
St Francis Primary School	Fruit trees on the site
St Quintin Kitchen Garden	Community kitchen garden with raised and ground level beds
Silchester East (Whitstable House and Kingsnorth House)	Kitchen garden with raised beds (to the west of Whitstable House)

Note: Robinson House and Wesley Square have been excluded from this list as the soil in the vegetable growing beds has either been completely changed or are new since 2017.

Equipment, PPE & Materials List

Item	Essential?	Notes
HASP & First Aid Kit	Y	To provide information
Sample location plan	Y	To mark up exact sample collection location
Contact details for crop owners	Y	To ensure permission is provided for collection. Client may hold this information
Sample containers / bags	Y	To place crop sample in
Sample labels	Y	To go on individual sample containers
Chain of Custody Forms	Y	For laboratory
Cool boxes, frozen ice packs (or instant ice pack) and address labels	Y	For transportation of samples to laboratory
Plastic sheeting	Y	To prevent cross contamination
Tape measure	Y	To mark up exact sample collection location
Stainless steel hand trowel	Y	To assist with collection of samples
Stainless steel secateurs	Y	To assist with collection of samples
Measuring scales	Y	To ensure sufficient quantity of crop sample collected
Soft vegetable brush	Y	To remove excess soil from roots / tubers
Sample proforma sheets, site diary, pens	Y	For recording observations and details of sampling
Camera / phone camera	Y	Important to collect visual record

Item	Essential?	Notes
Sample ID board / preprinted sheet	Y	Important to collect visual record
Sampling equipment for decontamination (detergent, deionised water, water spray and cleaning cloth, or disposable wipes)	Y	For decontamination of sampling equipment between sample locations
Disposable coveralls, cut resistant gloves, nitrile gloves, laced safety boots	Y	Minimum PPE during work which includes potential contact with soil, Made Ground, crops.
Other PPE	Y	As defined in the SHE Plan (also refer to ELS guidance on mandatory PPE and training requirements for site work available in the Health & Safety folder on the ELS sharepoint site)

3. Responsibilities

It is the responsibility of the Project Manager to communicate the Crop Sampling Plan to field staff and ensure that this Crop Sampling Procedure aligns with that Crop Sampling Plan.

It is the responsibility of field staff to understand and comply with the Crop Sampling Plan and this Crop Sampling Protocol.

4. Safety

All work must be undertaken in accordance with the requirements of the project Safety, Health and Environment (SHE) Plan.

5. Terms and Definitions

Not Required.

6. References

AGS Guide to Environmental Sampling, Association of Geotechnical and Geoenvironmental Specialists, 2019

BS 101075:2011+A2:2017 Investigation of potentially contaminated sites – Code of practice, British Standards Institution Publication, 2017

BS ISO 18400-102:2017 Soil quality – Sampling. Part 102: Selection and application of sampling techniques, British Standards Institution Publication, 2017

BS ISO 18400-105:2017 Soil quality – Sampling. Part 105: Packaging, transport, storage and preservation of samples, British Standards Institution Publication, 2017

BS ISO 18400-201:2017 Soil quality – Sampling. Part 201: Physical pretreatment in the field, British Standards Institution Publication, 2017

BS ISO 18512:2007 Soil Quality – Guidance on long and short-term storage of soil samples, British Standards Institution Publication, 2007

CCME Guidance manual for environmental site characterisation in support of environmental and human health risk assessment, Volume 3, Suggested operating procedures, PN 1555, Canadian Council of Ministers of the Environment, 2016

Commission Regulation (EC) No 333/2007 - Laying down the methods of sampling and analysis for the official control of the levels of lead, cadmium, mercury, inorganic tin, 3-MCPD and benzo(a)pyrene in foodstuffs, 2007.

Environment Agency, UKSHS Report No. 2 – UK Soil and Herbage Pollutant Survey, Chemical and Radiometric Sample Collection Methods, 2007.

7. Records

- a. Sample Location map (annotated with exact location measurements)
- b. Photographic record (pre sampling and post sampling with samples in containers)
- c. Crop and Root Zone Soil Sampling Proforma sheet (including crop owner permission details, soil logging record, sampling observations)
- d. Laboratory Chain of Custody
- e. Daily field diary

8. Appendices

- a. Attachment 1 – Stage 2 Grenfell Potential Land Contamination, Crop and Root Zone Soil Sampling Proforma

9. Change Log

List the change history pertaining to this document including if it was identified differently throughout its life-cycle:

Rev #	Change Date	Description of Change	Location of Change

Stage 2 Grenfell Potential Land Contamination Crop and Root Zone Soil Sampling Proforma

Project Reference: 60632092		Date:				
Sample Area Name:						
Sample Area No.:		Time Start:		Time complete:		
Plot / bed number or owner:						
Crop harvest permission provided:						
Weather Conditions:						
Field team:						
Crop species: (& circle crop type below)						
Green vegetable	Root Vegetable	Tuber Vegetable	Tree Fruit	Herbaceous Fruit	Shrub fruit	Not known
Crop Sample number			Sample Weight (g)		Sample taken (tick)	
GTCS2 - P						
Photo subject		Photo taken (tick when taken)	Photo checked (tick when checked)		Photographer name (camera ID if different)	
1 st crop prior to harvest						
2 nd crop harvested; foil wrapped & labelled						
Comments / observations:						

Project Reference: 60632092		Date:	
Sample Area Name cont:			
Root Zone Soil Sample number			Sample taken (tick)
GTCS2 – P			soil
Photo subject	Photo taken (tick when taken)	Photo checked (tick when checked)	Photographer name (camera ID if different)
3 rd open hole in root zone			
4th samples collected & labelled			
Sample Log:			
Observed CoPC: (note of any ash etc.)			
Further reinstatement required (yes or No)			
Sample location marked on attached map with measurements (tick)			
Tools decontaminated after sampling and reinstating (tick when decontaminated)			
Notes			