Phase 3 Remediation Strategy

Park Gerry at Park Road, Camborne, TR14 8QB

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CONTENTS

FIGURES

TABLES

EXECUTIVE SUMMARY

<table>
<tr><th colspan="3">Objectives</th></tr>
<tr><td colspan="3">Wheal Jane Consultancy was commissioned by Mei Loci Landscape Architects to undertake a Phase 3 Remediation Strategy at the site known as 'Park Gerry at Park Road, Camborne, TR14 8QB'.</td></tr>
<tr><th colspan="3">Remediation</th></tr>
<tr><td>Areas of Site Requiring Remediation</td><td colspan="2">The Phase 2 Site Investigation (Reference 21665/PH2) identified contamination in the northwestern extent of the site, in exploratory holes WS03 and HP01. Therefore, a zoned remediation strategy is considered to be suitable, whereby remediation is only required for the northwestern extent of the site surrounding the areas where exploratory holes WS03 and HP01 undertaken. A plan delineating the area of site requiring remediation can be seen in Figure 4.1a
• Remediation is required in soft landscaping in the northwestern extent of the site, in areas of proposed non-continuous hardstanding in the northwestern extent of the site.
• Remediation is also required around any proposed or existing trees.
• Full radon protection measures are required for the planned permanent building (community hub)
• Where continuous hardstanding is proposed no remediation measures are necessary</td></tr>
<tr><td rowspan="2">Remedial Requirements</td><td>Soft Landscaping</td><td>It is necessary to emplace a minimum depth of 400mm of clean Topsoil over a high visibility geotextile. This should be placed over the residual soils where either 400mm have been removed or on top of areas that are to be risen. These areas are highlighted green in Figure 4.1b.
Topsoil from elsewhere on site is suitable for re-use for remediation purposes in the northwestern extent of the site.</td></tr>
<tr><td>Non-Continuous Hardstanding</td><td>It is necessary to cover the exposed soils with a high visibility geotextile. An overlay of at least 100mm of compacted, clean sub-base or lean-mix concrete should then be added. Block paving, paving slabs or gravel should then be placed above this layer. If gravel is to be installed it should be of at least 150mm depth. Non-continuous hardstanding should be placed over the residual soils, where a specified depth of contaminated materials have been removed to accommodate remedial materials. These areas are highlighted yellow in Figure 4.1b.</td></tr>
</table>

	Indoor Areas	The site is located in an area where more than 30% of properties are above the action level, therefore full radon protection measures are required. These areas are highlighted blue in Figure 4.1b.
Remediation Timescale	• It is expected that the scope of works should be completed at an early stage in the construction works. • Material excavated from the northwestern extent of the site (within the area delineated in Figure 4.1a) should be treated as waste and would have to be disposed of to a licensed waste management facility. • Any soil imported to site should be certified for public open space end use with certification to demonstrate it is of suitable composition. • Topsoil from elsewhere on site is suitable for re-use for remediation purposes in the northwestern extent of the site. • Recommendations were given in the Phase 2 report concerning the design sulphate class for concrete. • This remediation strategy should be submitted to the Local Authority prior to construction commencement.	
Verification	• To complete the phased process, a Verification Report documenting the successful implementation of the outlined works above shall be produced and submitted to the Local Authority. • **Photo documentation should be taken regularly during the course of the remedial work for the Phase 4 Verification Report. Key stages of the development to be photographed may include when a site is cleared, when excavations and footings are open, when geo-textile membranes are laid, when imported materials are being added and installed, when the site is complete.** • For inspection and verification purposes, the installation of temporary plastic pipes in remediated areas is highly recommended. The pipes should be open ended and oriented vertically, with the base of the pipes sitting directly onto the surface of the geo-textile membrane. Remedial materials should then be appropriately installed surrounding the exterior of pipes. Pipes should be a minimum of 160mm in diameter to allow for visual inspection and measurements to take place. Once the Phase 4 Verification Report has been approved by the local planning authority, the pipes should be removed, and the remaining holes backfilled with suitable materials. • **It is paramount that all invoices, analysis certification, waste transfer notices and all other general documentation relating to the remedial process be kept for verification purposes.** • A suitably qualified person from Wheal Jane Consultancy will monitor the progress of the remediation and conduct a site visit upon completion of all outlined works to ensure compliance has been achieved.	

1 INTRODUCTION

1.1.1 Wheal Jane Consultancy was commissioned by Mei Loci Landscape Architects to plan a remediation strategy for the site; "Park Gerry at Park Road, Camborne, TR14 8QB."

1.1.2 This report has been prepared by Wheal Jane Consultancy solely for the benefit of the client. It shall not be relied upon or transferred to any third party without the prior written authorisation of Wheal Jane Consultancy.

1.2 Scope and Objectives

1.2.1 The objective of this report is to outline a strategy of remediation to mitigate any risks to human health and that of flora and fauna inhabiting the site.

1.2.2 This strategy has been prepared with guidance from BS10175:2011+A2:2017 and the UK government Land Contamination Risk Management (LCRM) framework published October 2020 (superseding Environment Agency report CLR11), and as such represents a Phase 3 Remediation Strategy.

1.2.3 The conclusions and recommendations of this report are valid for a period of 12 months from the date of issue. Outside of this timeframe the report will require reviewing by a suitably qualified geoenvironmental engineer / environmental scientist, to ensure that the report complies with any changes to industry standards, policies and/or guidelines.

1.2.4 This report does not constitute an asbestos inspection that may fall within the 'Control of Asbestos' regulations, 2012.

1.3 Background

1.3.1 In order to comply with the latest Government guidelines on new building developments, the site needed to be subjected to a phased environmental assessment prior to any development works commencing. This report forms Phase 3 of this process and should be considered in conjunction with the previous Phase 1 and Phase 2 reports, detailed below (section 2.4).

2 THE SITE

2.1 Site Location

2.1.1 The site is located approximately 1.10km southwest of the Camborne (East) A30 junction. The site is situated within the town of Camborne. The site is approximately centred on National Grid Reference 165280 40640.

2.1.2 The site is irregular in shape and covers an area of approximately 3.79ha.

2.1.3 A site location plan (SLP) is contained in Figure 2.1, to the rear of the report.

2.2 Surrounding Area

Direction	Land Use
North	Residential
East	Residential
South	Residential
West	Residential

2.3 Proposed Development

2.3.1 It is proposed to redevelop the public park extensively, adding areas to play sports, a skate park, flower beds, and pathways. For more information see PA22/00625/PREAPP.

2.3.2 The proposed site plan is contained in Figure 2.2, to the rear of the report (plan drawn by Mei Loci Landscape Architects, Ref. M550-DR-L-1002 Rev 02).

2.4 Previous Investigations

2.4.1 The following investigations have taken place on site;

Table 2.1: Previous Site Investigations

Report	Date	Author
Phase I Preliminary Risk Assessment – 21441/PH1	November 2022	WJC

Phase 2 Site Investigation – 21655/PH2	September 2023 and further investigation in January 2024	WJC

2.4.2 The BGS 1:50,000-scale bedrock geological map Sheet 352, Falmouth, of the area shows the site to be underlain by the Mylor Slate Formation.

2.4.3 The Phase 2 Site Investigation in September 2023 involved the excavation of 6no. Windowless Sample Boreholes to depths of between 1.50 – 5.00 mBGL. The revisit for further sampling in January 2024 involved the excavation of 6no. hand pits to depths of between 0.90 - 1.20 mBGL, targeting the northwestern extent of the site. Samples were collected for laboratory analysis and tested for;

- Heavy Metals (As, B, Cd, Cr, Cu, Hg, Pb, Ni, Se, Zn)
- Sulphates
- Polycyclic Aromatic Hydrocarbons (PAH)
- pH
- Total Petroleum Hydrocarbons (TPH)

2.4.4 3no. Gas and Groundwater Monitoring standpipes were installed, following a ground gas risk identified in the Phase 1 Report.

2.4.5 Chemical testing revealed that elevated concentrations of arsenic were observed in the northwestern section of the site at a depth of 0.50mBGL, up to a maximum concentration of 13000mg/kg (the site-specific assessment criteria for Public Open Space was calculated at 4600mg/kg, following bioaccessibility testing). There were no elevated levels of other heavy metals in relation to current Public Open Space assessment criteria. Concentrations of PAH and TPH were below guideline values. No significant quantities of harmful ground gasses were detected during monitoring.

2.4.6 Recommendations were given in the Phase 2 report concerning the design sulphate class for concrete.

3 RISK ASSESSMENT

3.1 Introduction

3.1.1 The assessment of risk is based upon the principle of the pollutant linkage, which is described in more detail below. This assessment sought to identify plausible pollutant linkages associated with the proposed development. Once this was done, the resultant risk was determined based on the probability and the possible consequence of the pollutant linkages being present. As such, this qualitative risk assessment has been undertaken in accordance guidance published in CIRIA C552.

A summary of the CIRIA C552 risk classification matrix is presented in Table 3.1 below.

Table 3.1 *Risk Classification Matrix*

Risk Classification Matrix					
Taken from CIRIA C552		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very High	High	Moderate	Moderate / Low
	Likely	High	Moderate	Moderate / Low	Low
	Low Likelihood	Moderate	Moderate / Low	Low	Very Low
	Unlikely	Moderate / Low	Low	Very Low	Very Low

3.2 Refined Conceptual Model

3.2.1 This conceptual site model has been undertaken with due regard to guidance provided in BS10175:2011+A2:2017 and the UK government Land Contamination Risk Management (LCRM) framework published October 2020 (superseding Environment Agency report CLR11). The assessment of risk from land contamination also pays due regard to the definition of contaminated land, as defined within Part 2A of the Environment Protection Act 1990. This legislation defines contaminated land as any land that is in such a condition that by reason of substances in, on or under the land:

- Significant harm is being caused or there is a significant possibility of such harm being caused; or
- Pollution of controlled water is being, or is likely to be, caused.

3.2.2 This definition is based on the principles of risk assessment defined as a combination of the probability (or frequency) of occurrence of a defined hazard and the magnitude (including the seriousness) of the consequences. Central to the risk assessment process is the concept of pollutant linkage, which is a linkage between a contaminant and a receptor by means of a pathway.

***Table 3.2**. Summary of statutory definitions relating to pollution linkage.*

Statutory definitions relating to pollution linkage.	
Contaminant	"a substance which is in, on or under the land and which has the potential to cause harm or to cause pollution of controlled waters."
Receptor	"a living organism, a group of living organisms, and ecological system or a piece of property" which meets given criteria. "controlled waters which are, or could be, polluted by a contaminant".
Pathway	"one or more routes or means by, or through, which a receptor: • is being exposed to, or affected by, a contaminant, or • could be so exposed or affected".

3.2.3 Without the presence of all three components, there is no linkage and therefore no risk. The relationship between these components is discussed below in order to identify the existence of any source-pathway-receptor linkage on the site, and hence the potential risks associated with any contamination. Following the site investigation, the preliminary conceptual site model was revised as outlined in the Phase 2 report, with regard to the quantitative risk assessment.

3.2.4 A Revised Conceptual Model (included as Table 3.4 overleaf) was produced following the conclusions of the chemical testing discussed above.

***Table 3.3**: Identified Sources, Pathways and Receptors*

Source – Pathway – Receptor Overview	
Contaminant sources	Natural geology
	Historic Mining
	Landfill
	Gas Storage
	Industrial Land Use
	Fuel Stations
	Military Facilities
	Pollution Incidents
Pathways	Dermal contact
	Ingestion
	Ingress into buildings
	Inhalation of dust and soil
Receptors	Flora & Fauna
	Future site users
	Water supply pipes
	Site workers

Table 3.4: Refined Conceptual Site Model

Preliminary Conceptual Model							
	Source(s)	**Contaminant(s)**	**Pathway(s)**	**Receptor(s)**	**Probability**	**Consequence**	**Risk Assessment**
On Site	Natural Geology	Radon gas	Ingress into proposed buildings	Future site users	High Likelihood	Minor	**Moderate / Low Risk.** – Development is within an area where greater than 30% of properties are above the action level. However, due to the lack of permanent residents or dwellings in the proposed development, the risks associated with the build-up of Radon gas are significantly lower.
		Arsenic	Dermal contact Soil and dust ingestion and inhalation	Future site users Site workers Site flora and fauna	Likely	Medium	**Moderate Risk** – Estimated levels of arsenic within the soil were estimated at >120mg/kg in Envirocheck data and 200-400mg/kg using the Tellus SW Map. Laboratory testing revealed moderately high arsenic results, resulting in bioaccessibility testing being undertaken. The bioaccessibility testing yielded favourable results and resulted in a new site-specific assessment criterion of 4600 mg/kg for arsenic. As a result of this, only a

							single exceedance of arsenic is now noted on site, in WS02 at a depth of 0.50m.
Off Site	Infilled Land/Mine Wastage	Heavy Metals	Dermal contact Soil and dust ingestion and inhalation	Future site users Site workers Site flora and fauna	Likely	Medium	**Moderate Risk –**Estimated levels of arsenic within the soil were estimated at >120mg/kg in Envirocheck data and 200-400mg/kg using the Tellus SW Map. As discussed above, following favourable bioaccessibility testing only a single exceedance of arsenic is noted on site. Levels of other heavy metals are all within guideline values.
	Historic Mining Works/Shafts	Total Petroleum Hydrocarbons (TPH) Polycyclic Aromatic Hydrocarbons (PAH) Heavy Metals	Dermal contact Soil and dust ingestion and inhalation Ground & surface waters	Future site users Site workers Site flora and fauna	Likely	Medium	**Moderate Risk –** The closest historic works were located 150m W, at Wheal Gerry. The closest shaft is located 75m to the NE. As discussed above, following favourable bioaccessibility testing only a single exceedance of arsenic is noted on site. Levels of other heavy metals, as well as TPH and PAH, are all within guideline values.

Landfill	Ground Gas: Methane, Carbon Dioxide, Leachate	Dermal contact Soil and dust ingestion and inhalation Ground & surface waters Ingress into proposed buildings	Future site users Site workers Site flora and fauna	Unlikely	Medium	**Low Risk** – Gas monitoring wells were installed on site and weekly monitoring visits were undertaken. No harmful quantities of ground gasses were detected.
Pollution Incidents	Various	Dermal contact Soil and dust ingestion and inhalation Ground & surface waters	Future site users Site workers Site flora and fauna	Low Likelihood	Low	**Low Risk**– There is one recorded pollution incident with 500m of the site, occurring in 1999 due to firefighting run-off. The incident was classified as category 3 (Minor Impact), but due to its proximity to the site, as well as occurring on an equal elevation, a contaminated pathway may be present. However, due to the isolated nature and low severity of the incident, this is considered a low risk to human health.
Industrial Land Use	Total Petroleum Hydrocarbons (TPH) Polycyclic Aromatic Hydrocarbons (PAH)	Dermal contact Soil and dust ingestion and inhalation Ground & surface waters	Future site users Site workers Site flora and fauna	Unlikely	Medium	**Low Risk-** There is an abundance of contemporary industrial land use in the surrounding area. No exceedances of TPH or PAH were detected during laboratory testing.

Gas Storage	Ground Gas: Methane Total Petroleum Hydrocarbons (TPH) Polycyclic Aromatic Hydrocarbons (PAH)	Dermal contact Soil and dust ingestion and inhalation Ground & surface waters Ingress into proposed buildings	Future site users Site workers Site flora and fauna	Unlikely	Medium	**Low Risk-** Beginning on the earliest Map (1879) a Gas Storage cylinder has been present on the 2m N of the site. No exceedances of TPH or PAH were detected during laboratory testing. No harmful quantities of methane were detected during ground gas monitoring.
Military Centre	Total Petroleum Hydrocarbons (TPH) Polycyclic Aromatic Hydrocarbons (PAH)	Dermal contact Soil and dust ingestion and inhalation Ground & surface waters	Future site users Site workers Site flora and fauna	Unlikely	Mild	**Low Risk:** The earliest maps indicate the northern edge of the site is bordered with a military facility, containing an Armoury, Drill Yard, and Flagstaff. No exceedances of TPH or PAH were detected during laboratory testing.
Fuel Station	Ground Gas: Methane Total Petroleum Hydrocarbons (TPH) Polycyclic Aromatic	Dermal contact Soil and dust ingestion and inhalation Ground & surface waters Ingress into proposed buildings	Future site users Site workers Site flora and fauna	Unlikely	Medium	**Low Risk** – An Active Fuel Station is present 213m S of the site. Due to the distance and intervening hardstanding, it is unlikely a contaminated pathway exists, and this is therefore considered a low risk to human health.

	Hydrocarbons (PAH)		

4 REMEDIATION

4.1 Remedial Objectives and Options Appraisal

4.1.1 The remedial objectives for this site are designed to ensure that the final development greatly reduces the risk from exposure to the contaminants identified in the Phase 2 investigation by people, flora or fauna.

4.1.2 Any made ground that is removed from the site should be treated as waste and is not suitable for use as structural fill.

4.1.3 A plan illustrating the remedial requirements is presented as Figure 4.1.

4.1.4 Several options to remediate the site have been considered and these are summarised in Table 4.1.

Table 4.1 Remediation Options Appraisal

Overview of Remedial Options	
Option	**Assessment**
Simple In-Situ Capping System	Excavation of a pre-determined depth of contaminated media before a geotextile fabric is laid over the exposed soil and capped with clean, cover material. This option ensures the removal of contaminated material, and the geotextile guarantees the pathway from the soil is broken.
Soil washing	This physical approach to remediation involves the extraction of contaminated soil and then treatment using mechanical and chemical separation of contaminants from uncontaminated soil. This method is likely to have constraints particularly regarding timescale, as a treatability study may have to be carried out.
Soil flushing	A flushing solution is delivered to the surface of the soil, utilising infiltration. Leachates are diverted and collected where they are subsequently treated at the surface. This approach may require the addition of further chemical treatment to neutralise acidity. It is also likely to be costly.

Stabilisation and solidification using hydraulic binders	Soil mixing equipment is used to cut and mix the soil. Pre-selected materials are then added to the mix to solidify and stabilise the soil. The area is gradually treated in columns. This technique is also costly and involves careful assessment of soil types and binder additives, usually during a treatability study.

4.1.5 The most suitable remediation methodology for this site is the simple in-situ capping system. This method will be suitable for all areas, with a separate consideration for the proposed areas of non-continuous hardstanding and ground where tree protection measures have been identified. The permanent buildings will also be considered in relation to radon protection and buried services.

4.2 Remediation Strategy

4.2.1 The Phase 2 Site Investigation (Reference 21665/PH2) identified contamination in the northwestern extent of the site, in exploratory holes WS03 and HP01. Therefore, a zoned remediation strategy is considered to be suitable, whereby remediation is only required for the northwestern extent of the site surrounding the areas where exploratory holes WS03 and HP01 were undertaken. A plan delineating the area of site requiring remediation can be seen in Figure 4.1a

4.2.2 Each of the areas requiring remediation are discussed separately below.

4.3 Soft Landscaping

4.3.1 The proposed soft-landscaped areas are highlighted in green in Figure 4.1b. As this application is for the development of public open space; it is necessary only to excavate existing soils/made ground to a minimum depth of 400mm below the finished ground level. A high visibility geotextile should be placed over the residual soils and overlain with clean soil; Figure 4.2 depicts the recommended method of remediation. The soils should be clean, chemically inert topsoil. Alternatively, it is acceptable to use 220mm of clean subsoil with 180mm of topsoil. If there are areas where soil is not currently present and there is only exposed rock where gardens are planned, it will be necessary to install the geotextile above the rock and place the clean cover above it.

4.3.2 Topsoil from elsewhere on site is suitable for re-use for remediation purposes in the northwestern extent of the site.

4.3.3 The following points should be noted:

4.3.4 The material excavated from the site should be treated as waste and would have to be disposed of at a licensed waste management facility. The materials should be handled in accordance with the Site Waste Management Plan. Waste transfer notes should be retained for your records. A layer of sand beneath the geotextile may be required to ensure that the barrier is not pierced on stones when it is installed.

4.3.5 The geotextile and clean cover material must be stored securely if it is to be delivered and stockpiled on site prior to use, to prevent any mixing occurring with contaminated media.

4.3.6 The geotextile (a permeable synthetic textile sheet) should be of a suitable colour such as orange or white, such as Lotrak Alarm high visibility geotextile or Wrekin Multitrack NW 1000. The purpose of the geotextile would be to act as a barrier to prevent mixing of the imported clean soil and any contaminated ground beneath. It will also act as a warning device should future site users carry out any excavations.

4.3.7 The clean cover placed onto the geotextile should be a minimum thickness of 400 mm after firming, a sufficient thickness to allow vegetables and plants to grow. Where trees are planned please refer to section 4.4.

4.3.8 As part of the Phase 2 contamination investigation, heavy metal and bioaccessibility testing was undertaken on soil samples from across the site. This testing revealed that all soils on site, except those present in the northwestern corner, are suitable for use as public open space. Therefore, topsoil excavated from elsewhere on site is suitable for re-use in the northwestern extent as part of the remediation scheme.

4.3.9 Any imported clean topsoil should be accompanied by an analysis of its content to prove its suitability for the proposed end-use (no more than 6 months old). The source of the material should also be recorded. The certificate of analysis should be retained for record purposes. The suitability of the soil should be verified prior to it being brought on site. If as part of any landscaping plan, retaining walls or raised beds are considered, it is important to ensure that the encapsulation layer is present across the area.

4.3.10 For inspection and verification purposes, the installation of temporary plastic pipes in remediated areas is highly recommended, as illustrated in Figures 4.2 & 4.3 The pipes should be open ended and oriented vertically, with the base of the pipes sitting directly onto the surface of the geo-textile membrane. Remedial materials should then be appropriately installed surrounding the exterior of pipes. Pipes should be a minimum of 160mm in diameter to allow for visual inspection and measurements to take place. Once the Phase 4 Verification Report has been approved by the local planning authority, the pipes should be removed, and the remaining holes backfilled with suitable materials.

4.3.11 The remedial works are to be periodically inspected and documented by a suitably qualified person (e.g. Environmental Scientist) as part of the Phase 3 Verification Report.

4.4 Tree Protection Areas

4.4.1 A number of trees are proposed on site, these areas are highlighted orange in Figure 4.1.

4.4.2 The roots of any existing trees should not be disturbed in order to maintain their health. Further details are given in the BSI Standards Publication 'Trees in Relation to Design, Demolition and Construction – BS 5837:2012'.

4.4.3 For any new trees proposed a minimum soil depth of 1m over an area that will support the tree's mature rooting volume requirements, as per guidance from Green Blue Urban Tree Species Soil Volume Guide.

4.5 Hardstanding Areas

4.5.1 Where *non-continuous* hardstanding (for examples, resin-bound pathways) is proposed within the plots it will be necessary to excavate existing soils/made ground to a minimum depth to accommodate the installation of the clean aggregate and surface finish. Figure 4.1b indicates the areas of non-continuous hardstanding (highlighted in yellow). The exposed soils should be covered with a high-visibility geotextile. An overlay of at least 100mm of compacted, clean sub-base or lean-mix concrete should then be added, (Figure 4.4). The paving or surface finish should then be placed above this layer, gravel should be of at least 150mm depth.

- Where the ground level requires modification, it may be necessary to remove some of the existing soil. In which case the material excavated from the site should be treated as waste

and would have to be disposed of to a licensed waste management facility. Waste transfer notes should be retained for your records.

- The geotextile (a permeable synthetic textile sheet) should be of a suitable colour such as orange or white. The purpose of the geotextile will be to act as a warning device should future site users carry out any excavations. A layer of sand beneath the geotextile may be required to ensure that the barrier is not pierced on stones when it is installed.
- The remedial works are to be inspected and documented by a suitably qualified person (e.g. Environmental Scientist) as part of this report.

4.5.2 For inspection and verification purposes, the installation of temporary plastic pipes in remediated areas is highly recommended, as illustrated in Figure 4.4. The pipes should be open ended and oriented vertically, with the base of the pipes sitting directly onto the surface of the geo-textile membrane. Remedial materials should then be appropriately installed surrounding the exterior of pipes. Pipes should be a minimum of 160mm in diameter to allow for visual inspection and measurements to take place. Once the Phase 4 Verification Report has been approved by the local planning authority, the pipes should be removed, and the remaining holes backfilled with suitable materials.

4.5.3 If as part of any landscaping plan, retaining walls or raised beds are considered, it is important to ensure that the encapsulation layer is present across the area.

4.6 Indoor Areas

4.6.1 In the area beneath the permanent building, where a continuous floor slab (either raised or ground bearing) is to be provided, it will act as a source – receptor barrier, preventing any contact with the contaminated ground by the subsequent occupiers of the property. No further remediation will be required in this area for soil contamination. However, radon protection measures are required. The site is located in an area where greater than 30% of properties are above the action level, therefore full radon protection measures are required. These areas are highlighted blue in Figure 4.1

4.6.2 Recommendations were given in the Phase 2 report concerning the design sulphate class for concrete.

4.7 Remediation Timescale

4.7.1 It is expected that the scope of works should be completed at an early stage in the construction works.

4.7.2 This remediation strategy should be submitted to the Local Authority prior to construction commencement.

5 REPORTING OF UNEXPECTED CONTAMINATION

5.1.1 The Phase 1 and 2 investigations that have taken place on site have identified contamination within the underlying soil. This remediation strategy is aimed at breaking the source-pathway-receptor model and thus reducing risk.

5.1.2 Any contamination encountered during the course of construction which differs in type and/or quantity to that already identified on site must be reported in writing to the local planning authority. Development in areas of site affected by the unexpected contamination shall be suspended until a risk assessment has been carried out. Further sampling and analysis may be required.

6 VERIFICATION

6.1.1 To complete the phased process, a Verification Report documenting the successful implementation of the outlined works above shall be produced and submitted to the Local Authority.

6.1.2 Photo documentation should be taken regularly during the course of the remedial work for the Phase 4 Verification Report. Key stages of the development to be photographed may include when a site is cleared, when excavations and footings are open, when geo-textile membranes are laid, when imported materials are being added and installed, when the site is complete.

6.1.3 For inspection and verification purposes, the installation of temporary plastic pipes in remediated areas is highly recommended. The pipes should be open ended and oriented vertically, with the base of the pipes sitting directly onto the surface of the geo-textile membrane. Remedial materials should then be appropriately installed surrounding the exterior of pipes. Pipes should be a minimum of 160mm in diameter to allow for visual inspection and

measurements to take place. Once the Phase 4 Verification Report has been approved by the local planning authority, the pipes should be removed, and the remaining holes backfilled with suitable materials.

6.1.4 It is paramount that all invoices, analysis certification, waste transfer notices and all other general documentation relating to the remedial process be kept for verification purposes.

6.1.5 A suitably qualified person from Wheal Jane Consultancy will monitor the progress of the remediation and conduct a site visit upon completion of all outlined works to ensure compliance has been achieved.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

7.1.1 This report has assessed the in-situ simple capping method is the most effective method to remediate the site in terms of cost, practicability, sustainability and overall reduction of risk. The following criteria are recommended:

7.1.2 In the soft-landscaped areas to break the contamination pathway, it is necessary to excavate the existing soils to a minimum depth of 400mm below the final surface level. A high visibility geotextile is to be placed over the residual soils and overlain with 400mm of clean cover, in soft landscaped areas. These areas are highlighted green in Figure 4.1b.

7.1.3 In areas of non-continuous hardstanding around the properties the exposed soils should be covered with a high-visibility geotextile. An overlay of at least 100mm of clean compacted sub-base or lean-mix concrete should then be added. The paving, decking or gravel should then be placed above this layer (gravel should be at least 150mm depth).

7.1.4 Where the ground level requires modification, it may be necessary to remove some of the existing soil. In which case the material excavated from the site should be treated as waste and would have to be disposed of at a licensed waste management facility.

7.1.5 Photo documentation should be taken regularly during the course of the remedial work for the Phase 4 Verification Report. Key stages of the development to be photographed may include:

when a site is cleared, when excavations and footings are open, when geo-textile membranes are laid, when imported materials are being added and installed, when the site is complete.

7.1.6 The proposed development is in an area where greater than 30% of properties are estimated to be above the UK Action Level for radon.

7.1.7 Long-term monitoring post-remedial works will not be required.

7.1.8 On completion of remedial works to the required standard, a Phase 4 Verification report must be obtained before the site can be deemed suitable for its intended use.

7.2 Recommendations

7.2.1 The use of in-situ simple capping system will break the contamination pathway between the soil and the site users.

7.2.2 In areas of the proposed building footprints no further remediation of the soil is required. It will be necessary to install full radon protection measures for all of the proposed buildings. These areas are highlighted blue in Figure 4.1b

7.2.3 Recommendations were given in the Phase 2 report concerning the design sulphate class for concrete.

7.2.4 Any soil removed from site should be disposed of at a licensed waste facility. Waste transfer notices should be kept. The materials should be handled in accordance with the Site Waste Management Plan.

7.2.5 Any soil imported to site should be certified for public open space end use with certification to demonstrate it is of suitable composition.

7.2.6 If any unrecorded contamination is encountered during site clearance operations, assessment will be required by a suitably qualified and experienced environmental scientist to ascertain the best procedure for remediation.

7.2.7 It is recommended that a copy of this report should be sent to the regulating authority before any works are commenced.

7.2.8 Health and safety requirements for the development of the site should include:

- In dry and dusty weather conditions, the site may require damping down to avoid excessive dust. Minimum PPE requirements should include dust masks, boots and gloves.
- It would also be considered prudent to complete a site induction/toolbox talk concerning elevated heavy metals and precautions to protect site workers and the public.

7.2.9 All workers on site should have access to hand-washing facilities. Current HSE guidelines must be adhered to with regards to working on this site.

8 REFERENCES

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8.1.5 Chartered Institute of Environmental Health (CIEH) and Contaminated Land: Applications in Real Environments (CL:AIRE) (2008) Guidance on Comparing Soil Contamination Data with a Critical Concentration. London, CIEH

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8.1.9 Contaminated Land: Applications in Real Environments (CL:AIRE) (2012) A Pragmatic Approach to Ground Gas Risk Assessment. Research Bulletin 17

8.1.10 Contaminated Land: Applications in Real Environments (CL:AIRE) (2016) CAR SOIL: Control of Asbestos Regulations 2012. Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials.

8.1.11 Department of Communities and Local Government (2012) National Planning Policy Framework. London, DCLG

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8.1.19 Great Britain. Environmental Damage (Prevention and Remediation) Regulations (2009). London, The Stationery Office

8.1.20 Great Britain. The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. London, The Stationery Office

8.1.21 Hollingsworth, S.C, 2004. Cover Systems for Land Regeneration: Thickness of Cover Systems for Contaminated Land. Watford: BRE

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8.1.23 Land Quality Press, 2009. The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd Edition). Replaced by Land Quality Press (2015) The LQM/CIEH Suitable 4 Use Levels for Human Health Risk Assessment (2nd Edition). Nottingham, Land Quality Press

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8.1.25 Royal Institution of Chartered Surveyors (RICS) (2012) Japanese Knotweed and Residential Property. Coventry, RICS

8.1.26 UK Water Industry Research (2010) Guidance for the Selection of Water Supply Pipes to be Use in Brownfield Sites: Report 10/WM/03/2

9 NOTES

9.1.1 This report is concerned solely with the property, as defined by this report, or parts thereof examined.

9.1.2 The report should not be used in connection with adjacent properties.

9.1.3 The information in the Groundsure EnviroInsight and GeoInsight reports, which have been used in compiling this Phase 1 Desk Study report, is derived from a number of statutory and non-statutory sources. While every effort is made by the supplier to ensure accuracy, the supplier cannot guarantee the accuracy or completeness of such information or data, nor to identify all the factors that may be relevant.

9.1.4 The conclusions and recommendations relate to the type and extent of development outlined in this report for this specific property only and should not be taken as suitable for any other form or extent of development on this property without further consultation with Wheal Jane Consultancy.

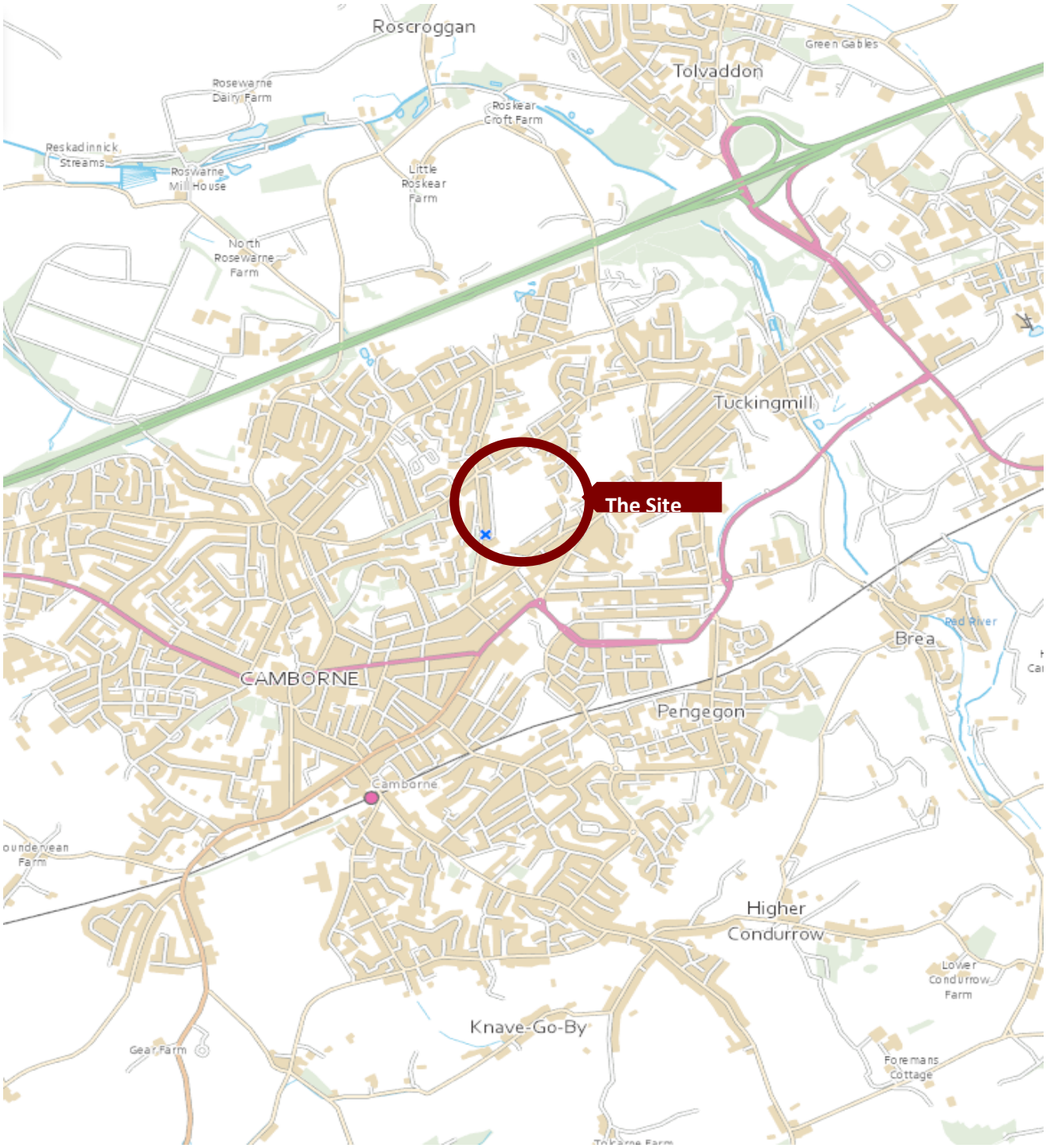
9.1.5 This report is confidential to the client, the client's legal and professional advisors, and may not be reproduced or distributed without our permission other than to directly facilitate the sale or development of the property concerned.

9.1.6 We have no liability toward any person not party to commissioning this report.

9.1.7 Unless otherwise expressly stated, nothing in this report shall create or confer any rights or other benefits pursuant to the Contracts (Rights of Third Parties) Act 1999 in favour of any person other than the person commissioning this report.

9.1.8 This report is not an asbestos inspection that may fall within the control of Control of Asbestos Regulations 2006.

FIGURES:



Title: **Site Location Plan**

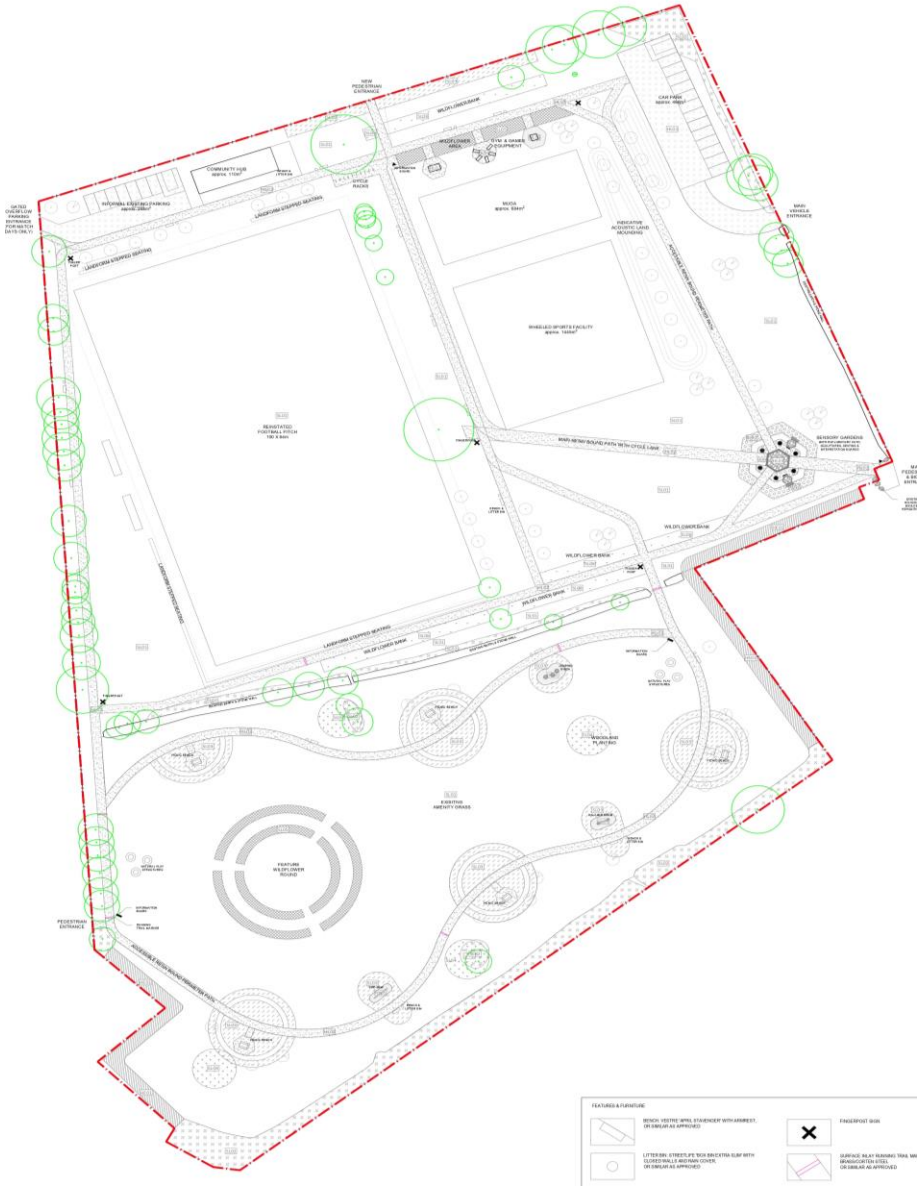
Project: **Park Gerry at Park Rd, Camborne, TR14 8QB**

Client: **Mei Loci**

Report Title: **Phase 3 Remediation Strategy**

WHEAL JANE CONSULTANCY
GEOTECHNICAL, ENVIRONMENTAL & MINING SERVICES

Date: **03/10/2023** Ref: **21876** Figure: **2.1**



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MEI LOCI

Studio G2, Old Bakery Studios, Blewetts Wharf, Truro, Cornwall, TR1 2PN
studio@meiloci.co.uk | 01872 264 899

CLIENT
CAMBORNE TOWN COUNCIL

JOB DESCRIPTION/LOCATION
Park Gerry
Camborne
Cornwall, TR14 8QB

DRAWING TITLE
GENERAL ARRANGEMENT

PLANNING

Date	Scale	Drawn By	Checked
22.03.30	1:500	JL	PH
Job. No.	Drawing No.		Revision
M550	DR-L-1002		02

N

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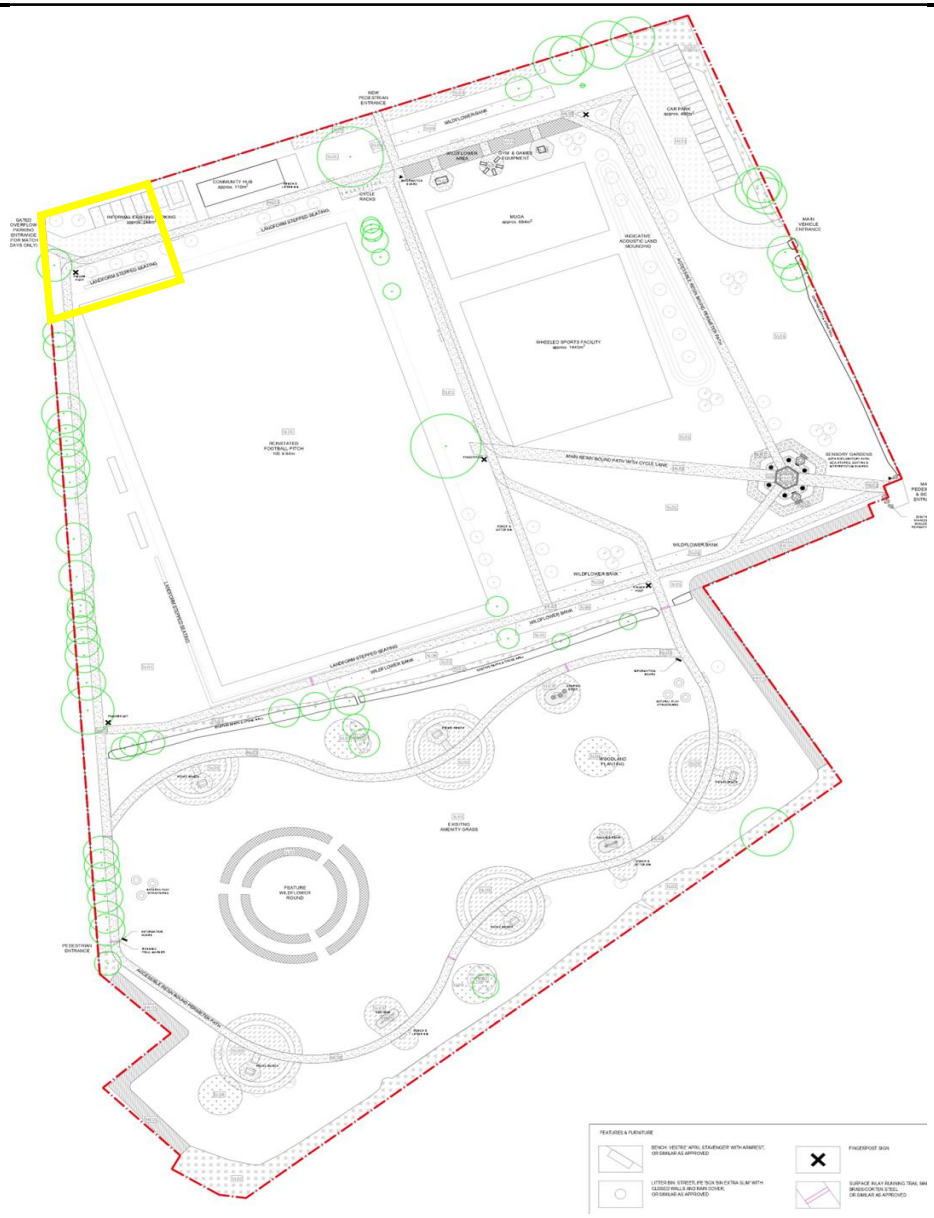
GEOTECHNICAL, ENVIRONMENTAL & MINING SERVICES

Title:	**Proposed Development Plan**
Project:	**Park Gerry at Park Rd, Camborne, TR14 8QB**
Ref:	**21876**
Client:	**Mei Loci**
Date:	03/10/2023
Scale:	NTS
Drawn by:	
Revision:	A
Figure:	2.2
Report Title:	Phase 3 Remediation Strategy



N

Legend:

Site Boundary

Zoned area of site requiring remediation

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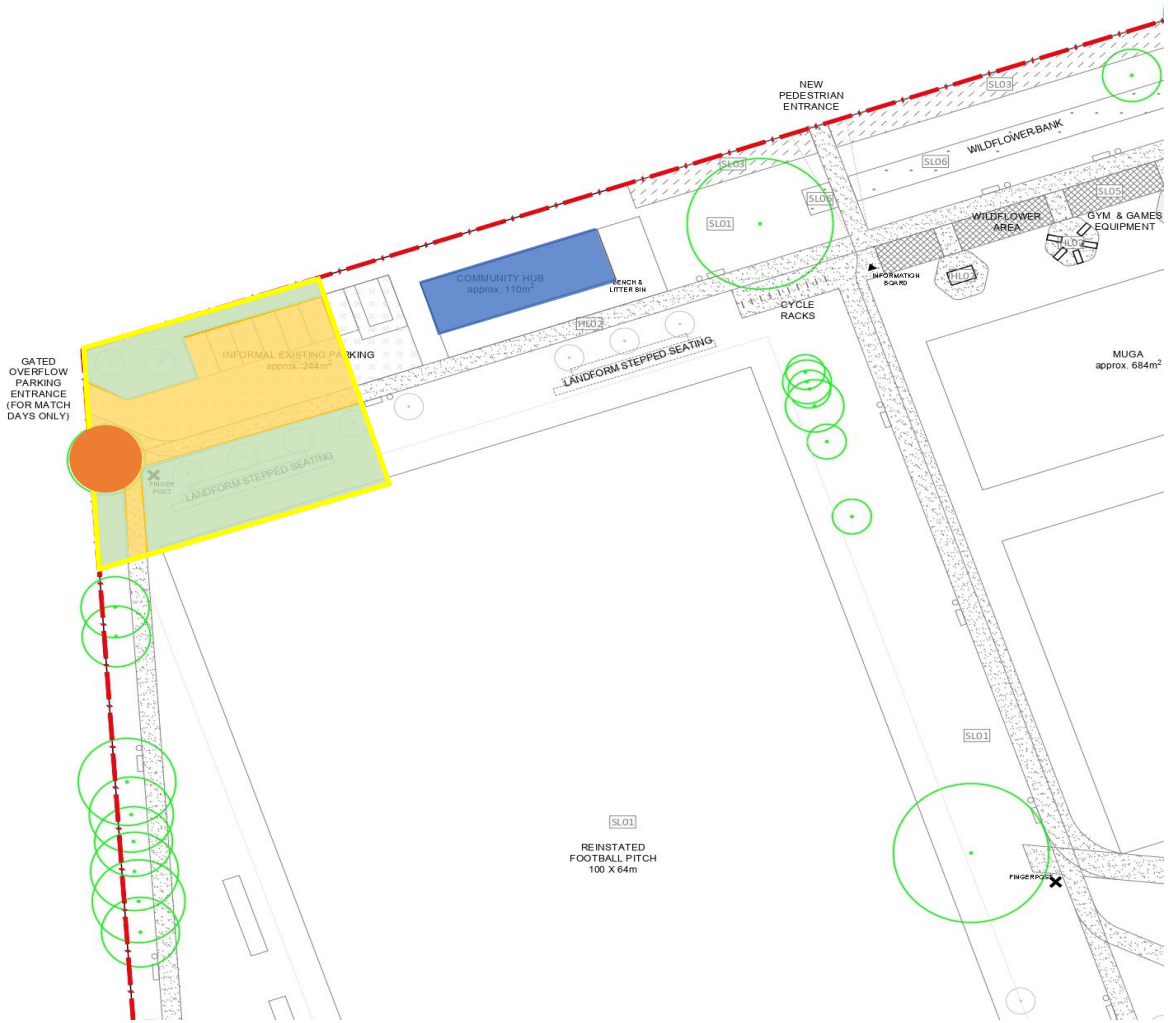
Title:	**Remedial Requirements (Overview)**
Project:	**Park Gerry at Park Rd, Camborne, TR14 8QB**
Ref:	**21876**
Client:	**Mei Loci**
Date:	23/02/2024
Scale:	NTS
Drawn by:	WJC
Revision:	-
Figure:	4.1a
Report Title:	Phase 3 Remediation Strategy



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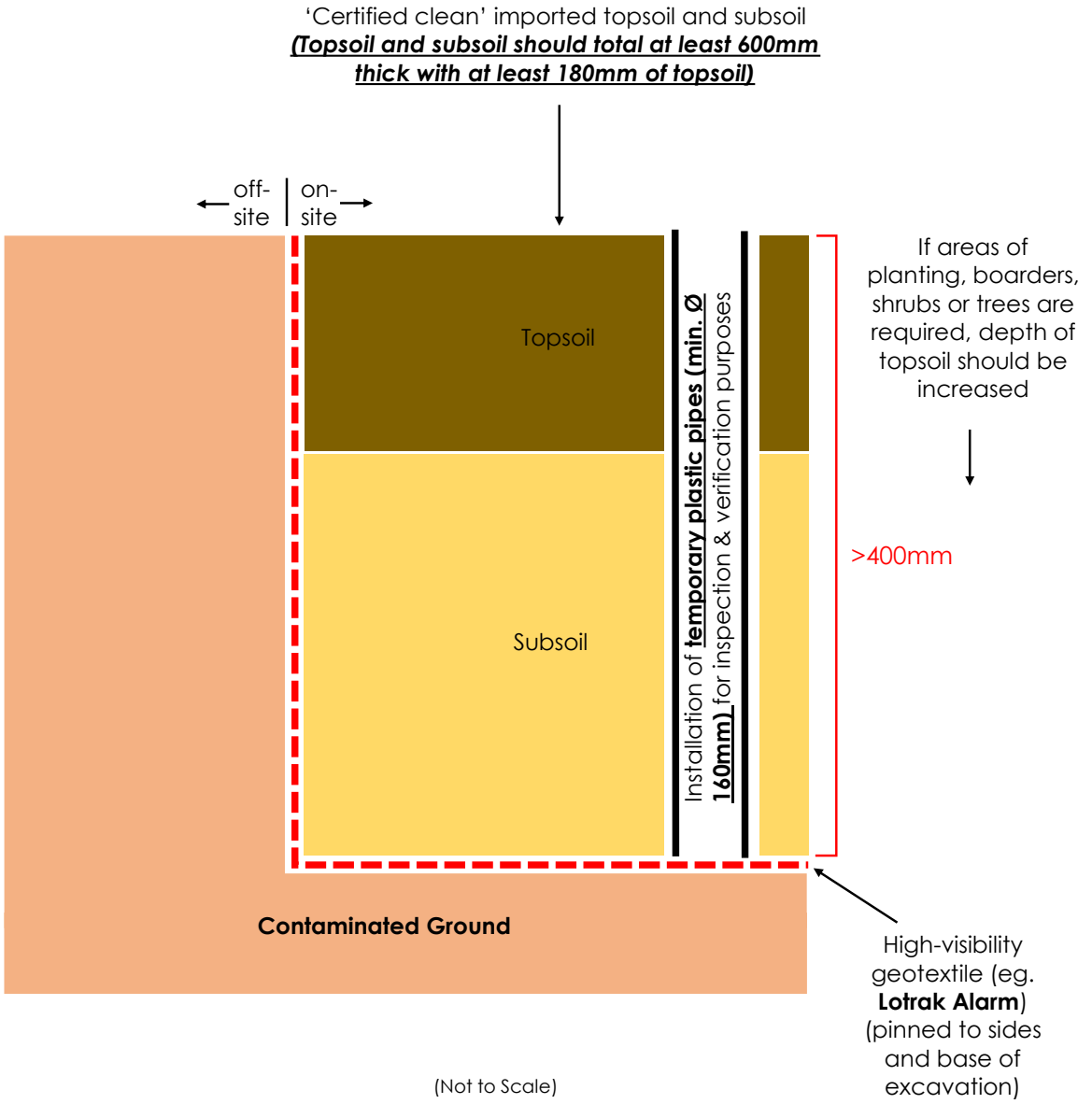
Legend:

- Radon Protection Required
- Private Gardens / Soft Landscaping Remediation Required
- Non-Continuous Hardstanding Remediation Required
- Site Boundary
- Zoned area of site requiring remediation
- Tree protection required

WHEAL JANE CONSULTANCY
GEOTECHNICAL, ENVIRONMENTAL & MINING SERVICES

Title:	**Remedial Requirements (Detailed)**
Project:	**Park Gerry at Park Rd, Camborne, TR14 8QB**
Ref:	**21876**
Client:	**Mei Loci**
Date:	23/02/2024
Scale:	NTS
Drawn by:	WJC
Revision:	-
Figure:	4.1b
Report Title:	Phase 3 Remediation Strategy

Private Gardens & Soft Landscaping



Title: **Private Gardens & Soft Landscaping**

Project: **Park Gerry at Park Rd, Camborne, TR14 8QB**

Client: **Mei Loci**

Report Title: **Phase 3 Remediation Strategy**

Scale: **Not to Scale**

Date: **03/10/2023** Ref: **21876** Figure: **4.2**

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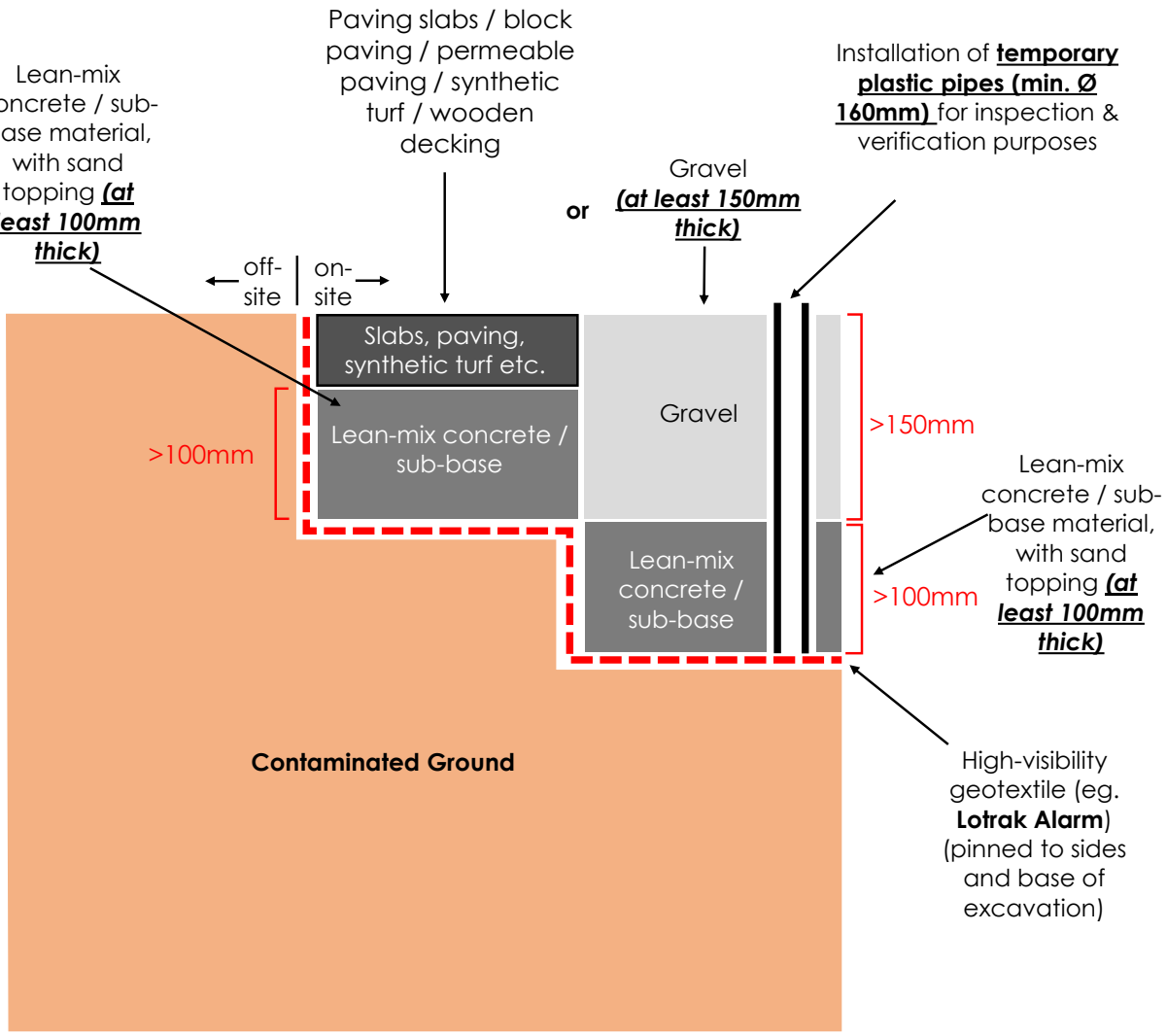
Non-Continuous Hardstanding



(Not to Scale)

Title: **Non-Continuous Hardstanding**

Project: **Park Gerry at Park Rd, Camborne, TR14 8QB**

Client: **Mei Loci**

Report Title: **Phase 3 Remediation Strategy**

Scale: **Not to Scale**

Date: **03/10/2023** Ref: **21876** Figure: **4.4**

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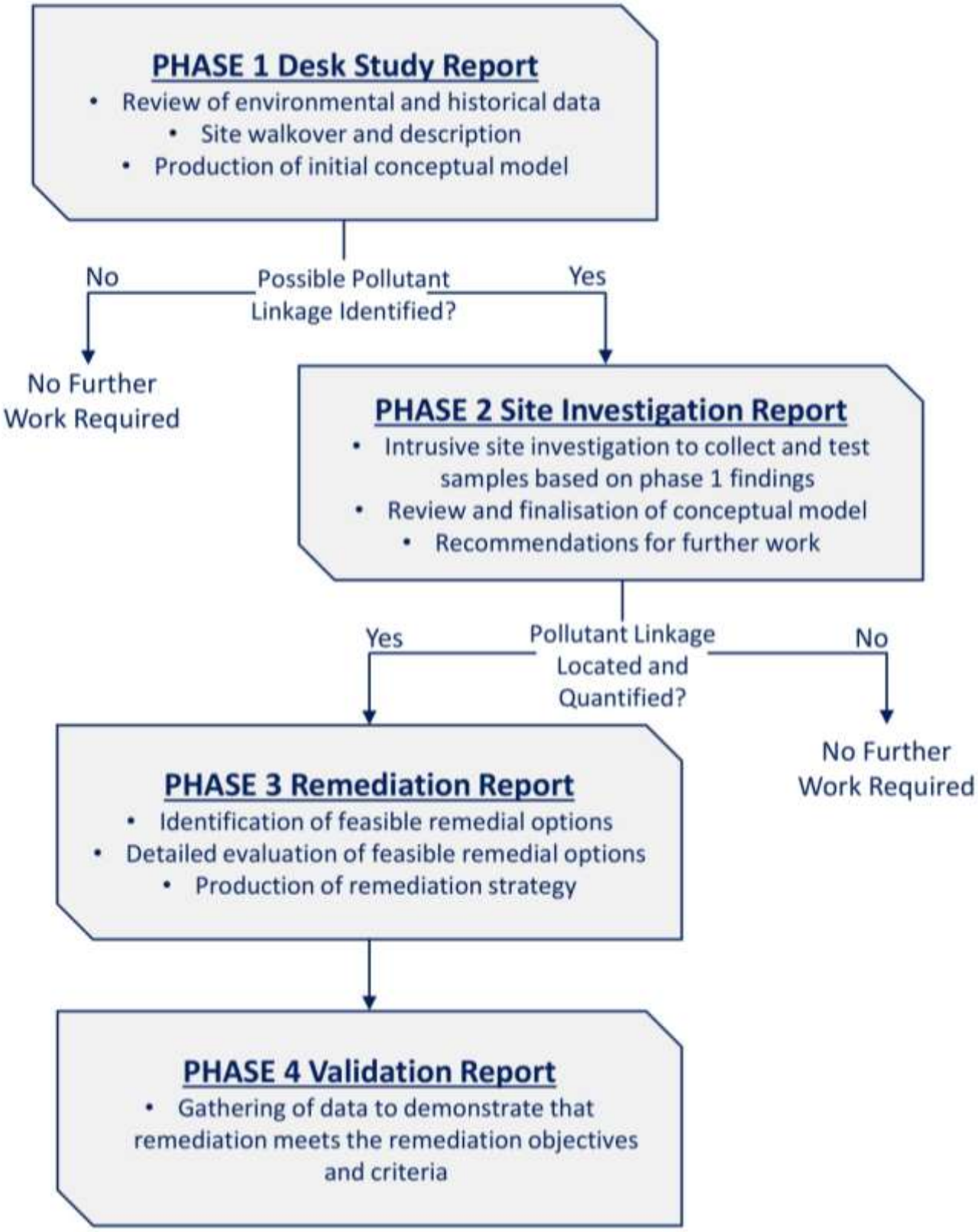
The Phased Approach to Land Contamination

As set out in Contaminated Land Report 11 - Model Procedures for the Management of Land Contamination. Environment Agency Guidelines



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