Laurel House
26 High Street
Catworth
Huntingdon
PE28 0PF

[redacted]

REMEDIAL METHOD STATEMENT

LAUREL HOUSE 26 HIGH STREET CATWORTH HUNTINGDON PE28 0PF

RE: Laurel House, Catworth 15/01146/HHFUL conditions 16/80133/COND

1. History

A Phase I Desk Study and Phase II Geo-Environmental Assessment was carried out in 2016 by EPS Ltd which identified elevated levels of lead (Pb) present in the topsoils at the above site. Subsequently a Remedial Method Statement (RMS) was prepared by EPS on behalf of the owners, detailing an engineered cover system comprising geotextile membranes and a 150mm capillary break covered by 150mm clean topsoil. This RMS was deemed acceptable to the Local Authority for discharge of the associated planning condition.

While certainly effective in blocking the pathway between source and receptor, this RMS would cause disruption to the owners of the property, degradation in the quality and potential use of the site, and would require significant movement of materials to and from the site.

The body of research relating to remediation of Pb contaminated land has developed in the years since the existing RMS was submitted, and consequently the owners propose to adopt a new remedial method as detailed below.

2. Site description

The site is within the curtilage of a Grade II listed building. It is a mature residential garden associated with the house. See Appendix A for site plan showing the area requiring remediation in the Phase I and Phase II study..

Previous hand auger survey work has indicated that elevated Pb levels exist within the top 0-300mm of soil on site. Below the topsoil is natural clay (Oadby Member).

3. Contaminant characteristics

Soil samples processed for the Phase II survey identified a range of Pb concentrations from 16 to 3787 mg/kg with a u95 true mean of 1513 mg/kg
Full analysis of the lead contamination can be found in the Phase I & II reports prepared by EPS Ltd and previously submitted to the council in discharge of condition 3, 15/01146/HHFUL.

A summary of the contaminants found are extracted from the phase I and II reports below.

Phase I & II Geo-Environmental Assessment
Laurel House, Catworth
EPS Ref: UK16.2238

Contaminant	No. of Samples	No of Detections	Range of Detections (mg/kg)		Highest Location & Depth (m bgl)
			Min	Max	
Arsenic	21	21	12.0	25.6	HA9 (0.10-0.30)
Cadmium	21	20	0.1	0.8	HA8 (0.10-0.30) HA15 (0.10-0.30)
Chromium	21	21	35.8	76.2	HA6.3 (0.10-0.30)
Copper	21	21	17	96	HA12 (0.10-0.30)
Lead	21	21	16	3,787	HA12 (0.10-0.30)
Mercury	21	3	0.1	0.3	HA16 (0.10-0.30)
Nickel	21	21	25.5	39.2	HA11a (0.10-0.30)
Selenium	21	15	1	1	HA6.1, HA6.2, HA6.3, HA7, HA9, HA11a, HA11b, HA13, HA14, HA15, HA16, HA17 (0.10-0.30)
Zinc	21	21	67	471	HA6.3 (0.10-0.30)
Benzo[a]pyrene	6	4	0.25	1.60	HA1 (0.00-0.10)
PAH (Total of 16)	6	4	4.9	24.2	
TPH (Total Aliphatics & Aromatics)	6	3	71	128	HA3 (0.10-0.20)
BTEX	6	-	-	-	-
Phenols	6	-	-	-	-

Notes: - Contaminant not found above laboratory detection limits
PAH Polycyclic Aromatic Hydrocarbons
TPH Total Petroleum Hydrocarbons
BTEX Benzene, Toluene, Ethylbenzene, Xylenes

4. Aim

The proposed approach aims to reduce the bioavailability of the Pb to both human and plant receptors by stabilising the chemical species of the Pb present in the soil using phosphate (P) enriched bio solid amendments.

5. Method

a) Remove topsoil to depth of 300mm from areas B (measuring approx 4.4m x 8m) & C (measuring approx 7m x 9.5m) and remove from site.
b) Create hard standing at areas B & C depth 300mm with geotextile membrane barrier below (schematic at Appendix B)
c) Reline and restore pond to area D (measuring approx 11m x 5m)
d) Till to a minimum of 150mm and level topsoil in hatched area A
e) Treat area A with P enriched (0.25-0.5%) spent mushroom compost at a rate of 247 tons (dry weight) per hectare. This equates to 31 tons on this site.
f) Incorporate treatment into the topsoil using tiller

g) Seed with all purpose lawn grass seed one week after treatment

6. Validation

At least 6 months after completion of treatment, 4 no. samples to be taken at regular intervals across area A and submitted for bioaccessibility assessment of the lead using the BARGE method ISO 17924.

BARGE results indicating bioaccessible lead levels less than 200 mg Pb / Kg are to be considered acceptable.

7. Evidence

This RMS uses the method and findings of a 2021 scientific report titled 'Restoration and risk reduction of lead by phosphate-enriched biosolid amendments' - full link in 9. Reference.

The subject land in the study had Pb concentrations ranging from 230 to 3800 mg Pb / kg and an average of 1004 mg Pb/ Kg

Study plots were treated at a rate of 123 to 247 tons dry weight per ha based on the Pb concentration measured on each plot.

Measurements were taken 8 – 10 years post treatment and suggest biosolid treatment is a persistent method for reduction of bioaccessible Pb.

The long study period was designed to provide evidence of the persistence of the remediation method.

In summary, the authors found that Pb bioaccessibility in Pb contaminated soils reduced by 97.6% when treated with spent mushroom compost. The authors also found that concentrations in plant tissue grown after treatment, Pb (mg/kg), reduced significantly when compared with the control, and soil microbial toxicity remained unchanged when compared with the control.

Chemical fractionation and solid speciation analysis confirmed the transformation of soil Pb from the most bioaccessible forms to more stable forms by the formation of pyromorphites or pyromorphite-like minerals induced by the treatments.

8. Assumptions

The report doesn't specify what rate of SMC was used or the Pb level of the land in the SMC test area. In caution, this RMS uses the highest level of treatment per ha (247 t/ha) used by the report authors.

9. Reference

Restoration and risk reduction of lead by phosphate-enriched biosolid amendments
https://www.nature.com/articles/s41598-021-88576-y
1Vol.:(0123456789)Scientific Reports | (2021) 11:8965 | https://doi.org/10.1038/s41598-021-88576-ywww.nature.com/scientificreports
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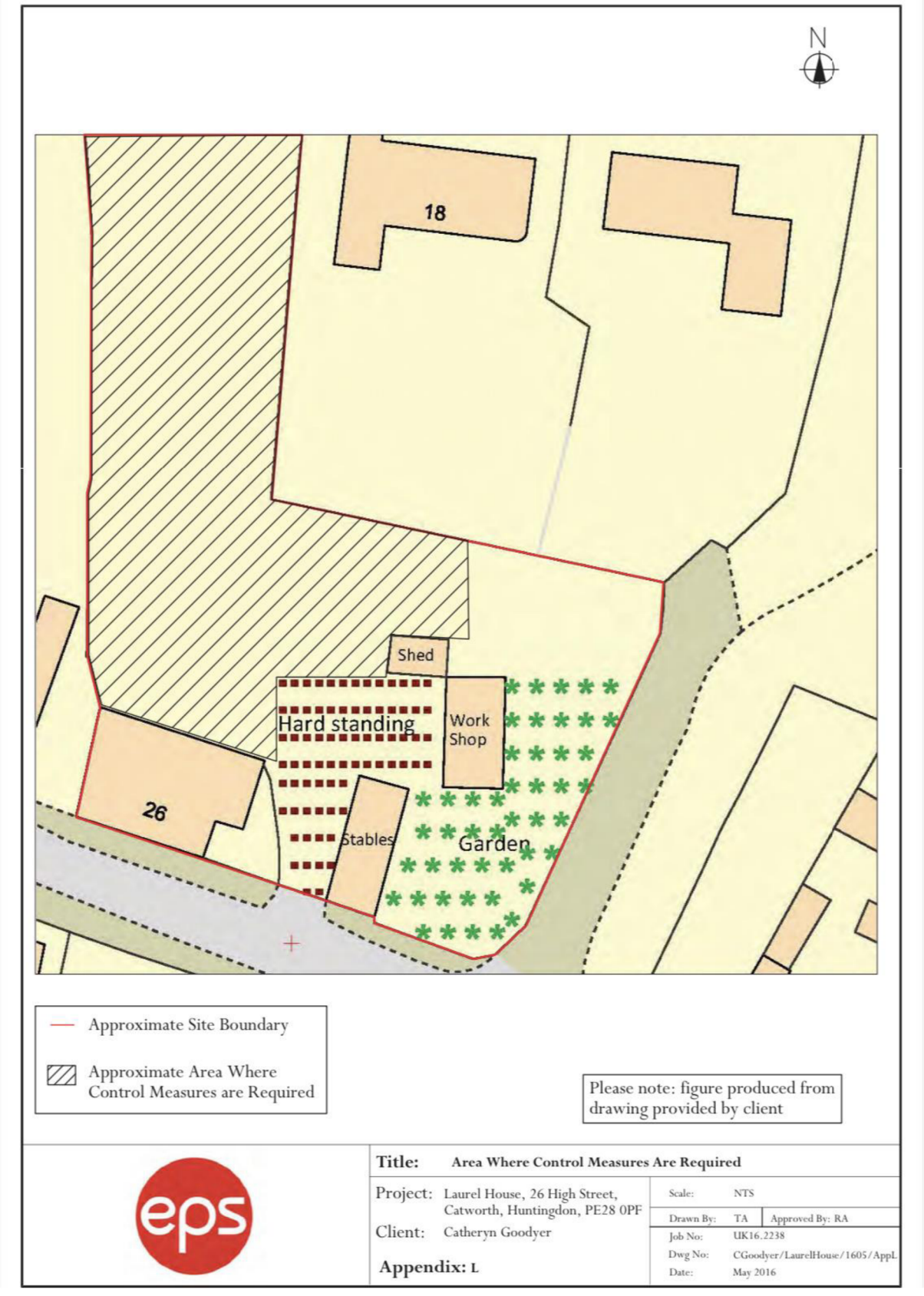
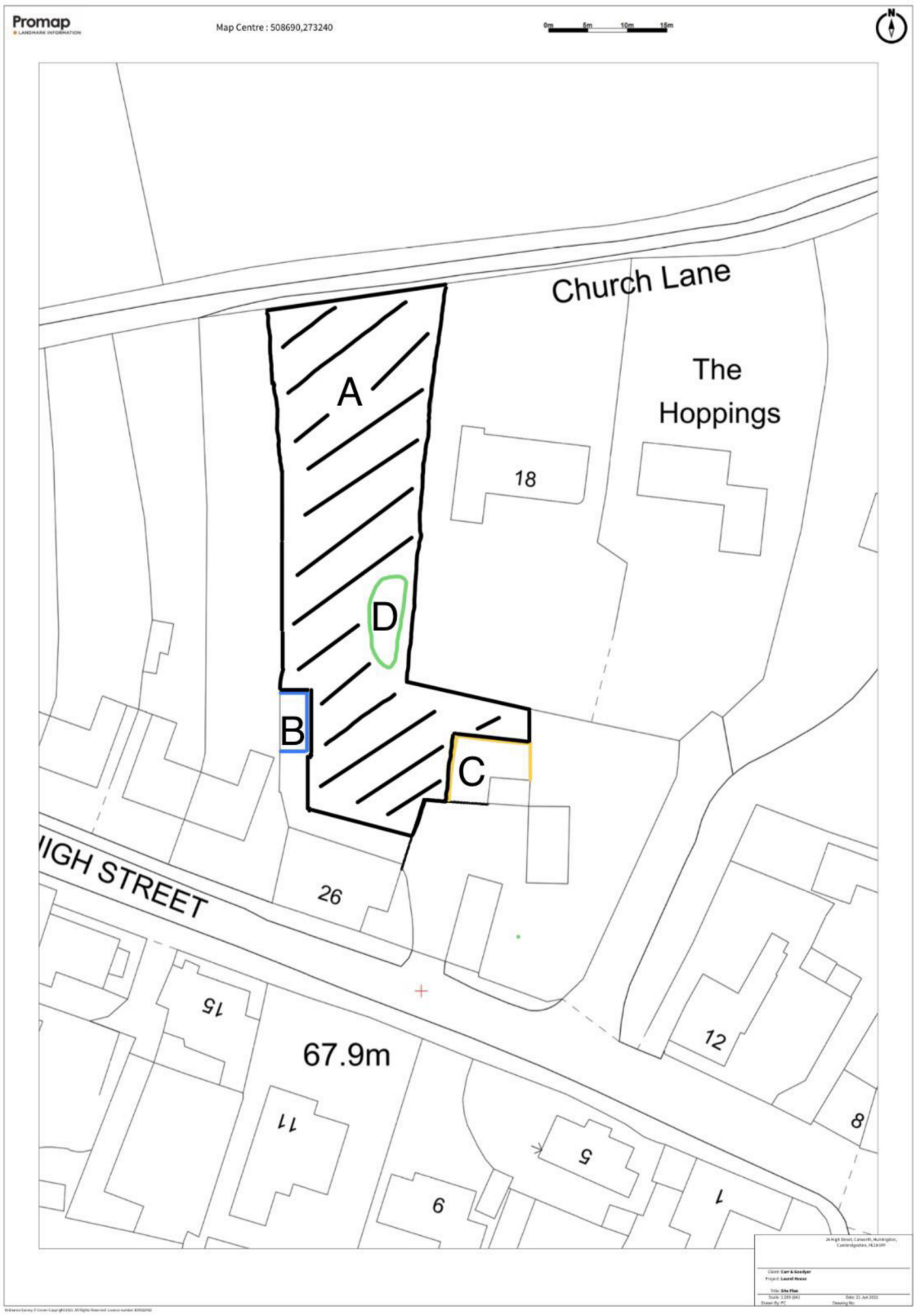
10. Appendices

Appendix A


N
18
Shed
Hard standing
Work Shop
26
Stables
Garden
Approximate Site Boundary
Approximate Area Where Control Measures are Required
Please note: figure produced from drawing provided by client
eps
Title: Area Where Control Measures Are Required
Project: Laurel House, 26 High Street, Catworth, Huntingdon, PE28 0PF
Client: Catheryn Goodyer
Appendix: L
Scale: NTS
Drawn By: TA
Approved By: RA
Job No: UK16.2238
Dwg No: CGoodyer/LaurelHouse/1605/AppL
Date: May 2016

Appendix B


Promap
Map Centre : 508690,273240
Church Lane
The Hoppings
18
A
D
B
C
IGH STREET
26
15
67.9m
11
6
5
1
12
8