REMEDIATION STRATEGY

BECKENHAM PLACE PARK
LAKE REINSTATEMENT WORKS
LONDON, BR3 1SY

REC REFERENCE: 1CO104645/P4/R2

REPORT PREPARED FOR: LONDON BOROUGH OF LEWISHAM

AUGUST 2018

National Consultancy, Locally Delivered

A CONCEPT LIFE SCIENCES COMPANY

QUALITY ASSURANCE

Issue/revision	Issue 1	Revision 1	Revision 2
Remarks	DRAFT FOR COMMENT	Updated with client comments	Updated with CLO comments
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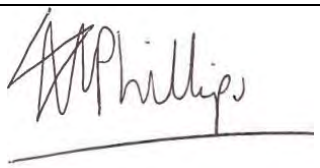
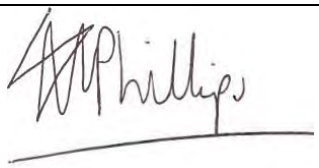
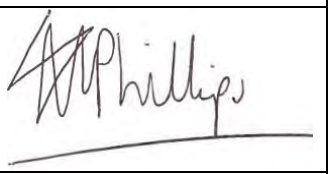
Signature			
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EXECUTIVE SUMMARY

Site Address	Beckenham Place Park, Lewisham, Greater London, BR3 5BP
National Grid Reference	538188,170902
Site Area	2.24 ha

Background

REC understands that the Client is intending to restore the 18th century estate landscape of Beckenham Place Park. The proposed works are to include the reinstatement of an historic lake, with an associated wet woodland area.

REC has previously undertaken the following works at the site:

- *Phase I & II* Geo-Environmental Site Investigation. Report Ref. 1CO102156pr2r0, dated August 2016; and
- *Additional* Geo-Environmental Site Assessment, Report Ref. 1CO104645/p3/r0, dated July 2018.

Due to the presence of asbestos containing material and elevated concentrations of other contaminants of concern within the Made Ground soils, remedial works are required in order to mitigate the potential risk to future site users.

Tier II Human Health Risk Assessment

Soils

Elevated concentrations of the following were recorded within the Made Ground:

- **Lead; Asbestos fibres; ACM bulk product (chrysotile); Dibenzo(a,h)anthracene and TPH C_{21}-C_{35}.**

Site Remediation

This site specific Remedial Strategy (RS) provides a methodology for the site remediation that is required to negate the identified contaminant linkages and reduce the consequent pollutant pathways to a standard suitable for the proposed development. The salient details of the RS are summarised below:

- Redesign of proposed lake area to avoid excavation of crocidolite fibres with a reasonable buffer;
- Hand screening of bituminous material and offsite removal. Validation of surrounding soils;
- Treatment of Japanese Knotweed stand;
- Phased excavation, asbestos hand screening and transport of Made Ground soils to receiving location elsewhere in Beckenham Place Park;
- Encapsulation of hand screened Made Ground soils elsewhere in Beckenham Place Park (BPP) and capped with chemically suitable materials; and
- Independent verification of the above works and production of a validation report to demonstrate that any potential risks to human health have been mitigated (i.e. by REC).

All works to be undertaken in strict accordance with UK Environmental Permitting and to the satisfaction of the Local Planning Authority.

REC understands that a Materials Management Plan has been produced by the groundworks contractor, relating to movement and reuse of site-won materials elsewhere in Beckenham Place Park. Due to the presence of asbestos within the Made Ground, REC understands that an Asbestos Management Plan has also been produced.

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APPENDICES

1.0 INTRODUCTION

Resource and Environmental Consultants Ltd (REC) has been instructed by London Borough of Lewisham (herein referred to as "the Client") to prepare a Remediation Strategy (RS) to support their development at the site known as Beckenham Place Park, Lewisham. A site location plan (ref. 1CO104645-001) is presented within Appendix I.

This report concentrates on an area of the site which is proposed to be developed to reinstate an historical lake. Herein, "the Site" is defined as the proposed lake footprint and its immediate environs. The wider Beckenham Place Park area is referred to in full or as "BPP".

1.1 Report Objectives

The purpose of this RS, broadly in accordance with CLR11[1], is to identify and evaluate feasible remedial technologies and to validate the successful implementation of site remediation to ensure the safe, cost effective, and regulatory compliant redevelopment of the site.

A glossary of terms used within this report are given as Section 7.0. Limitations of this report are given as Section 8.0.

1.2 Proposed Development Plan

REC understands that the Client is intending to restore the 18th century estate landscape of Beckenham Place Park. The proposed works are to include the reinstatement of an historic lake, with an associated wet woodland area.

The lake proposals are separated into two parts:

- A restored lake of up to 3.50 m water depth, covering an area of approximately 1.05 ha; and,
- An area of wet woodland, where excavations cover an area of approximately 0.20 ha, with varied water depths up to 1.00 m.

The restored lake footprint is to be located within a former 18-hole golf course. The golf course is underlain by various sections of made ground, derived from when the original lake was infilled during the 1930s.

A proposed site development plan (ref. 1CO104645-002) is presented within Appendix III.

1.3 Scope of Works

The aims of the remedial works, as detailed within this document, are as follows:

- To ensure that construction/ground workers are not put at an unacceptable short term risk during the construction/remediation works;

[1] Environment Agency (2004) Model Procedures for the Management of Land Contamination, Contaminated Land Report 11 (CLR11).

- To ensure that site end users and neighbours are not put at an unacceptable short or long term risk as a result of any contamination sources within the site; and
- To satisfy the requirements of the regulatory authorities (i.e. the Local Planning Authority and the Environment Agency).

Table 1.1 demonstrates that each of the potential contaminant linkages, based upon the contaminant-pathway-receptor model, will be satisfactorily addressed by the proposed remedial works across the site.

Table 1.1 Proposed Mitigation Measures to Break the Identified Contaminant Linkage

Receptor	Potential Risk	Current Residual Risk	Comment / Mitigation
Human Health - Future Site Users	*Inhalation / Ingestion*	**YES**	Elevated concentrations of lead and widespread asbestos containing material (ACM) identified within the Made Ground. Asbestos fibres >0.001% were recorded in a single location. The Made Ground within the lake is to be fully excavated as part of the proposed development and encapsulated elsewhere on site with 600mm of clean capping material, thus removing any residual risk to future site users. Asbestos is to be hand screened prior to encapsulation. The single location with measurable concentrations of fibres is now not to be excavated as part of these works.
	Skin contact		
	Irradiation	No	The development will be fully external and as such no radon or bulk gas risk is anticipated.
	Fire and explosion		
Natural Environment	*Contamination of Controlled waters*	**YES**	A quantity of bituminous material was encountered within a single location. This is to be hand screen and disposed from site. Leachate analysis on Made Ground soils identified the potential for elevated concentrations of a number of contaminants. Recommended mitigation comprises a combination of semi-permeable and impermeable membranes.
	Plant Phytotoxicity	No	Removal of the Made Ground and introduction of the lake liner is considered sufficient to break this potential pollutant pathway. REC understands that any new planting will be within newly placed 300mm thick topsoil above the lake liner.

1.4 Previous Works

REC has previously undertaken the following works at the site:

- *Phase I & II* Geo-Environmental Site Investigation. Report Ref. 1CO102156pr2r0, dated August 2016; and,
- *Additional* Geo-Environmental Site Assessment, Report Ref. 1CO104645/p3/r0, dated July 2018.

The investigation completed by REC in 2016 comprised a Phase I and II assessment, considering historical land use, development of a conceptual site model and a phase of soil sampling to depths up to 5.0mbgl. The scope, provided by Land Use Consultants, was limited due to budget and access constraints as the area was heavily vegetated and wooded at the time and comprised an active golf course. The works, as such, were confined to limited areas.

Due to Made Ground deposits of an unknown origin, associated with previous (early 20th Century) landscaping of the golf course areas of the site, the preliminary risk assessment suggested a **Low to Moderate** risk for human receptors (based open a Public Open Space end use). The soil testing for the site did not identify evidence of significant contamination, including asbestos, within 5no. samples from the Made Ground soils, when compared against the relevant generic assessment criteria for Public Open Space. Chemical analysis for the disposal or subsequent re-use of the material on site was not included in the scope provided by the Client.

The underlying superficial soils comprise Head Deposits, a Secondary Undifferentiated Aquifer. Given that the majority of the Made Ground was to be excavated as part of the proposed development, the risk to controlled waters was considered to be Low.

During the preliminary reinstatement works for the former lake in June 2018, fragments of potential Asbestos Containing Material (ACM) have been encountered within the Made Ground soils. Subsequently works have been stopped pending development and approval of methodology for management of the soils. REC undertook an additional phase of sampling and analysis, which confirmed the presence of ACM throughout the Made Ground. Full details can be found in REC's report ref. 1CO104645p3r2, dated July 2018, with pertinent details summarised in Section 2.3.

Based on the above, it was recommended that a Remediation Strategy (RS) should be produced setting out remedial measures to mitigate against the contamination risks posed to future site users, construction workers and controlled waters, and detailing the associated validation requirements (i.e. this report).

1.5 Summary of Involved Parties

Table 1.2 Summary of Involved Parties

Name of Party	Function / Interest
London Borough of Lewisham	Developer
REC Ltd	Geo-Environmental Consultant
BDP / Idverde	Remediation / Construction Contractor

Name of Party	Function / Interest
London Borough of Lewisham	Human Health Regulator / Local Planning Authority
Environment Agency	Controlled Waters Regulator

2.0 SITE CHARACTERISTICS

2.1 Site Details

Table 2.1 Site Location and Description

Site Address	Beckenham Place Park, Lewisham, Greater London, BR3 5BP
National Grid Reference	538188,170902
Site Area	2.24 ha

The site forms part of a larger park area called Beckenham Place Park. The park area has historically been used as a private residence, prisoner of war camp and public golf course. Beckenham Place Park also encompasses areas of woodland, access roads and footpaths, and Beckenham Place Mansion, which until 2016 served as the golf course club house and café.

The former lake area (the Site) trends approximately NW-SE, narrowing in the middle and curving to the west at the northern end. Prior to commencement of lake reinstatement works, the majority of the site comprised ash woodland within a slight depression (approximately one metre below surrounding ground level).

The southeast half of the site is wooded, surrounded by a brick and packed gravel public footpath with woodland beyond. The middle of the northwest half of the site was until recently similarly wooded and in a depression. The remainder of the northwest half has historically been artificially raised to form part of the Beckenham Place Golf Course.

The wider BPP topography generally slopes downhill towards the northeast. Vehicular access into the park is via Beckenham Hill Road (A2015), although the Site itself is not accessible by public road.

2.2 Geology

The 2016 ground investigation generally confirmed the published geology and identified the strata set out in Table 2.2 below. This information has been updated following preliminary trial pitting for reinstatement of the lake.

Table 2.2 Summary of Geological Strata

Stratum	Min Depth to Top of Strata (m)	Max Depth to Top of Strata (m)	Max Thickness (m)
Made Ground	Ground Level	Ground Level	2.50 (WS104*)
Topsoil	Ground Level	Ground Level	0.30
Head Deposits (Clay, Silt, Sand & Gravel)	0.30	1.65	>2.35 (WS101^{NP})
Harwich Formation	Unknown		Unknown
Lambeth Group	Unknown		Unknown
Upper Chalk	Circa 31.0 mbgl (based on other borehole on site)		>39m

2.2.1 Made Ground

Made Ground was encountered within all window samples and trial pits and typically comprised grass over grey and brown CLAY, SAND and GRAVEL of varying proportion with moderate cobble content and low boulder content. Gravel is angular to rounded, fine to coarse flint, brick, cement, chalk, sandstone, ceramic, glass, slate, wood, possible asphalt and bituminous material with sub-angular to sub-rounded cobbles of brick and slate. Boulders were brick, concrete and metal. Within a number of trial pits advanced in 2018, ACM was also recorded within this stratum. Made Ground deposits were encountered between ground level and a maximum depth of 2.50mbgl.

2.2.2 Topsoil

Topsoil was encountered in two hand pits (HP101 and HP102) undertaken within the proposed wet woodland area to the southeast of the main lake excavation. This stratum typically comprised light brown slightly gravelly slightly clayey SAND. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to medium flint, with frequent roots and rootlets.

2.2.3 Superficial Deposits (Head Deposits)

Head Deposits were encountered within both hand pit locations (HP101 & HP102) and within four window sample locations (WS101, WS102, WS103 & WS105). Trial pits for lake excavation works terminated at the base of the Made Ground and the superficial soils were not logged.

Within the hand pit locations the head deposits comprised yellowish to greyish brown slightly gravelly, slightly clayey SAND. Sand is fine to coarse. Gravel is angular to sub-rounded, fine to coarse flint. Within the window sample locations, the head deposits typically comprised soft to firm, yellowish brown slightly gravelly slightly sandy CLAY. Sand is fine to medium. Gravel is sub-angular to rounded, fine to coarse flint.

2.2.4 Solid Geology

Bedrock geology was not encountered during the investigation.

2.2.5 Groundwater

Groundwater was encountered within WS101 and WS102. Both strikes were recorded at 3.00mbgl as seepage within the sand and gravel.

2.3 Human Health Risk Assessment

A generic qualitative human health risk assessment (GQRA) has been undertaken using adopted Generic Assessment Criteria (GAC). These are based on Suitable for Use Levels reference values published by LQM/CIEH in 2015 or, where unavailable, CLEA derived assessment criteria and 2014 Defra C4SL (Category 4 Screening Level).

2.3.1 Soil Sampling Strategy

In July 2018, upon discovery of ACM within the soils, machine excavated trial pits were advanced across the area of Made Ground proposed to be excavated from the lake footprint. An REC engineer obtained representative soil samples from 15no. trial pits at depths where visible ACM had been encountered and to provide suitable spread throughout the depth of shallow soils. Fragments of ACM were also obtained for laboratory confirmation.

All 31no. soil samples obtained were screened for the presence of asbestos fibres. These samples are in addition to a further 5no. samples analysed during the previous Geo-Environmental Site Investigation (report ref. 1CO102156pr2r0, dated August 2016).

Approximately 11,000m^3 of Made Ground soil is proposed for excavation from the lake area. This provides a sampling frequency of 1:300 which is considered sufficient to characterise the soils within this area and for the proposed end use.

2.3.2 Chemical Analysis of Soils

Selected soil samples were tested for a range of contaminants of potential concern including:

- CLEA Metals;
- pH & Water Soluble Sulphate;
- Asbestos screen & asbestos quantification where applicable;
- Total and Speciated USEPA16 PAH; and,
- Banded TPH.

Based on the results of a direct comparison against appropriate and conservative Generic Assessment Criteria (GAC), the following exceedances were recorded. All elevated concentrations were recorded in samples from the 2018 trial pit sampling investigation.

- **Lead** (TP301 @ 1,100 mg/kg, TP302 @ 880 mg/kg, TP306 @ 830 mg/kg, TP307 @ 650 mg/kg, TP310 @ 650 mg/kg, TP311 @ 650 mg/kg and TP314 @ 1,300 mg/kg);
- **Asbestos fibres** (TP303, TP304, TP306, TP307, TP315);
- **ACM bulk product** (TP301, TP302, TP304, TP306, TP308, TP314);
- **Dibenzo(a,h)anthracene** (TP301* @ 2.3 mg/kg); and,
- **TPH C_{21}-C_{35}** (TP301* @ 42,000 mg/kg).

The sample from TP301 was a cobble of bituminous material which comprised the entirety of the material tested.

Lead

Exceedances of lead were identified within samples from trial pits across the site. The main exposure pathway for lead within the context of this site is ingestion of soil and / or oral background exposure. The elevated values of lead are attributed to contaminants within the Made Ground.

Asbestos (fibres and bulk product)

Asbestos fibres and ACM were encountered in samples from across the site and are understood to be directly associated with Made Ground infill materials. The main exposure pathway for asbestos is inhalation of fibres.

Where a positive identification of asbestos fibres within soil was recorded, the sample was subsequently submitted for quantification. The results of Asbestos quantification tests are summarised in Table 2.3, below.

Table 2.3 Summary of Asbestos Identification and Quantification

Location	ACM Identified	Asbestos Type(s) Identified	Overall Mass Percentage of Asbestos	Comment
TP301	Bulk product	Chrysotile	N/A	Non Notifiable
TP302	Bulk product	Chrysotile	N/A	Non Notifiable
TP303	Loose Fibre	Chrysotile	<0.001	Non Notifiable
TP304	Loose Fibre	Chrysotile	<0.001	Non Notifiable
TP304	Bulk product	Chrysotile	N/A	Non Notifiable
TP306	Loose Fibre	Chrysotile	<0.001	Non Notifiable
TP306	Bulk product	Chrysotile	N/A	Non Notifiable
TP307	Loose Fibre	Chrysotile	<0.001	Non Notifiable
TP308	Bulk product	Chrysotile	N/A	Non Notifiable
TP314	Bulk product	Chrysotile	N/A	Non Notifiable
TP315	Loose Fibrous Asbestos Debris	Crocidolite Chrysotile	0.012	Notifiable non-licensable waste

Samples of identifiable fragments of ACM cement were obtained from 6no. trial pits and positively confirmed at the laboratory as containing chrysotile asbestos. Given the presence of identifiable pieces of ACM across the site, in accordance with Environment Agency technical guidance WM3[2], all soils must be considered as hazardous waste without interim remedial measures. This is discussed in detail in Section 3.

Given the presence of limited quantities of crocidolite asbestos, REC consider that the proposed excavation and movement of Made Ground soils would be classified as **Notifiable Non-Licensed Work** (NNLW) in accordance with HSE guidance. Notification of works should be obtained prior to work commencing if excavation were to proceed in this area.

However, should the potential for exposure to crocidolite fibres be mitigated by delineation and exclusion of the affected area (see following paragraph), removal of the remaining ACM within the soils could be considered as **non-licensable** work in accordance with HSE documentation.

[2] Environment Agency (2015) Guidance on the classification and assessment of waste, WM3.

Following the first phase of trial pit sampling works undertaken by REC in 2018 (TP301 to TP315), an engineer attended site to obtain a further 5no. samples from within a 5m radius of TP315 in order to determine whether there may be evidence of further crocidolite fibres. All samples returned with No Asbestos Detected and as such, the loose fibres have been considered localised within a single area.

A plan identifying distribution of asbestos is given as drawing 1CO104645-003 within Appendix I.

A detailed discussion of ACM and asbestos risk and mitigation is included within REC report 1CO104645/p3/r0.

Dibenzo(a,h)Anthracene & TPH C21-C35

The primary human health pathway for these contaminants in this context are ingestion of soil, oral background exposure and dermal contact with soils. Elevated concentrations were recorded within a sample of bituminous material identified within the stockpile of TP301.

A sample of the soils immediately surrounding the material was submitted for laboratory analysis to determine the extent of any leaching of contaminants. The results of this testing identified no elevated concentrations when compared to generic screening criteria for Public Open Space. As such, it is considered that the contaminants are bound within the bituminous material with negligible leaching potential.

2.3.3 Plant Phytotoxicity

Concentrations of lead, zinc and copper within the Made Ground may be potentially harmful to the environment via interaction with lake water. These determinants could leach into the lake and negatively affect any wildlife within the proposed lake.

Removal of the Made Ground and introduction of the lake liner is considered sufficient to break this potential pollutant pathway. REC understands that any new planting will be within newly placed 300mm thick layer of topsoil above the lake liner.

2.3.4 Japanese Knotweed

REC understands that a small stand of Japanese Knotweed has been identified within the site area. It is recommended that this should be managed by a suitably licensed and qualified contractor, with works coordinated to avoid conflict with the asbestos or bituminous material remediation works.

2.4 Controlled Waters

Following the recording of chemical exceedances within the soil samples, additional soil samples were analysed for leachability to determine whether contaminants may leach into the underlying natural material once stockpiled. The site is underlain by Head Deposits, which are designated as a Secondary Undifferentiated Aquifer, with Secondary A aquifers indicated to be present within the

Lambeth Group and Harwich Formation strata. The underlying Chalk (>30mbgl) is a Principal aquifer. Numerous surface water features are understood to currently be present on the site.

Removed Made Ground soils are proposed to be placed within 3no. receiving sites, all within the northeast corner of the Beckenham Place Park site. This area of the Park is at a lower elevation than all other areas of the park and is adjacent uphill to an active railway mainline. A plan indicating receiving site locations is given in Appendix III (ref. 1CO104645-002).

Samples of leachate deriving from Made Ground soils were screened against generic assessment criteria for water with concentrations of determinants compared with the relevant thresholds. The results of this direct comparison indicates that the screening criteria have been exceeded for the following determinants:

- **Arsenic:** Groundwater screening values – TP302, TP306, TP310, TP311, TP314 & TP315;
- **Chromium VI:** Surface water screening values – TP301;
- **Chromium III:** Surface water screening values – TP307;
- **Iron:** Surface water screening values – TP307, TP311 & TP312;
- **Lead:** Surface water screening values – All samples;
- **Lead:** Groundwater screening values – TP301, TP302, TP307 & TP310 to TP315;
- **Mercury:** Surface water screening values – TP301, TP302 & TP314;
- **Nickel:** Surface water screening values – TP311 & TP312;
- **Zinc:** Surface water screening values – TP301, TP302, TP307, TP310, TP311, TP312 & TP313;
- **Anthracene:** Surface water and groundwater screening values – TP302; and
- **Fluoranthene:** Surface water screening values – TP302.

A detailed discussion of the results is given in REC report 1CO104645p3r2. Key considerations are summarised below:

- Based on the findings of the leachate analysis and screening, the risk to shallow groundwater is considered to be Low to Moderate and therefore remedial measures would be required;
- Given that there are no records of potable water abstractions within a 1.0km radius of the site, drinking water screening values have not been considered within this comparison; and,
- Upon review of topographical and drainage characteristics of the site, the residual risk to surface waters was considered to be Negligible to Very Low.

2.5 Remedial Options Appraisal for Asbestos Contamination

Given the identification of previously unexpected asbestos contamination across the infilled Made Ground areas of the proposed lake footprint, remedial works will be required in order to mitigate against potential exposure to both future site users and construction workers.

REC discussed three broad remedial options, these being:

- Terminate works and do not complete the lake;
- Reduce the size of the lake to avoid excavating area of crocidolite fibres and thus all works are

non-notifiable; or

- Continue as planned, including with works in the vicinity of TP315 being NNLW.

On balance of time, cost and end result, the second option (lake reduction) was selected as most favourable and has been taken forward into the Remediation Strategy which follows as Section 3.0.

3.0 REMEDIATION STRATEGY

The remediation strategy for the site will therefore comprise:

- Redesign of proposed lake area to avoid excavation of crocidolite fibres with a reasonable buffer;
- Hand screening of bituminous material and offsite removal. Validation of surrounding soils;
- Treatment of Japanese Knotweed stand;
- Phased excavation, asbestos hand screening and transport of Made Ground soils to receiving location elsewhere in Beckenham Place Park;
- Encapsulation of hand screened Made Ground soils elsewhere on site, including mitigation of soil leachate risk, and 600mm thick capping with chemically suitable materials; and
- Independent verification of the above works and production of a validation report to demonstrate that any potential risks to human health have been mitigated (i.e. by REC).

3.1 Remediation Works

The rationale detailed below provides a synopsis of the proposed remediation works required to reduce any potential health risks between identified contaminated soils and the future site end users. The risk to construction workers is to be addressed through appropriate site controls, with particular note made to the requirement for asbestos PPE, RPE and monitoring.

The remediation strategy should be implemented with appropriate supervision by REC consultants and engineers so that the works can be fully validated. Upon completion of the remedial works a validation report is to be produced summarising the works and demonstrating that any identified risks to human health have been reduced to the satisfaction of the Local Authority.

The Remediation Plan (ref. 1CO104645-004), presented within Appendix I, demonstrates the location where elevated concentrations have been encountered within the Made Ground and also indicates the locations where remedial measures are necessary.

3.1.1 Site Health and Safety

Under the Construction Design Management (CDM) Regulations 2015, the Principal Contractor is responsible for provision of a detailed Risk Assessment and Method Statement and the delivery suitable site inductions to all personnel.

Due to the presence of contaminated soils across the site, all personnel must be briefed on the associated risks during site inductions. As required, staff should be supplied with all necessary PPE and RPE to protect against exposure. Particular awareness should be made to the presence of asbestos and the associated risks. Due to the presence of asbestos within the Made Ground, a detailed Asbestos Management Plan (AMP) should be produced in accordance with Regulation 4 of

CAR 2012[3]. REC understands that idverde have an AMP in place for this scheme.

3.2 Revision of Proposed Layout

Due to the presence of quantifiable crocidolite asbestos fibres encountered within TP315, excavation of soils within this area would be classified as Notifiable Non-Licensable Works (NNLW) and thus would potentially significantly increase costs of soil treatment and removal. The additional 5no. samples obtained by REC returned with No Asbestos Detected, and as such it is considered that the quantifiable fibres are localised to this area.

It is proposed that the lake footprint be redesigned to remove the requirement for excavation in this area. Offsetting the lake area north by circa 5m would provide a reasonable buffer around the TP315 location. On this basis and based on the quantification results obtained to date, no areas with measurable loose fibres will be disturbed during the works.

The sample from TP315 was obtained from circa 0.90mbgl, and as such it is considered sufficiently deep to not pose a significant risk to future site users without additional capping materials.

3.3 Bituminous Material

Cobbles of bituminous material were visually identified within TP301, WS104 and WS105 in the southeast of the proposed lake area. Laboratory analyses of this material recorded very high concentrations of dibenzo(a,h)anthracene and TPH C21-C35. A sample of the surrounding soils was found to contain no elevated concentrations when compared to generic assessment criteria for Public Open Space. As such, it is considered that the contaminants are bound within the bituminous material with limited impact on the surrounding soils.

The most appropriate action is considered to be hand screening the soils in this area to remove all identifiable fragments of bituminous material. Fragments should tested for waste acceptance criteria and be removed from site to appropriate receiving landfill.

Once all fragments have been removed, the underlying soils should be validated to ensure that no impacted soils remain. Any significantly impacted soils should be excavated and tested to determine a hazardous waste classification, prior to removal or reuse within BPP landscaping as appropriate.

3.4 Japanese Knotweed

It is understood that a stand of Japanese Knotweed (JKW) has been identified on the Site. This is a controlled substance and must be managed in accordance with legal requirements.

Given the timescales of this project, recommended treatment options include excavation and encapsulation or incineration. Treatment is not covered within the scope of this Remediation Strategy, however is being undertaken by the Remediation Contractor and this must be considered

[3] CAR (2012) The Control of Asbestos Regulations, Statutory Instruments 2012 No. 632.

alongside the other remedial works required on the Site.

Where JKW impacted soils are excavated from Made Ground areas, soils should be hand screened for bituminous material and ACM prior to removal or disposal.

3.5 Excavation and Handling of ACM Impacted Soil

REC understands that it is the Client's intention to remove all asbestos impacted materials from the lake area for burial elsewhere on site. The remediation contractor has advised previously that the made ground is removed fully and not left in situ below the lake liner, as the integrity of the liner would otherwise be compromised.

3.5.1 Detailed Plan of Works (Asbestos Works)

A detailed plan of work (POW) should be produced prior to works by the asbestos/groundworks contractor in accordance with CAR2012 Reg. 7. This must include a description of the proposed works, persons involved, control measures in place and removal techniques.

The risk drivers for asbestos are for an inhalation pathway and as such will be mitigated through the adoption of these site specific risk assessments and working methodologies to be validated by reassurance testing provided in HSG248[4]. Confirmation of Asbestos air monitoring should be undertaken in accordance with HSG248 by a UKAS accredited analyst.

3.5.2 Soils Containing Asbestos

The following protocols should be adopted into site management operations:

Designated Areas

In accordance with L143[5] pp.91-92, every employer must ensure that any area in which work under the control of that employer is carried out is designated as an asbestos area, subject to regulation 3(2), where any employee would be liable to be exposed to asbestos in that area. Any area where the risk assessment cannot clearly demonstrate that the control limit will not be exceeded must be demarcated as a respirator zone.

Asbestos areas and respirator zones must be clearly and separately demarcated and identified by notices indicating:

- That the area is an asbestos area or a respirator zone or both, as the case may be; and
- In the case of a respirator zone, that the exposure of an employee who enters it is liable to exceed the control limit and that respiratory protective equipment must be worn.

The employer must not permit any employee, other than an employee who is required for work

[4] HSG248: Asbestos, the analysts guide to sampling and analysis.
[5] Health and Safety Executive (2013) Managing and Working with Asbestos, Control of Asbestos Regulations 2012, L143 (Second edition).

purposes to be in an area designated as an asbestos area or a respirator zone, to enter or remain in any such area and only employees who are so permitted shall enter or remain in such an area.

Every employer must ensure that only competent employees enter a respirator zone. The employer must also supervise any employees who enter a respirator zone. A competent employee means an employee who has received adequate information, instruction and training.

All areas where there is asbestos work should be segregated and marked with suitable warning notices as asbestos areas, subject to the exemptions provided in regulation 3(2).

In cases where the work area is to be in an enclosure, place warning notices on the airlock and enclosure walls. In the absence of an enclosure, establish the work area using ropes or barriers at a suitable distance. Place warning notices at suitable locations around the work area and at the entrance.

Employers should make sure that food and drink is never consumed in an asbestos area or respirator zone. Employers should provide an area to eat and drink.

Damping Down of Soils – Mitigate Particulate (Dust) Emission

Where Made Ground soils are being excavated / are in direct contact with the air in stockpiles or open excavations, water is to be sprayed onto these soils to assist in damping down and suppression of airborne particulates. A significant source of water will be required on site to carry out regular damping down of these soils, and this should be accounted for before excavation works are carried out. Particular attention should be given to this duty during hot and dry conditions where dusts are likely to be highly mobile.

In addition, where excavations are left open or where soil is stockpiled, soils that are suspected to be impacted with asbestos should be encapsulated using an impregnable sheeting or membrane and be suitably weighted down in order to prevent dispersal into the air. Care should be taken to ensure that encapsulating sheeting is not damaged during this process, breaching the encapsulation and allowing fibres to disperse.

Personal Protective Equipment (PPE)

In accordance with the Health and Safety Executive (HSE) Asbestos Essentials Guidance Note EM6 '*(Personal Protective Equipment (PPE) '* for non-licensed asbestos works, REC recommends that all site operatives present within the work area where potential asbestos impacted soils are being excavated are supplied with the following PPE:

- Respiratory Protective Equipment (RPE) with a protection factor of 20 or more;
- RPE must be face fitted and no worker can undertake works that involve asbestos until such a face fit has been undertaken;
- Single-use disposable gloves;
- Wellingtons are preferable to disposable overshoes; and,
- Overalls:

- Disposable overalls. Type 5/6 (BS EN ISO 13982-1);
- Waterproof overalls for outdoor work;
- Use oversized overalls - this will help to prevent ripping at the seams;
- If the cuffs are loose, seal them with tape;
- Avoid wearing a long-sleeved shirt - these are difficult to cover properly;
- Wear the overall legs over footwear (wellingtons recommended). Tucking them in lets dust into footwear; and,
- Wear the hood over the RPE straps.

Failure to utilise and correctly employ PPE will result in immediate cessation of works. Works will not be permitted to recommence until the individual has undergone further training in the use of PPE or the individual removed from works area.

Monitoring of Local Weather Conditions

The use of real time on-site weather monitoring is a useful tool in assessing the risk associated with the generation of particulate emissions and can also be used to demonstrate to any interested parties (such as the HSE) that a high level of diligence is being employed when dealing with hazardous substances such as ACM.

Visual monitoring of aerial emissions shall be carried out by site staff supervising materials handling operations. Visual monitoring will also be undertaken by the site manager or supervisor, at least twice per day, at the site boundary situated downwind of the engineering operations, and shall be recorded in the site diary.

Asbestos Air Monitoring

When handling asbestos impacted soils identified during the enabling works, asbestos monitoring works should be conducted in accordance with but not limited to the following HSE legislation and guidance:

- Health & Safety at Work Act 1974;
- The Control of Asbestos Regulations 2006;
- Approved Code of Practice L143 “Managing and Working with Asbestos”;
- Management of Health and Safety at Work Regulations 1999;
- HSE Guidance Note HSG248 ‘*Asbestos, the analysts guide to sampling and analysis’*; and,
- HSE Guidance Note HSG247 ‘Asbestos: The licensed contractors’ guide’.

Air Monitoring Procedures

Air monitoring for asbestos fibres will be undertaken in three distinct forms as follows:

- Boundary;

- Working area; and
- Personal.

Boundary Monitoring

Boundary monitoring will comprise a series of static air monitoring pumps located along the boundary down-wind of the active working area. This will allow for a comprehensive assessment of the presence of any airborne fibres which may be transported to the site's boundary.

Depending upon the wind direction, the placement of the static monitoring points may vary daily, which will allow for a proactive monitoring assessment. The wind direction will be relayed at the start of the working day to REC Asbestos from the onsite consultant.

Working Area

A series of static air monitoring pumps will be clustered both upwind, downwind and crosswind of the active working area, which will be defined by the consultant at the start of each monitoring occasion.

Personal Monitoring

Personal monitoring pumps will be worn by selected ground workers involved within the active working area.

Results of Air Monitoring

Once the monitoring has been analysed by the onsite UKAS accredited laboratory, the results will be delivered to the consultant who will then follow the correct site procedure.

Air monitoring will be undertaken by a UKAS accredited surveyor to a limit of detection (LOD) of 0.01 f/ml. Works will immediately cease if monitoring records asbestos fibres in excess of 0.1 f/ml. If activities on site are seen to create any discernible increase in air-borne fibre levels, the works will halt and the working methodologies will be assessed, with particular consideration given to the dampening down of materials and any PPE requirement.

Record keeping

The following recorded should be kept for verification purposes when ACM has been positively identified:

- Register;
- Testing results;
- Photographs;
- Details of locations where ACM is identified (drawings);
- Consignment notes relating to any ACM that is disposed of off-site; and,

- Certificates of any air monitoring undertaken.

3.5.3 Hand Screening of Soils

Prior to transport and burial, it is proposed that all soils be hand screened for visible ACM fragments and that these be removed from site separately as hazardous waste to an appropriate receiving landfill. Hand screening is required in order to achieve reasonable betterment of the soils and thus minimise the potential for residual ACM to remain on site.

Hand screening should be undertaken by operatives trained in recognition of ACM and with appropriate PPE, RPE and air monitoring systems in place.

Once soils have been transported, a second phase of visible hand screening should be undertaken, prior to stockpiling and/or encapsulation.

3.5.4 Stockpiling and Storage of Soils

Excavated soils which are stockpiled both pre- and post- screening should be stored on an impregnable sheeting or membrane and be suitably weighted down in order to prevent dispersal into the air or exposure to impacted soils. The stockpiles should be secured with fencing and appropriate signage to ensure no unauthorised access.

3.5.5 Encapsulation of Soils and Capping Layer

Once visually screened and the Environmental Consultant is happy that reasonable betterment has been achieved, the soils may be placed in the proposed encapsulation location. Soils should be placed on top of and fully covered by an impregnable sheeting or membrane and a “no dig” marker layer be placed, to prevent a pathway to impacted soils being activated.

Given the membrane is to be impregnable accidental exposure is unlikely, therefore a minimum 600mm of chemically suitable soil is considered sufficient capping as detailed below. This thickness should be confirmed by the regulatory authority as being satisfactory prior to commencement of capping layer placement.

Capping Layer Design

A 600mm thick clean capping layer is required over all encapsulated soils to ensure the potential migration pathway of underlying contaminants to future site users (Human Health receptor) is effectively severed. The Chemical Testing Specification for public open space is presented as Appendix II.

Suitability of Capping Materials

REC understands that all proposed capping layer materials are to be derived from elsewhere on the BPP site. Chemical testing of materials that are site-won or imported has been undertaken by REC to confirm their suitability for use. REC understands that a Materials Management Plan has been produced by idverde, relating to movement and reuse of site-won materials elsewhere in Beckenham

Place Park.

Testing of clean capping materials was completed at a frequency of 1 sampler per 500m^3, based on site-derived natural soils. Soils are to be sourced from the lake excavation, comprising both chemically validated topsoil and natural materials from beneath the Made Ground. All soils shall be clean and free of foreign debris, building materials, timber and other deleterious matter.

Post Placement Validation

Following installation of the capping layer, physical validation must be carried out to ensure the minimum depth requirements have been adhered to. The inspection works are to be undertaken by REC and at locations determined by REC during the validation works in order to ensure that sufficient coverage is achieved across the encapsulated areas.

REC will record the thickness, depth and composition of the capping layer and obtain a photographic record of the works for inclusion within the validation report.

3.5.6 Record of Works and Materials Management

The location of the soils should be accurately surveyed and submitted to the regulatory authority. Methodology should be approved in writing by the regulatory authority prior to commencement of screening and burial works.

All soil movement must be done under the relevant necessary waste and materials management and environmental permits and exemptions as appropriate (see Section 4.2).

3.6 Soil Leachate & Ground Gas

The results of soil leachate testing indicated the potential for contaminants to leach out of Made Ground soils, which could pose a threat to shallow groundwater underlying the site. In order to prevent the mobilisation of leachable contaminants and subsequent migration into underlying natural strata, the following is required:

- Installation of fully impermeable impregnable membrane either above or below the stockpiled Made Ground soils, whichever is considered by the site engineer to be the more structurally stable; and
- Installation of semi-permeable impregnable membrane above or below stockpile (converse of the above).

Installation of impermeable membrane over the stockpile is considered sufficient to prevent downward migration of water and thus mobilisation of leachable contaminants. Installation of impermeable membrane beneath the stockpile is considered sufficient to prevent any mobilised contaminants from migrating downwards into underlying natural soils.

It is considered that full encapsulation with impermeable membrane may increase the potential for drainage issues within this area of the site.

3.6.1 Potential Build Up of Ground Gas

Stockpiled Soils

REC has carried out a basic ground gas risk assessment in accordance with CL:AIRE guidance RB17. Given high soil organic content within the Made Ground, it is considered that there is a potential for hazardous gas generation within the stockpiled soils. Should the impermeable membrane be placed on top of stockpiled soils, this could potentially lead to accumulation of hazardous concentrations within the stockpile. As such, appropriate ventilation would be required to be incorporated into the scheme. A passive venting system should comprise perforated or slotted plastic pipework within the Made Ground and protruding vertically through sealed plastic pipework to the surface to allow gases to be released.

The proposed capping material comprised predominately sand, and therefore is anticipated to be of at least moderate permeability. As such, should the impermeable membrane be placed beneath the stockpile, REC consider that any potentially hazardous gases would be able to vent. Therefore, there would be no potential for hazardous gas accumulation. It is understood that no buildings or structures which could result in the build-up of gasses are proposed within the areas of the proposed placement of the Made Ground soils.

Soils Underlying Lake

The potential for generation of ground gas underneath the impermeable lake liner membrane, caused by removal of overlying Made Ground soils is considered negligible. The underlying natural strata were found to have a low soil organic matter content, with no visual evidence of gas producing characteristics (e.g. no organic material and/or Chalk).

Soils at Receiving Sites

The potential for mobilisation of ground gas from the natural soils underlying and immediately surrounding the proposed Made Ground sites has also been considered negligible. It was considered that the additional loading might force gas movement within these soils, however the underlying natural strata were found to be generally coarse grained and demonstrated no visual evidence of gas producing characteristics (e.g. no organic material and/or Chalk).

3.6.2 Potential for Pooling of Contaminated Water

Should the impermeable membrane be placed underneath the stockpiled soils, with a semi-permeable membrane placed on top, there is a potential for pooling of leached contaminants at the base of the stockpiled soils. This could potentially lead to stability issues, overflowing and migration of contaminated water into the underlying soils, or upward migration of pooled contaminated water to surface. As such, appropriate closed drainage and/or water filtration material should be installed at the base of the stockpile, over the membrane, to allow any contaminated water to migrate away to a suitable receiving site without potentially reaching the underlying aquifer.

3.7 Validation Report

Upon satisfactory completion and validation of all of the remedial measures outlined above, a validation report will be prepared by REC. This report will present the relevant site records and act as certification that the remedial measures have been carried out in accordance with the RS. Further details on the contents of the letter report are provided in Section 5.2.

4.0 ENVIRONMENTAL MONITORING AND VALIDATION

4.1 Site Management

The tracking of materials will be based on the following hierarchy:

- The Principal Contractor will have the responsibility for setting out areas of the site on the basis of the contract specification;
- Operatives will have instructions only to excavate and to emplace materials in specified areas as assigned by the Site Manager / Foreman;
- The Site Manager (employed by the Principal Contractor) will issue daily instructions to drivers regarding the placement of materials sourced from specific stockpiles or areas, ensuring that appropriate documentary evidence is collected that details which materials are going where and why; and
- All material imported and removed from site will have Duty of Care / Consignment Notes, copies of which will be retained on-site by the Site Manager.

4.2 Materials Management

4.2.1 Site Clearance

Any soils or rubbles that have been excavated as part of the site clearance should be chemically validated in order to determine the most appropriate method of either re-use or off-site disposal.

4.2.2 Re-Use of Site Won Materials

Chemical testing of site-won materials must be undertaken to confirm their suitability for use within the proposed development. A Materials Management Plan (MMP) is required to support re-use of remediated soils within the site boundary. Any unsuitable material should be identified and segregated prior to placement. REC understands that an MMP has been produced for the site by the groundworks contractor idverde.

4.2.3 Soil Monitoring

Where applicable, chemical characterisation of excavated soils is recommended to be carried out as part of site enabling and clearance works in order to assess the presence of any potentially significant contaminants within the arisings. This chemical testing will provide a dataset which will direct the most appropriate course of action (i.e. re-use or off-site disposal). Excavated soils should be stockpiled and separated based upon visual identification prior to testing.

5.0 RECORD KEEPING & VALIDATION REPORT

5.1 Record Keeping

5.1.1 Site Manager

- The Site Manager shall be responsible for obtaining all relevant environmental permits for the works to be completed;
- The Site Manager shall be responsible for recording all environmental incidents at the site and be responsible for reporting it to the Environmental Consultant and the relevant regulatory bodies (if applicable);
- The Site Manager shall be responsible for recording and managing all material movements, including the location, type and volume of stockpiles created;
- The Site Manager shall be responsible for retaining copies of all delivery notes of materials imported to the site, which as a minimum should confirm the material source and volume; and
- The Site Manager should ensure all wastes disposed of off-site are done so in a regulatory compliant manner and a copy of all Waste Transfer Notes and Consignments are retained for inspection.

5.1.2 Environmental Consultant

- The Environmental Consultant will maintain a watching brief of the enabling works where appropriate. Ultimately, attendance of a consultant is at the discretion of the Client, the Remediation Contractor and the regulatory authority;
- Where applicable, the Consultant will compile and assess all monitoring records;
- Where instructed, the Consultant will inspect excavations and excavated materials to ensure that the materials are being identified, segregated and handled appropriately and help to identify any grossly contaminated or asbestos containing materials;
- Where required, the Consultant will ensure that all materials are sampled for validation and waste disposal purposes as required; and
- The Consultant will compile a photographic record of all key works undertaken during their attendance on site.

5.2 Validation Report

Following completion of the remedial works a validation letter report will be compiled by the Environmental Consultant, summarising the works undertaken and confirming that they have been carried out in accordance with this Remediation Strategy.

The validation letter report will include the following:

- A summary of the remediation requirements and works completed;

- Records of Watching Briefs including hand screening of soils, bituminous material and ACM management and disposal, and encapsulation of screened soils;
- Copies of any waste soil and groundwater disposal tickets (to be supplied by the Client and/or remediation contractor); and
- A summary statement confirming that all remedial works have been completed in accordance with this Remediation Strategy and are considered protective of human health and suitable for use.

6.0 CONTINGENCY PLAN FOR PREVIOUSLY UNIDENTIFIED CONTAMINANTS

Ground workers should be advised of the potential for unidentified contaminants to be discovered during works and if any unusual discolouration, odours, or fragments of deleterious materials are identified then a site manager should be informed immediately who will seek the advice of REC immediately.

Should any material be encountered during the development that may potentially be significantly impacted by other previously unrecorded contaminants, then it should be excavated and stockpiled on an impermeable material and sampled and tested for an appropriate range of determinants.

Once the laboratory analysis of the material is available an assessment should be REC to determine whether it can be retained on-site as part of the Material Management Operations or whether it should be disposed off-site.

Depending on the nature of any such impact it may be necessary to undertake validation testing of the excavation faces in order to demonstrate that no such materials are left in-situ.

7.0 GLOSSARY

TERMS

Atm	Atmospheres
ACM	Asbestos Containing Materials
BGS	British Geological Survey
BSI	British Standards Institute
CBR	California Bearing Ratio
CIEH	Chartered Institute of Environmental Health
CIRIA	Construction Industry Research Association
CL:AIRE	Contaminated Land: Application in Real Environments
CLEA	Contaminated Land Exposure Assessment
COP	Code of Practice
CS	Characteristic Situation
CSM	Conceptual Site Model
DWS	Drinking Water Standard
EA	Environment Agency
EQS	Environmental Quality Standard
FFL	Finished Floor Level
GAC	General Assessment Criteria
GL	Ground Level
GSV	Gas Screening Value
LPA	Local Planning Authority
MM	Material Movement
MMP	Material Management Plan
ND	Not Detected
NHBC	National House Builders Council
NR	Not Recorded
PAH	Poly Aromatic Hydrocarbon
PID	Photo Ionisation Detector
QA	Quality Assurance
QP	Qualified Person
RE	Resident Engineer
SGV	Soil Guideline Value
SPT	Standard Penetration Test
SVOC	Semi Volatile Organic Compound
TPH (CWG)	Total Petroleum Hydrocarbon (Criteria Working Group)
VOC	Volatile Organic Compound
VCCs	Vibro Concrete Columns

8.0 LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between REC and the Client.

2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.

3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.

4. In addition to the above REC note that when investigating, or developing, potentially contaminated land it is important to recognise that sub-surface conditions may vary spatially and also with time. The absence of certain ground, ground gas, and contamination or groundwater conditions at the positions tested is not a guarantee that such conditions do not exist anywhere across the site. Due to the presence of existing buildings and structures access could not be obtained to all areas. Additional contamination may be identified following the removal of the buildings or hard standing.

5. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.

6. REC cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by REC is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by REC in this connection without their explicit written agreement there to by REC.

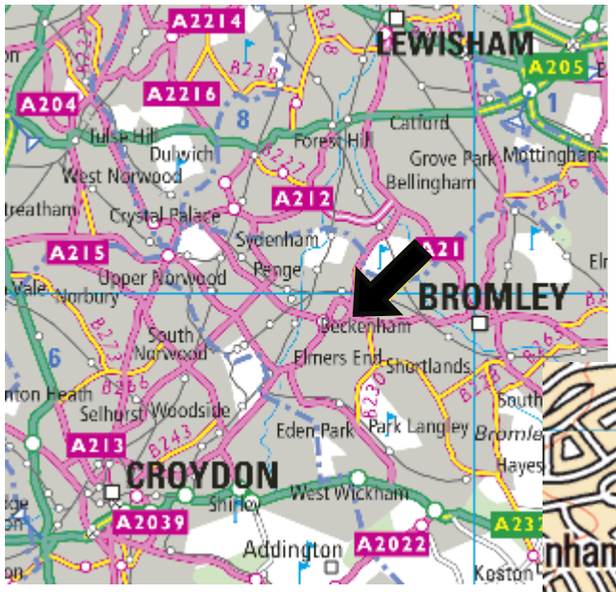
END OF REPORT

APPENDIX I

DRAWINGS

KEY:

N



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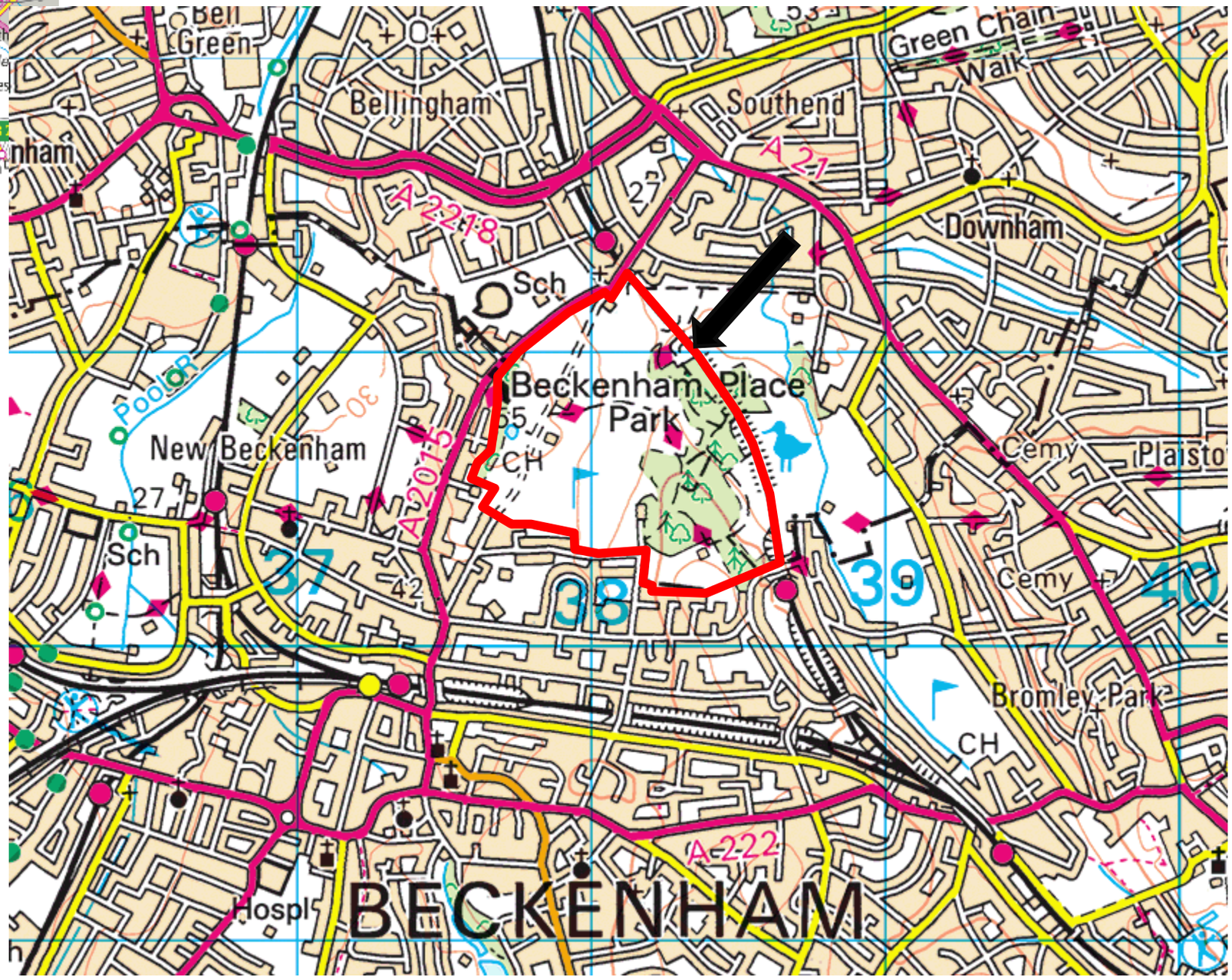
1 km



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Job Title:
Beckenham Place Park

Client:
London Borough of Lewisham

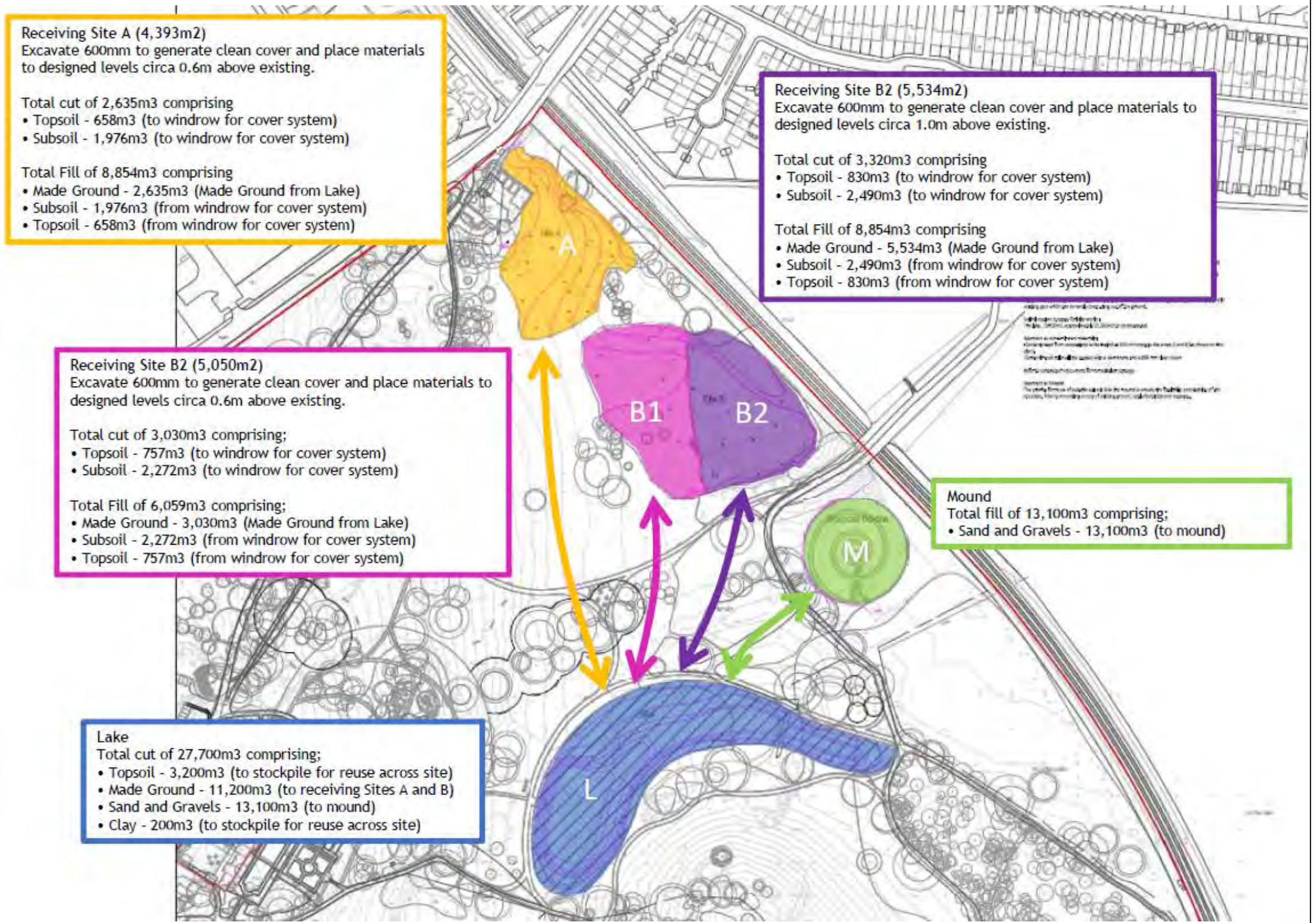
Job No:	1CO104645
Drawn By:	JS
Approved by:	RH

Notes:

Drawing Title:
1CO104645-001
Site Location Plan

KEY:

N



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Job Title: Beckenham Place Park

Client: London Borough of Lewisham

Job No:	1CO104645
Drawn By:	RH
Approved by:	TH

Notes: Derived from idverde: GMOPLC62 BPP IDV 01 Materials Movement Plan

Drawing Title: 1CO104645-002 Site Development Plan

KEY:

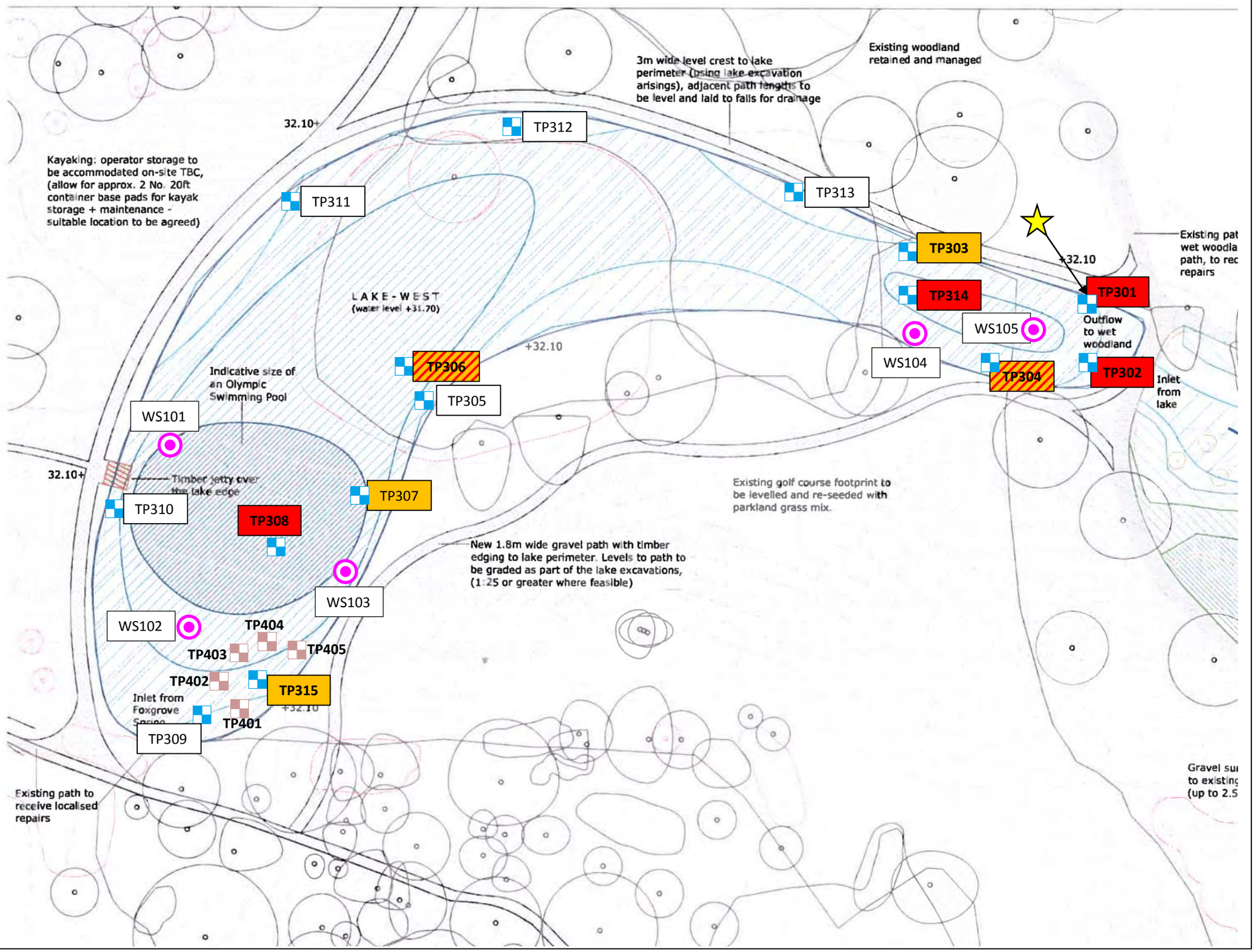
N

- Trial Pit Sampling Locations
- Sampling location from previous works
- Location of Bituminous Material

TP301 - ACM detected

TP303 - Loose fibres detected

TP304 - ACM & loose fibres detected



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Client: London Borough of Lewisham

Job No:	1CO104645
Drawn By:	JS
Approved by:	RH

Notes: Taken from Drawing no. 6429_LD_PLN_408
NOT TO SCALE

Drawing Title: 1CO104645-003 Exploratory Hole Location Plan

APPENDIX II

CHEMICAL TESTING SPECIFICATION

Table AII-1: Suitability Targets for Use Targets for Materials within Soft Landscaping Areas

Determinand	Units	Screening Value for Capping Layer Public Open Space	Source
Inorganics			
Arsenic	mg/kg	79	(i)
Barium	mg/kg	6,800	(i)
Beryllium	mg/kg	2.2	(i)
Boron	mg/kg	21,000	(i)
Cadmium	mg/kg	120	(i)
Chromium (VI)	mg/kg	7.7	(i)
Copper	mg/kg	12,000	(i)
Lead	mg/kg	630	(iv)
Mercury (inorganic)	mg/kg	120	(i)
Nickel	mg/kg	230	(i)
Selenium	mg/kg	1,100	(i)
Vanadium	mg/kg	2,000	(i)
Zinc	mg/kg	81,000	(i)
Cyanide	mg/kg	800	(v)
Asbestos	%	None Detected	N/A
Organics – PAHs and Phenol			
Phenol	mg/kg	760	(ii)
Naphthalene	mg/kg	4,900	(ii)
Acenaphthylene	mg/kg	15,000	(ii)
Acenaphthene	mg/kg	15,000	(ii)
Fluorene	mg/kg	9,900	(ii)
Phenanthrene	mg/kg	3,100	(ii)
Anthracene	mg/kg	74,000	(ii)
Fluoranthene	mg/kg	3,100	(ii)
Pyrene	mg/kg	7,400	(ii)
Benzo(a)Anthracene	mg/kg	29	(ii)
Chrysene	mg/kg	57	(ii)
Benzo(b)Fluoranthene	mg/kg	7.1	(ii)
Benzo(k)Fluoranthene	mg/kg	190	(ii)
Benzo(a)Pyrene	mg/kg	5.7	(ii)
Indeno(123-cd)Pyrene	mg/kg	82	(ii)
Dibenzo(a,h)Anthracene	mg/kg	0.57	(ii)
Benzo(ghi)Perylene	mg/kg	3,100	(ii)
Organics – TPHs			
TPH C_5-C_6	mg/kg	56,000	(iii)
TPH C_6-C_8	mg/kg	56,000	(iii)
TPH C_8-C_{10}	mg/kg	5,000	(iii)
TPH C_{10}-C_{12}	mg/kg	5,000	(iii)
TPH C_{12}-C_{16}	mg/kg	5,100	(iii)
TPH C_{16}-C_{21}	mg/kg	3,800	(iii)

Determinand	Units	Screening Value for Capping Layer	Source
		Public Open Space	
TPH C_{21}-C_{35}	mg/kg	3,800	(iii)
TPH C_{35}-C_{40}	mg/kg	3,800	(iii)

Screening Value Source

(i) LQM/CIEH Suitable For Use Level (S4UL) (2015);
(ii) S4UL – Conservative Assessment Approach of 1% SOM;
(iii) S4UL –1% SOM and assumed worst case aliphatic / aromatic compound;
(iv) Defra Category 4 Screening Level (2014);
(v) CLEA v1.06 Derived Value.

Notes Asbestos will be screened visually on-site by a qualified environmental consultant and where potential ACM is identified representative samples will be subject to quantitative analysis of volume by weight. Should any ACM be identified within the soil matrices, further detailed % assessment would be required when the reported laboratory result exceeds the limit of detection for the analytical method at 0.01% by volume (weight).