

REMEDIATION STRATEGY

RIVER ACADEMY READING

REC REFERENCE: 1-CO108720

REPORT PREPARED FOR: MACE GROUP LTD

FEBRUARY 2020



DELIVERING ENVIRONMENTAL AND RISK MANAGEMENT SOLUTIONS



QUALITY ASSURANCE

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EXECUTIVE SUMMARY

Options Appraisal

- ▶ The site lies in mostly in Flood Risk Zone 2 with Flood Zone 3 being located along the ditch that bisects the southern part of the site and before flowing northwards along the western boundary of the site and in the car parking area in the southern part of the site.
- ▶ A detailed flood risk assessment and drainage strategy is not available for the site at this time and will need due consideration in final designs for the site.
- ▶ Based on available information at this time, taking climate change into account, predicted flood levels from the Thames will be above the majority of current ground levels on site with predicted flood depths ranging from 0.18m to 2.18m along the drainage ditch in the south of the site.
- ▶ The principal issues with regard to contaminated land that need addressing are ground gas and exposure to contaminated soils.
- ▶ Taking the development as a whole, and considering the requirement to minimise off-site disposal the most suitable options for remediation would be ground gas management measures where required and provision of capping layers/cover system for areas of landscaping and sports pitches.
- ▶ The intention therefore would be to increase site levels where required, through development, thus minimising the need for off-site disposal of soils. The currently proposed layout need not therefore be changed to accommodate the development, but consideration will need to be given to how the development will be delivered in terms of ground level changes that may be needed to accommodate remedial measures for different elements of the development.



EXECUTIVE SUMMARY	
Remediation Strategy	▶ Additional investigation and assessment will be required to confirm the characteristic situation with regard to ground gas such that the appropriate gas management measures can be adopted. ▶ Additional investigation of shallow soil quality in the vicinity of the proposed sports pitches and areas of soft landscaping. Car Park ▶ Hardstanding within the proposed carpark will sever the pathway between the landfill materials and users. Ground levels may need raising to lift the car park above the predicted flood levels, ▶ Passive ground gas venting measures may be required within the carpark. School Buildings and Court Yard ▶ Hardstanding within the proposed school building will sever the pathway between the landfill materials and users. ▶ Ground gas protection measures in accordance to CS3 Building Type C will be required unless further assessment shows demonstrate the characteristic situation can be reduced. ▶ Passive ground gas venting measures may be required within the court yard. ▶ A capping layer/break layer and growing medium will be required for areas of soft landscaping. MUGA Pitches ▶ Hardstanding within the proposed MUGA will sever the pathway between the landfill materials and users. ▶ Passive ground gas venting measures may be required in the vicinity of the MUGA pitch. Sports Pitches ▶ A capping layer/barrier/ growing medium will be required unless additional assessment demonstrates otherwise. ▶ Approximately 11,000m³ of imported material is likely to be required based on a double dig depth of 600mm given asbestos containing matters have been identified in the soils. The thickness of the cover may be reduced subject to additional assessment. ▶ The thickness of the cover system may be subject to change, depending on the Flood Risk Management Strategy. ▶ Passive ground gas venting measures may be required within the area of the sports pitches. ▶ At this stage is not certain whether finished ground levels will need to be above flood levels in the sports pitch area. Additional Matters for Consideration ▶ UKWIR Assessment required for potable water supply pipes; ▶ Piling Risk Assessment required; ▶ Materials Management Plan to allow reuse of site won material; ▶ Previously unidentified contamination; and ▶ Validation procedures including record keeping.



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1.0 INTRODUCTION

1.1 Background

Resource and Environmental Consultants (REC) Ltd has been instructed by Mace Group Ltd to prepare a Remediation Strategy for River Academy, Reading. A Site Location Plan Drawing No. 1-CO108720-001 is included within Appendix II.

1.2 Proposed Development

REC understands that the proposed development comprises the construction of a new secondary school with associated outdoor athletics facilities within the northern portion of the site and staff and visitor car parking spaces the south of the proposed school structures. The layout is to comprise of two separate structures forming a “main” building and a sports hall. Proposed development (ref. 1CO108720-002) layout for the site can be found presented within Appendix III.

1.3 Previous Reports

REC has completed the reports summarised below which should be read in conjunction with this report:

- ▶ REC Phase I Contaminated Land & Geotechnical Desk Study Report by Terra Firma (South) dated May 2018, Ref. 6147/2; and,
- ▶ REC Phase II Geo-Environmental Assessment by REC dated November 2018, Ref 1CO106158/P2/R0.

In addition, REC have been provided with a flood risk site assessment titled “Reading Secondary School Site Assessment – Flood Risk” by Ramboll, dated April 2018, Ref. 162004973/ENV/R01.

1.4 Objectives and Scope of Works

The purpose of the Remediation Strategy is to identify and evaluate feasible remedial techniques and to confirm the process for validation of the implemented scheme. This will allow a safe, cost effective and regulatory compliant redevelopment of the site.

1.5 Stakeholders

Table 1.1 summarises the key companies and agencies involved in the development.

Table 1.1 Stakeholders

Function / Interest	Name of Party
Land Owner / Developer	Department of Education
Geo-Environmental Consultant	REC Ltd
Principal Contractor	To Be Confirmed
Local Planning Authority	Reading Borough Council

1.6 Limitations and Confidentiality

The full limitations of this report are presented in Appendix I. REC has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from REC.



2.0 SITE SETTING

2.1 Site Location and Description

The northern portion of the site was found to consist of a generally flat open area dominated by grass cover. The southernmost portion of this half of the site was where a former golf driving range structure was located which is now operated by Reload Reading – Laser Clay Shooting Range. The structure has associated car parking to the south and an access road which runs east along the drainage ditch towards the leisure centre. The golf range area was seen to have local minor depressions and rises with no significant change in elevation or slope. The site was bound on all sides by large metal fencing.

The southern portion of the site south of the drainage ditch comprised of areas of open space which were seen to have asphalt/ roadstone capping which was of a poor quality. Interspersed vegetation was identified as to typically consist of trees, shrubs and occasional patches of grass cover. The topography here was typically flat with occasional local depressions and rises. The elevation dropped slightly to the southernmost point. It was seen that this area was not in use by the public and was largely derelict, except for it being used for the access of large articulated delivery lorries which were delivering goods to the neighbouring Caversham Bridge Garden Centre.

The drainage ditch running east to west across the site was seen to be set below the typical ground level by circa. 2.0mbgl with the water levels appearing to not exceed 1.0m. The surface water feature was heavily polluted with physical detritus such as plastic, wood and metal objects of various forms. The water course was heavily overgrown with trees and large shrubs.

2.2 Ground Conditions

Ground investigation undertaken by REC generally confirmed the published geology and a summary of previous findings is provided in Table 2.1 below. Ground investigation locations are shown on Drawing 1-CO107916-003.

Table 2.1 Summary of Strata within Former Landfill Area

Stratum	Min Depth to Top of Strata (m bgl)	Max Depth to Top of Strata (m bgl)	Max Thickness(m)
Made Ground - Topsoil	Ground Level	Ground Level	1.30 (BH01)
Landfill Material	0.40	1.20	2.00 (BH02 & BH05)
Kempton Park Gravel Member	2.00	2.80	5.80 (BH01)
Seaford and Newhaven Chalk Formation	7.00	8.70	8.00 (BH01 & BH05)

NP * – Total strata thickness not proven. Table 2.1 includes data from BH01 – BH06 and HP01 – HP05.

Table 2.2 Summary of Strata within Disused Land in Southern Portion of Site

Stratum	Min Depth to Top of Strata (m bgl)	Max Depth to Top of Strata (m bgl)	Max Thickness(m)
Made Ground	Ground Level	0.25	0.90 (HP07) NP*
Langley Silt Member	0.25	0.90	0.60 (HP09) NP*

NP * – Total strata thickness not proven. Table 2.2 includes data from HP06 – HP09.



2.2.1 Made Ground - Topsoil

Made ground was encountered in all locations. Topsoil was observed to depth up to 1.20m bgl with a slightly sandy gravelly clay composition, typically being dry and friable in consistency. The material in most cases was found to contain gravels of predominantly flint with anthropogenic materials featuring heavily, such as glass, brick, ceramic, plastic and metal objects. It is believed that this material was employed as a capping for the underlying landfill material. The material was seen to have been mixed well and there was little in the way of discerning true topsoil from the subsoils due to colour and constituent similarities.

2.2.2 Landfill Material

Landfill material was encountered within all borehole locations and three of the nine hand pitted locations (HP01, HP02 and HP04). The material recovered from the boreholes was typically encountered from depth of 0.80m bgl to 1.30m bgl and was identified as comprising sand and gravel set within a CLAY matrix. This material was underlain by granular landfill which were recorded as comprising of varying quantities of sand and gravel.

Sands within this unit were typically fine to coarse. Gravels recovered were identified as being angular to rounded fine to coarse flint, concrete, brick, metal objects, glass, plastic objects, hair material, relic plant matter, wood matter, bituminous material, ceramic objects and paper objects. Cobbles within this fill were recorded as angular to subrounded fine to coarse metal and plastic objects, wood and glass.

Strong visual and olfactory evidence of contamination was identified within this stratum.

A review of Reading Council Planning Portal for the immediate surrounding area indicates that landfill material encountered to a depth of 4.50m bgl.

2.2.3 Langley Silt Member

The Langley Silt Member was identified in two locations during the site investigation within HP08 and HP09 at 0.25m bgl and 0.30m bgl, respectively. The material encountered was found to comprise greenish grey to brown CLAY with slight amounts of sand and gravel. Sand was found to be fine to medium and gravels were subangular to subrounded fine flint.

2.2.4 Kempton Park Gravel Member

Identified within all of the boreholes this stratum was encountered from depth ranging from 2.00m bgl to 3.00m bgl. The unit was identified as a dark grey to grey granular stratum underlying the landfill material comprising varying quantities of SAND and GRAVEL with low to high cobble content. Sands were fine to coarse. Gravel was angular to rounded fine to coarse flint. Cobbles were angular to subrounded flint.

The material graduated into a yellowish brown to light brown colour deeper within the unit.

2.2.5 Seaford and Newhaven Chalk Formation

Identified within all boreholes the Seaford Chalk Formation was identified from depths of 7.00m bgl to 8.70m bgl. The material was recovered as an off-white gravelly CLAY to clayey GRAVEL with occasional bands of black flint gravel or cobbles.



2.3 Hydrogeology and Hydrology

Table 2.3 below summarises the hydrogeological data.

Table 2.3 Hydrogeological Data

Geological Unit	Classification	Description	Aquifer Classification
Superficial	Kempton Park Gravel Member	Sand and Gravel	N/A
	Langley Silt Member	Clay and Silt	N/A
Bedrock	Seaford and Newhaven Chalk Formation	Chalk	Principal

A drainage ditch with stream trends east west in the south half of the site with the River Thames 120m to the north.

The site is located within a flood plain. A flood risk assessment has been undertaken and is reviewed in Section 2.5.3.

2.4 Human Health Risk Assessment - Soils

Previous investigation screened chemical data against very conservative assessment criteria. There are insufficient data available to make a meaningful assessment against more relevant criteria. However, for the purposes of developing this strategy we have assumed the whole of the site is underlain by landfilled materials and as such there are likely to be a plausible pollutant linkages, particularly with regard to the proposed sports pitches and soft land scaping areas.

2.5 Controlled Waters Risk Assessment

2.5.1 Groundwater

The Phase II report indicated that there was hydraulic connectivity between the Secondary A and Principal Aquifers on site. However, no unacceptable risk to either the Secondary A or Principal Aquifers beneath the site was identified.

2.5.2 Surface Water

No unacceptable risk to surface water was identified.



2.5.3 Flood Risk

A Site Assessment – Flood Risk Report dated April 2018 has been undertaken by Ramboll as part of a preliminary study to identify the most suitable site development. It should be noted that a detailed flood risk assessment and drainage strategy is not available at this time. Pertinent details of the report are included below.

- ▶ The majority of the site lies in Flood Zone 2.
- ▶ The southern part of the site and the ditch in the south and along the western boundary of the site lie in Flood Zone 3.
- ▶ The majority of the site is at low to medium risk of flooding from rivers and the sea.
- ▶ Data obtained from EA LiDAR puts site levels at 38.5mAOD, peaking at 39mAOD at various points, with a low of 37mAOD at points along the drainage ditch in the south;
- ▶ The 1% Annual Exceedance Probability (AEP) for channel flood levels associated with the River Thames ranges from 38.22mAOD and 38.48mAOD;
- ▶ When adjusted for climate change impact the 1% AEP for channel flood levels associated with the River Thames ranges from 38.92mAOD and 39.18mAOD, which is above current ground levels;
- ▶ Predicted flood depths range from 0.18m to 2.18m along the drainage ditch in the south of the site (based on LIDAR).
- ▶ Consideration should be given to the change in surface water runoff regime due to the significant increase in overall impermeable surface area.

It is therefore considered that the remediation strategy needs to take into account the risk from flooding, particularly in the south of the site in and around the drainage ditch with the proposed carpark at risk from flooding.

2.6 Ground Gas

A single ground gas monitoring round was undertaken as part of the Phase II investigation with the result summarised in Table 2.5 below.

Table 2.5 Calculation of maximum implied characteristic situation

Flow rate (L/h)	Maximum CH4 (%)	Maximum CO2 (%)	CH4 Qhg (L/h)	CO2 Qhg Rate (L/h)	Interim Implied CH4 CS	Interim Implied CO2 CS
0.1	25.9	23.9	2.59	2.39	3	3

CS : Characteristic Situation

Qhg : Hazardous gas flow rate

Based on measurements in Table 2.5, the site maximum site hazardous bulk ground gas flow rate is considered to be 2.59 L/h, which is the highest reported value for methane. A site hazardous gas flow rate of 2.59 L/h lies well within the upper range of GSV values for CS3 (<3.5 L/h).



3.0 OPTIONS APPRAISAL

The flood risk report has indicated that a flood event could result in flood levels being above current ground levels.

The intention would therefore to be to retain ground levels as they currently are, subject to agreement of a flood risk and drainage strategy for the site, or to increase them as part of the proposed development to minimise the need for any off-site disposal of contaminated materials.

In relation to this, it is considered that there is no benefit in altering the current proposed layout of the site. Again, this will be subject to agreement of a flood risk and drainage strategy.

Therefore, it is considered that a capping layer is the most economical and sustainable option to control potential risks to human health through dermal contact and ingestion of contaminated materials in those areas of the site where exposure is likely.

The risk from ground gas across the site is currently classified as CS3. Remedial actions in the form of ground gas protection will be required for the proposed development; with passive gas venting measures a possible requirement within areas not containing buildings given the potential change in surface layers.

A comprehensive ground gas risk assessment is required to assess the need for ground gas protection measures. At this stage it is considered, according to BS 8485:2015+A1:2019 that the proposed development is a Type C. Based on the current CS-3 classification a minimum gas protection score of 3 is required and will need to be achieved with the combined implementation of gas protection measures from a structural barrier, ventilation protection measures, and gas resistant membrane.

4.0 REMEDIATION STRATEGY

This remediation strategy is based on the proposed development plan options appraisal. A drawing showing the proposed remediation of the development (drawing no. 1-CO108720-004) is presented in Appendix III.

Assessment of the four proposed site uses has been undertaken separately. It is considered, given similar ground levels across the site with the exception of the proposed car park, historical landfill covering the entirety of the site, that there is no advantage to altering the current proposed development layout. Although it is recommended that buildings are not placed within the area of the proposed car park due to the increased flood risk.

A proposed site layout plan is included in Drawing No. 1-CO108720-002 and reproduced as Figure 3.1 below.

Figure 3.1 **Proposed Site Layout**





4.1 Ground Gas

Further investigation is required to assess the risk from ground gas. Currently there are five wells where ground gas could be monitored, located in and around the proposed main building area. If these wells are serviceable they could be used to collect additional information. If they are not serviceable, they will need to be replaced. In addition, gas monitoring wells will be needed in the location of the sports hall.

Allowance should therefore be made for the installation of seven ground gas wells, with gas monitoring undertaken weekly for 12 weeks over a 3-month period. This will need to be completed before development begins such that the correct gas protection measures can be incorporated into the design.

To assess whether passive venting will be required in the car parking, MUGA pitch and Sport pitch areas, surface flux boxes assessment should be undertaken. The site appears to be capped and therefore unless the development proposals need to remove part of the capping layer and/or current surface emissions are unacceptable from an end use perspective, there should be no need for passive measures to be employed.

4.2 Additional Ground Investigation

For the proposed sports pitches, further assessment of the shallow soils needs to be undertaken to allow assessment of risk and the requirement for a cover system/capping layer. It is likely that as a minimum a growing medium will be required for the sports pitches to allow development of a suitable grass surface.

20 shallow (up to 1m depth) hand dug pits should be undertaken with a minimum of two soils collected per location. Samples should be analysed for a range of metals, TPH and PAHs, and asbestos.

4.3 Proposed Car Park

Hardstanding would break the pathway between the landfill materials and site users. The proposed car park area has been identified as being at medium risk of flooding.

It is recommended that formation/finished level be maintained as a minimum, if possible, based on the final designs being agreed, or raised where required to mitigate flood risk.

4.4 Proposed School Buildings and Yard Areas

The proposed elevation of the building floors and surrounding yard areas will need to be determined based on a detailed flood risk and drainage strategy. However, the hard standing would break the pathway from underlying contamination.

Where levels need to be raised to accommodate flood risk management, a net import of material is likely to be required.

However, where soft landscaping is proposed, and subject to the outcome of the further investigation and assessment, a growing medium/capping layer may be required in those areas.



Given piles are proposed for founding, a Piling Risk Assessment is required to determine the most appropriate pile type use for the development in terms of protecting groundwater resources.

4.5 Proposed MUGA

Given the proposed development would include a break layer/slab between the landfill material and the surface of the MUGA, there would be no pathway for dermal contact or ingestion of landfill materials.

Whether ground levels need raising or not will be dependent of the flood risk management strategy.

4.6 Proposed Playing Field

The risk posed by materials present at current levels will be assessed as part of the additional investigation.

It is unclear at this stage whether or not the raising of ground levels will be required as part of the flood risk management strategy for the development.

It is considered that where potentially unacceptable risks are present for the near surface materials, a capping layer/growing medium will be required. The thickness of any such capping would be determined based on the outcome of the additional dermal and ingestion of landfill material is likely within this proposed site use. For the purposes of this strategy, we have assumed that a minimum 600mm will be required.

For illustrative purposes an estimated amount of imported material required for the capping layer is as follows:

Area of playing fields x depth of cover system = amount of materials required

$$\sim 18,000\text{m}^2 \times 0.60\text{m} = \sim 10,800\text{m}^3$$

However, consideration should be given to the compressibility of the landfill material and the effect loading from a capping layer would have on finished site levels.

Additionally, it should be noted that the above volumes and thicknesses may be subject to change, dependant on the flood risk management strategy.

4.7 UKWIR Assessment

A UKWIR assessment has not been undertaken to date and should freshwater pipes be installed an assessment will be required. However, at this stage, given the historic site use of a landfill it is anticipate that barrier pipe is likely to be the minimum requirement.

4.8 Validation Sampling

Validation samples are required from all materials that are to be re-used or imported onto site and used within the development where there is the potential for any contaminants present to pose a risk to future site users. The sampling frequency for testing of materials is presented within Table 4.1.



Table 4.1 – Specification of Materials Validation Laboratory Analysis

Material Use	Testing Frequency	Suite of Analysis
Imported or Site Generated Fill Material	1 Sample Per 1000m ³ Minimum 3 samples per source	Speciated PAHs, banded TPH CWG, asbestos (ID), CLEA inorganic suite

Test results should be compared against screening criteria provided in Appendix IV. Where materials are found to contain concentrations of contaminants in excess of the screening criteria further assessment will be required to ensure their suitability for use.

4.9 Materials Management Plan

It would be beneficial that should the re-use of site won materials be considered, a 'Materials Management Plan' (MMP) will need to be created in accordance with Version 2 of the CL:AIRE Definition of Waste - Industry Code of Practice. The MMP should be declared by a Qualified Person and a signed declaration submitted to the EA prior to reuse of materials on the site.

Additionally, given waste materials are likely to be generated within any earthworks and from piling an MMP will need to be utilised to prior to removing the material from site.

4.10 Validation and Record Keeping

Any works undertaken in-line with this remediation strategy require verification and submission of a verification report to confirm the findings and to the satisfaction of the Local Planning Authority (LPA).

The verification report shall include as a minimum:

- ▶ Summary of pre-development conditions;
- ▶ Summary of land regrading / raising and details of any unexpected contamination;
- ▶ Description of any remedial measures including excavation volumes, obstructions, soils placement and laboratory analysis;
- ▶ Validation of ground gas protection measures;
- ▶ Information on waste disposal including waste carriers, receiving sites and volumes of materials moved;
- ▶ Details of the source and volumes of imported materials clearly referencing the origin of the materials used and testing carried out to confirm its suitability for use via comparison to the criteria in Appendix II, where required.



Remediation Strategy
River Academy, Reading
Mace Group Ltd
1-CO108720
February 2020

APPENDIX I

LIMITATIONS



1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between REC Ltd 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. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
 5. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
 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.
 7. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.
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Remediation Strategy
River Academy, Reading
Mace Group Ltd
1-CO108720
February 2020

APPENDIX II

GLOSSARY



AST	Above Ground Storage Tank
BGS	British Geological Survey
BSI	British Standards Institute
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CIEH	Chartered Institute of Environmental Health
CIRIA	Construction Industry Research Association
CLEA	Contaminated Land Exposure Assessment
CSM	Conceptual Site Model
DNAPL	Dense Non-Aqueous Phase Liquid (chlorinated solvents, PCB)
DWS	Drinking Water Standard
EA	Environment Agency
EQS	Environmental Quality Standard
GAC	General Assessment Criteria
GL	Ground Level
GSV	Gas Screening Value
HCV	Health Criteria Value
ICSM	Initial Conceptual Site Model
LNAPL	Light Non-Aqueous Phase Liquid (petrol, diesel, kerosene)
ND	Not Detected
LMRL	Lower Method Reporting Limit
NR	Not Recorded
PAH	Poly Aromatic Hydrocarbon
PCB	Poly-Chlorinated Biphenyl
PID	Photo Ionisation Detector
QA	Quality Assurance
SGV	Soil Guideline Value
SPH	Separate Phase Hydrocarbon
TPH (CWG)	Total Petroleum Hydrocarbon (Criteria Working Group)
SPT	Standard Penetration Test
SVOC	Semi Volatile Organic Compound
UST	Underground Storage Tank
VCCs	Vibro Concrete Columns
VOC	Volatile Organic Compound
WTE	Water Table Elevation

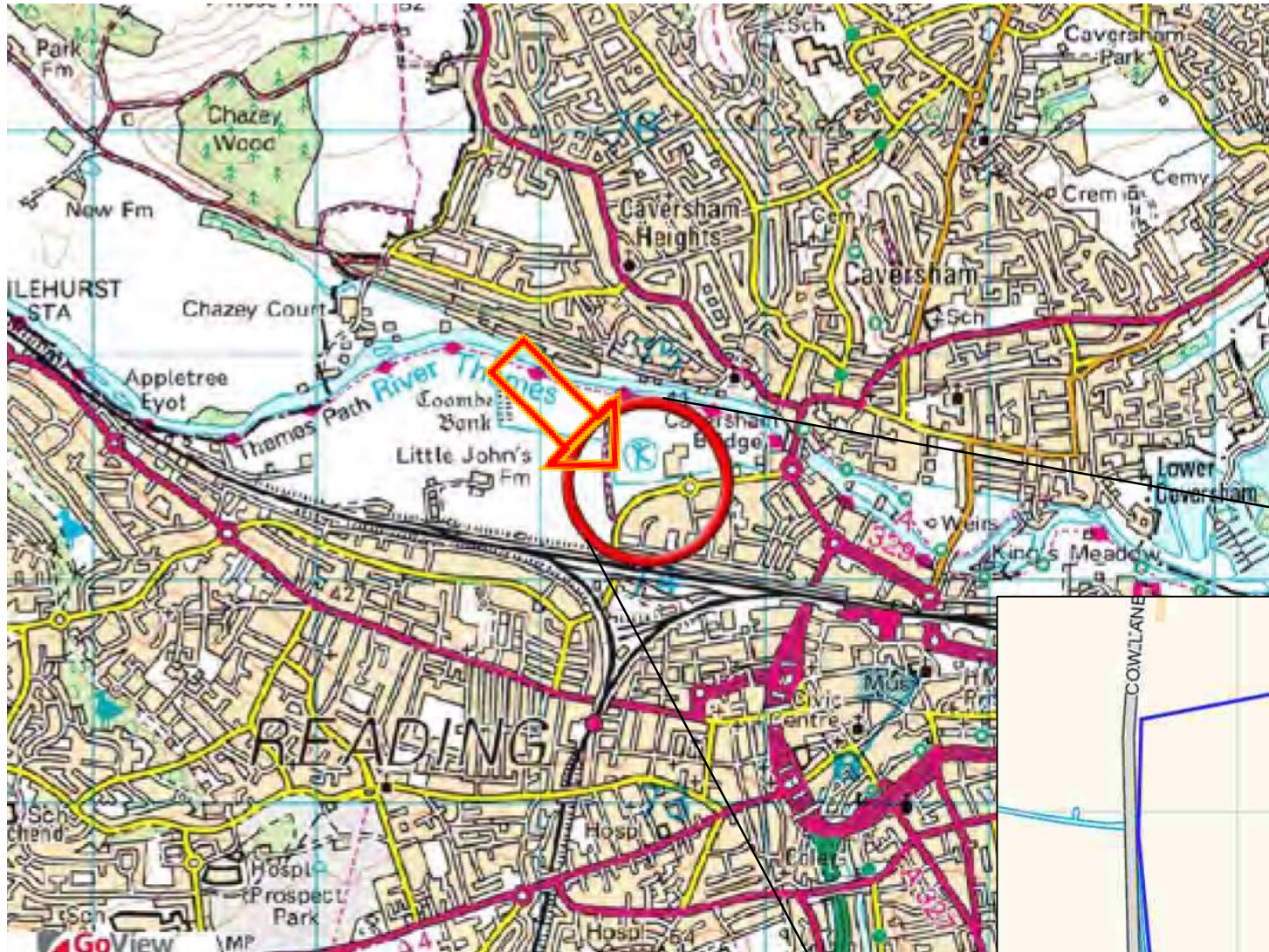


Remediation Strategy
River Academy, Reading
Mace Group Ltd
1-CO108720
February 2020

APPENDIX III

DRAWINGS

KEY:



The client must not amend any drawing, design or other intellectual property produced by REC Ltd, without permission in writing from REC Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, REC Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or other intellectual property.



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Drawn By:	AB
Approved by:	CT

Notes:

Drawing Title:

1CO108720-001
Site Location Plan

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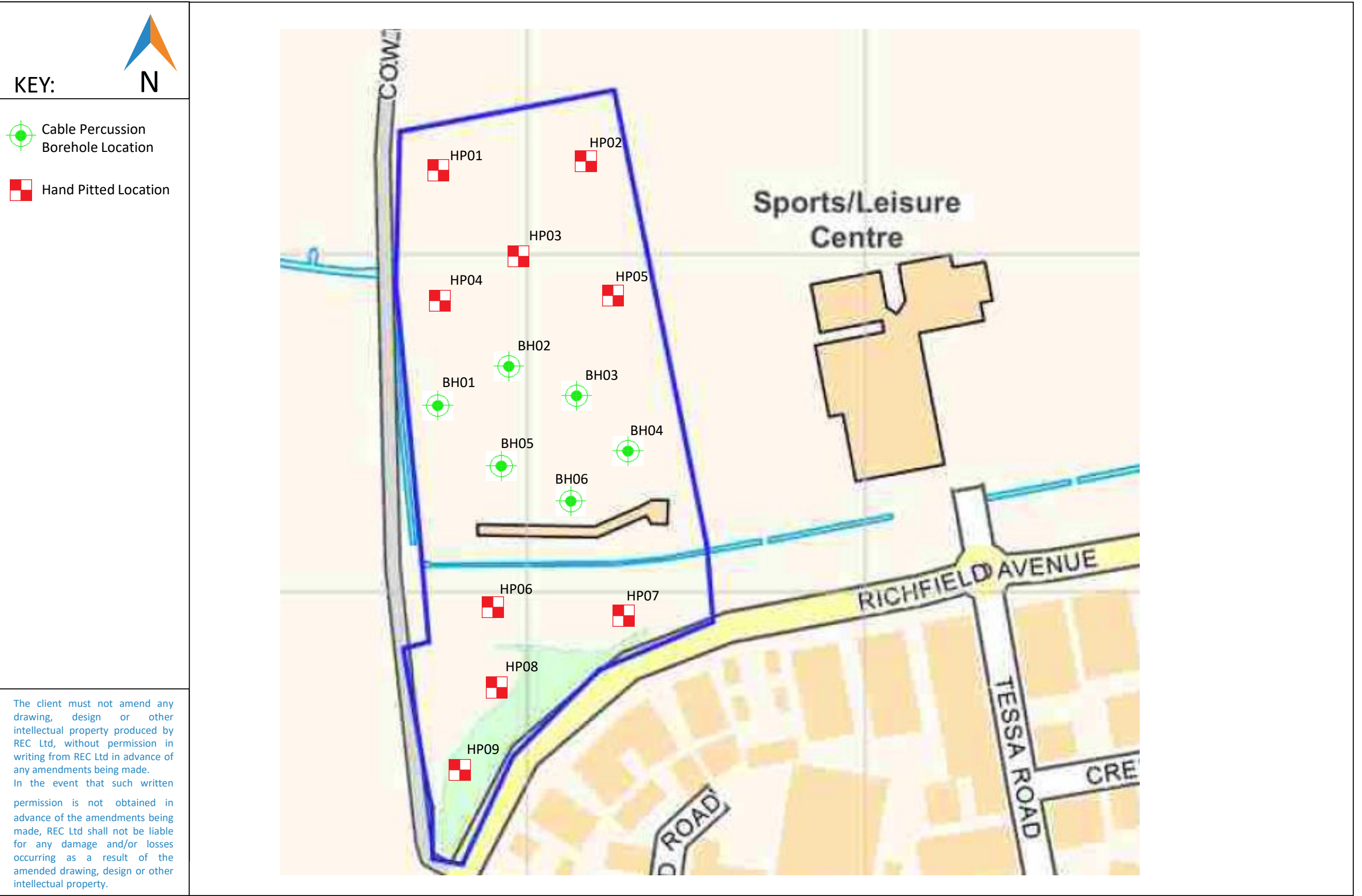
Approved by: PT

Notes:

Client Supplied

Drawing Title:

1C0108720-002 Proposed Indicative Site Layout



	REC Ltd Capital Business Centre, 22 Carlton Road, South Croydon, CR2 0BS t + 44 2034 788076 recltd.co.uk	Job Title: River Academy, Reading	Client: Mace Group Ltd	Job No: 1CO108720	Notes:	Drawing Title: 1CO108720-003 Exploratory Hole Location Plan
				Drawn By: AB		
				Approved by: CT		

KEY:



- 
 - Near surface testing to assess cover system
 - Capping layer & cover system ~300mm.
 - Gas monitoring for assessing passive venting requirements.
- 
 - Gas monitoring for assessing passive venting requirements.
 - Hardstanding breaks pathway.
- 
 - Gas monitoring for assessing passive venting requirements.
 - Piling Risk Assessment
 - Waste Assessment for Piling Waste
 - Hardstanding breaks pathway.
- 
 - Gas monitoring for assessing passive venting requirements.
 - Option to raise ground level due to flooding potential.
 - Hardstanding breaks pathway.

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Job Title:

River Academy, Reading

Client:

Mace Group Ltd

Job No: 1C0108720

Drawn by: NM

Approved by: PT

Notes:

Client Supplied

Drawing Title:

1C0108720-004 Proposed Remediation Layout



Remediation Strategy
River Academy, Reading
Mace Group Ltd
1-CO108720
February 2020

APPENDIX IV

VALIDATION CRITERIA



SUITABILITY TARGETS FOR IMPORTED OR SITE WON MATERIALS – RESIDENTIAL (WITHOUT PLANT UPTAKE)

Determinand	Units	Screening Value for Use Of site won or imported materials			Screening Value Source
Inorganics					
Arsenic	mg/kg	40			(i)
Cadmium	mg/kg	85			(i)
Chromium (VI)	mg/kg	6.0			(i)
Lead	mg/kg	310			(iv)
Inorganic Mercury	mg/kg	56			(i)
Nickel	mg/kg	180			(i)
Selenium	mg/kg	430			(i)
Copper	mg/kg	7,100			(i)
Zinc	mg/kg	40,000			(i)
Cyanide	mg/kg	530			(v)
Asbestos ^[1]	-	Non Detect			N/A
Organics – PAHs and Phenol					
		1% SOM	2.5% SOM	6% SOM	
Phenol	mg/kg	750	1300	2300	(ii)
Naphthalene	mg/kg	2.3	6	13	(ii)
Acenaphthylene	mg/kg	2900	4600	6000	(ii)
Acenaphthene	mg/kg	3000	4700	6000	(ii)
Fluorene	mg/kg	2800	3800	4500	(ii)
Phenanthrene	mg/kg	1300	1500	1500	(ii)
Anthracene	mg/kg	31000	35000	37000	(ii)
Fluoranthene	mg/kg	1500	1600	1600	(ii)
Pyrene	mg/kg	3700	3800	3800	(ii)
Benzo(a)Anthracene	mg/kg	11	14	15	(ii)
Chrysene	mg/kg	30	31	32	(ii)
Benzo(b)Fluoranthene	mg/kg	3.9	4	4	(ii)
Benzo(k)Fluoranthene	mg/kg	110	110	110	(ii)
Benzo(a)Pyrene	mg/kg	3.2	3.2	3.2	(ii)
Indeno(123-cd)Pyrene	mg/kg	45.0	46	46	(ii)
Dibenzo(a,h)Anthracene	mg/kg	0.31	0.32	0.32	(ii)
Benzo(ghi)Perylene	mg/kg	360	360	360	(ii)
Organics – TPHs					
TPH C ₅ -C ₆	mg/kg	42	78	160	(iii)
TPH C ₆ -C ₈	mg/kg	100	230	530	(iii)
TPH C ₈ -C ₁₀	mg/kg	27	65	150	(iii)
TPH C ₁₀ -C ₁₂	mg/kg	130	330	770	(iii)
TPH C ₁₂ -C ₁₆	mg/kg	1100	2400	4400	(iii)
TPH C ₁₆ -C ₂₁	mg/kg	1900	1900	1900	(iii)
TPH C ₂₁ -C ₃₅	mg/kg	1900	1900	1900	(iii)
TPH C ₃₅ -C ₄₀	mg/kg	1900	1900	1900	(iii)
Screening Value Source					
(i) LQM/CIEH Suitable For Use Level (S4UL) (2015);					
(ii) S4UL – Conservative Assessment Approach of 1% SOM;					
(iii) S4UL –1% , 2.5% and 6% SOM (iv) Defra Category 4 Screening Level (2014);					
(v) CLEA v1.06 Derived Value.					