Burgess Hill Community Entertainment and Events Centre, Cyprus Road, Burgess Hill, RH15 8DX

Remediation Options Appraisal and Method Statement

Burgess Hill Town Council

October 2019

P18-193rms

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REPORT ISSUE AND TRACKING

Issue	Date	Prepared By	Comment
1	**29/10/2019**	**Stephen Fisk BSc FGS**	
		Reviewed By	
		Matt Paddock MSc FGS	

1.0 INTRODUCTION

Paddock Geo Engineering Limited (PGE) was instructed by the client, Burgess Hill Town Council to prepare a Remediation Options Appraisal and Method Statement (RMS) as Phase 3 of a Site Contamination Assessment for the proposed redevelopment of the subject site, known as Burgess Hill Community Entertainment and Events Centre, Cypress Road, Burgess Hill, RH15 8DX.

Insignificant contamination risks have been identified on the site from previous investigation and contamination risk assessment works. However, at the request of the Client an RMS has been produced detailing the course of action to take in the situation that unexpected contamination is encountered during the site development.

The site is located within the town centre of Burgess Hill and is at the approximate national grid reference 531480, 119120. The site is rectangular is shape with its long axis orientated approximately north-south and covers an area of approximately 0.06 hectares.

The study area is surrounded by a car park to the north, residential properties to the south and similar community buildings to the east and west.

Site location plans and an Aerial Photograph are presented in Appendix A.

1.1 Terms of Reference

- British Standard (BS) 10175:2011 Investigation of Potentially Contaminated Sites – Code of Practice.
- British Standard (BS) 8485:2015+A1:2019 Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings.
- British Standard (BS) 5930:1999+A2:2010 Site Investigation Code of Practice.
- British Standard (BS) 8576:2013 Guidance on Investigations for Ground Gas - Permanent Gases and Volatile Organic Compounds (VOC)
- CIRIA C665 Assessing Risks Posed by Hazardous Ground Gases to Buildings. CIRIA 2007.
- CLR7 Assessment of Risks to Human Health from Land Contamination, 2002, DEFRA / Environment Agency (*currently withdrawn*).
- CLR8 Potential Contaminants for the Assessment of Land, 2002, DEFRA / Environment Agency (*currently withdrawn*).
- CLR11 Model Procedures for the Management of Land Contamination, 2010, DEFRA / Environment Agency.
- Environmental Protection Act: 1990 – Contaminated Land Statutory Guidance, April 2012, DEFRA.
- GPLC1 Guiding Principles for Land Contamination, 2010, Environment Agency.
- PPG23 (PPS23) Planning and Pollution Control (contaminated land aspects), 2002 (*currently withdrawn*).
- SC030114/R1 Verification of Remediation of Land Contamination Guidance Document, 2010, Environment Agency.

1.2 Site History

An investigation into the history of the site was undertaken as part of the Preliminary Contamination Risk Assessment (P18-193, December 2018) and the finding are summarised below.

The available historical maps span a period of 143 years, daring back to 1875. The site was open land until before 1937 when a structure similar to the current was noted on the site.

The site was located adjacent to the south of a Clay Pit from before 1897 which was infilled and level before 1967 when it was developed into the current car park.

The site area has remained urban since the earliest map edition, with limited light industrial land use, such as Clay Pits from 50m of the site from 1897 to current (unfilled) and a Smithy 80m NE from 1897 to before 1937. The site area has increased in development density throughout the mapping, from low density on the earliest maps to high density by the mid 1900s.

1.3 Overview of Previous Works

Two phases of work have been undertaken by Paddock Geo Engineering Limited (PGE) on the site, the first in late 2018 / early 2019 and the second phase in October 2019. The first phase of work involved a Preliminary Contamination Risk Assessment carried out for the site dated December 2018. The Preliminary Contamination Risk Assessment concluded that there was a potential risk of contamination to the proposed development of the site and thus an intrusive ground investigation was recommended and carried out at the site by PGE. The Ground Investigation, incorporating an initial Contamination Risk Assessment and Ground Gas Monitoring, was reported in January 2019.

At the request of the client a second phase of investigation was undertaken in October 2019 which involved shallow boreholes across the footprint of the site in order to refine the secondary contamination assessment and ground gas assessment.

The above-mentioned reports are listed below and should be read in conjunction with this Remediation Options Appraisal and Method Statement (RMS):

- Preliminary Contamination Risk Assessment by Paddock Geoengineering Limited (report reference: P18-193pra, dated December 2018).
- Ground Investigation by Paddock Geo Engineering Limited. (report reference: P18-193gi, dated January 2019).
- Supplementary Ground Investigation by Paddock Geo Engineering Limited. (report reference: P18-193gi-V2, dated October 2019).

1.4 Findings of the 2018 / 2019 Ground Investigation

A ground investigation was carried out by PGE in November 2018 to assess the ground conditions beneath the site.

The investigation comprised 2 No. cable percussive boreholes to a depth of 13m bgl and four hand excavated trial pits to expose existing foundation arrangements. The boreholes encountered Made Ground between 0.6m and 1.00m thick, comprising initial hardstanding over sub-base of brick and concrete rubble. This was underlain by soft sandy / gravelly CLAY with the gravel fraction being brick and chalk. Directly beneath the Made Ground firm to stiff variable sandy silty CLAY of the Weald Clay Formation was encountered and extended to the base of both boreholes.

The hand excavated trial pits were formed in internal area of the site as indicated by the SI specification supplied by the client. The trial pits to the north of the site area encountered loose brick rubble material which could not be dug effectively by hand, so these positions were moved externally to allow the foundation to be exposed. The trial pits established the existing foundation to be generally bearing onto firm Weald Clay Formation soils at a maximum of 1.3m depth.

Samples were recovered from shallow depths for laboratory analysis. This indicated PAH indicative compound; benzo[a]pyrene and dibenzo[a,h]anthracene, concentrations above the individual thresholds for the adopted Residential with Home Grown Produce land use. Both elevated concentrations were recorded within the sample from TP4 at 0.8m depth. Asbestos screening and subsequent quantification indicated chrysotile asbestos fibre contamination to a maximum level of 0.060% within TP2a in Made Ground soil beneath the current building footprint.

The statistical analysis indicated that the 95th percentile upper confidence limit was below the relevant thresholds.

As the footprint of the development is to be covered by hardstanding no pathways were concluded for these contaminants to impact the proposed development users, this is with the exception of pathways relating to migration of volatile contaminants. As no elevated volatile contaminants likely to give rise to vapour were indicated by the testing and no significant elevated concentration of ground gases were highlighted during the monitoring phase, it was deemed that remediation works were not necessary and the site was deemed suitable for its proposed future use.

The gas monitoring undertaken indicated that the site is classified as a Characteristic Situation 1 (CS1) and as such no ground gas protection measures are required.

The report did, however, indicate that due to the elevated PAH compounds within the Made Ground beneath the site that; barrier pipe is likely to be required for potable water supply infrastructure within the new development.

1.5 Findings of the October 2019 Ground Investigation

A second phase of works was requested by the client and was undertaken and reported in October 2019.

The works comprised the formation of 12no. shallow boreholes using hand-held window sampling equipment and supplementary laboratory chemical testing. The purpose of the phase two works was to significantly increase the resolution of the initial contamination risk assessment from the first set of works. Supplementary ground gas monitoring was also undertaken of the previously installed ground gas monitoring points and of a third new monitoring standpipe installed within the existing building footprint.

The works encountered similar ground conditions are identified within the first phase of works with Made Ground across the majority of the footprint comprising a timber floor over a void onto a thin layer of lean mix concrete less than 0.1m in thickness. This was typically underlain by soft brown variable sandy variably gravelly clay of maximum 1m in thickness over Weald Clay Formation deposits. Within the lower ground floor on the northern area of site the Made Ground comprised concrete over crushed brick and terracotta tile to approximately 0.5m depth. This was underlain by variably sandy variably gravelly clay with the gravel comprising brick and tile to approximately 1m depth over firm to stiff brown and blue grey sandy silty CLAY of the Weald Clay Formation. No significant staining or odours were noted during the works that would indicate significant hydrocarbon contamination and the associated potential for volatile contamination or odour nuisance.

Samples were recovered from shallow depths for laboratory analysis. Similarly, to the first phase of works this indicated PAH indicative compounds benzo[a]pyrene and dibenzo[a,h]anthracene) concentrations above the individual thresholds for the adopted Residential with Home Grown Produce land use. The 95th percentile upper confidence limit also exceeded the relevant thresholds. Statistical analysis indicated the exceedances are due to statistical outliers or contamination 'hotspots' of contamination.

Asbestos screening identified no asbestos fibres within the additional 12no. samples testing.

The additional ground gas monitoring confirmed the site should be classified as a Characteristic Situation 1 (CS1) and as such no ground gas protection measures are required.

Summary

A Source-Pathway-Receptor analysis carried out as part of the site contamination assessment undertaken following the ground investigation concluded that there was a residual human health contamination risk at the site relating to PAH indicative compounds benzo(a)pyrene and dibenzo(ah)anthracene) contamination in the shallow soils. As the site is to be covered by the building footprint however, this will sever potential direct contact pathways except for those relating to volatile contaminant migration. As no significant source of volatile contamination was identified during the works there is not considered to be a likely potential source of such volatile contamination.

Based on the recorded concentrations, no remedial action was deemed necessary to ensure the safe occupation of the site by human health receptors.

Due to the elevated PAH compounds within the Made Ground however, barrier pipe is likely to be required for service runs within the new development.

1.6 Regulatory Liaison

We understand that the Local Planning Authority, Mid-Sussex District Council, have been consulted and the above reports forwarded for them for review and comment.

2.0 PROPOSED DEVELOPMENT

The proposed development is indicated by the Client to include the clearance of the existing detached split-level building and construction of a new Community Entertainment and Events Centre to accommodate new flexible use spaces such as a theatre, rehearsal rooms and dance studios as well as the option of hosting banqueting in the modified theatre space.

These works are indicated to comprise the complete demolition of the existing property, the installation of earth support structures around the perimeter of the proposed basement and excavation to required formation levels, construction of a new basement under the southern end of the site to match the existing lower ground level to the northern end of the site.

The current proposed development scheme is detailed on the Proposed Site Layout Plan presented in Appendix A.

3.0 PARTIES AND RESPONSIBILITIES

The parties involved in the design, construction and operation of the remediation are categorised according to their roles as follows:

Current Owner	Burgess Hill Town Council

Developer	Burgess Hill Town Council
Architects / Designers	TBC
RQA Supervision	Paddock Geo Engineering Limited
Remediation Design	Paddock Geo Engineering Limited
Regulators	Mid-Sussex District Council and the Environment Agency
Analytical Testing Laboratory	I2 Analytical Limited, Watford (UKAS Accredited Testing Laboratory No. 4041)
Waste Haulier	Currently unknown
Waste Disposal Site	Currently unknown
Remediation Contractor	Currently unknown

4.0 RISK MANAGEMENT OPTIONS APPRAISAL

4.1 Introduction

The proposed development (as detailed in Section 2) will include the demolition of the existing structure, installation of earth supporting structures around the perimeter and excavation for the proposed basement, and erection of a new multi-use community space. The development is anticipated to be of traditional construction. The nature of the proposed development is of a moderate sensitive as the end users potentially could include child receptors. The exposure time for individual receptors, especially highly sensitive end users such as child receptors, is likely to be limited and in addition no soft landscaping areas are present within the proposed development, which would mitigate any direct contact contaminant pathways.

The SCA identified the existence of PAH contaminated soils on site. As the site is to be covered within the building footprint / hardstanding however, there is deemed to be no viable pathway between the contaminated soils and future end users of the site. As such no remediation is considered to be required with respect to the suitability of the site for its future end users.

4.2 Remedial Objectives

It should be noted however, that although the additional sampling works carried out in October 2019 have greatly increased the resolution of the contamination assessment for the site, and as such are considered to have reduced any uncertainty that any unexpected or previously unidentified contamination would be discovered during the future site development works to an acceptable low level, it does not completely eliminate such risk. A protocol for the discovery of unexpected / unidentified contamination is hereby outlined as a precautionary measure. Should such contamination be encountered, and following suitable testing and consultation with the authorities, further remediation is recommended, the type of remediation will depend upon the type and extend of any such contamination. A series of potentially remedial options are outlined below that will be considered upon discovery of such previously unidentified contamination.

Remedial works are regarded as a form of risk management, the aim of which is to demonstrably break the chain of any potentially unacceptable pollutant linkages that connect contaminant sources to receptors via pathways at the site. The aims of the remedial works are as follows:

- To ensure that human health (site end-users including future residents, visitors and ground workers including construction and future maintenance workers) are not exposed to elevated concentrations of hazardous substances on site; and
- Ensure that any remedial works overcome any perceived risks or blight associated with the previous use of the site and any potential associated contamination.

4.3 Source, Pathway and Receptor Management

A Source Pathway Receptor Conceptual Model has been produced for the site using the data from the SCA and is presented in Appendix B. There are three potential options to break pollutant linkages for any future contamination identified at the site. These options are presented below and overleaf:

4.3.1 Source Reduction

This involves the reduction, removal, modification or destruction of the source of contamination. Applicable techniques include:

- Source removal through excavation and disposal of contaminated soils and any associated contaminated infrastructure.
- In-situ or ex-situ physical, chemical, biological and thermal source reduction methods.

4.3.2 Pathway Management

This involves the prevention of movement of contaminants on route to receptors. Applicable techniques include:

- Removal or destruction of contaminants e.g. bioactive zones.
- Preventing pathways from operating e.g. separation-layer or clean-soil cover layer capping system, stabilisation and slurry walls.

4.3.3 Receptor Protection

This protects the receptor by modifying activities and behaviour to reduce exposure and is not normally classed as remediation, but as risk reduction. It is generally a less favourable method for mitigating the risk from contamination. Applicable techniques include:

- Restricting or changing the land use e.g. change to residential use without gardens.
- Changing the design, layout or the proposed construction e.g. adding hardstanding to problem areas.
- Restricting access of the receptor e.g. fencing or walls.

4.4 Viable Remediation Techniques

As with any proposed remedial works, the size, scale and nature of the site, site characteristics, quantity, type and extent of contaminated material present in soils and groundwater, the time frame, cost / benefit analysis and value and the sustainability of the remedial method must all be considered when exploring remedial options.

A Remediation Option Matrix for the site is presented in Appendix C.

A range of remedial technologies exist, and the most commonly utilised methods are listed below.

4.4.1 Excavation and Disposal

Excavation and disposal (also known as dig and dump) is the most basic of remedial techniques. Contaminated soils and any associated infrastructure i.e. buried pipework and impacted materials such as concrete bases are removed either in their entirety or to acceptable levels to allow the inclusion of an inert capping layer. Contaminated materials are generally disposed of to landfill, material recovery or soil treatment facilities.

The drawback of this technique is the potential for spiralling costs due to unknown and potential non-sustainable quantities of material and increased disposal costs. This method is also not considered suitable for deep contamination deeper than 2m bgl due to large volumes which would require disposal and the potential for ground instability from such an excavation.

4.4.2 Soil Stabilisation

Soil stabilisation is achieved by the reaction of contaminants with reagents to promote sorption, precipitation or incorporation into crystal lattices. This method is not deemed viable for sites with proposed residential garden areas on site.

4.4.3 Solidification

Solidification is a remediation technology that involves the addition of reagents to a contaminated material to impart physical and dimensional stability to contain contaminants in a solid product and reduce access by external agents (e.g. air and rainfall). This technology is not viable within proposed residential garden areas or within or close to adjacent residential dwelling building footprint due to potential drainage and geotechnical issues.

4.4.4 Chemical Oxidation

In its simplest form, chemical oxidation remediation comprises the introduction of an oxidation agent into the ground or a stockpiled material to allow an oxidation reaction to occur (in soil and groundwater) and convert the contaminants to a lower risk form. For in-situ treatment, this method requires permeable soils to allow the circulation of treatment chemicals which are generally in an aqueous form. This method is not likely to be suitable due to the complexity of the contaminants found including Benzo(a)pyrene and Dibenzo(ah)anthracene and the presence of asbestos.

4.4.5 Monitored Natural Attenuation

This method comprises the natural attenuation of contaminants in soil and groundwater through various means such as natural bio-gradation, abiotic oxidation, sorption, volatilisation and dispersion, with monitoring to assess the progress of the attenuation. For this method to be viable, the affected soil must be physically and chemically suitable and demonstrate that natural attenuation is occurring or could have the ability to occur. Due to the underlying clay natural strata and nature of the contaminants encountered on site to date, this option is not likely to be viable.

4.5 Remedial Sustainability

As discussed in Section 4, a range of remedial options have been investigated and several factors considered within the option appraisal process including; efficiency and effectiveness of the remedial technique, potential costs, haulage movements on and off-site and potential carbon emissions, other environmental factors, accurate focusing of remedial works, timescales and the general overall benefits.

4.6 Most Viable Remedial Option

Should additional contamination be encountered but not be proved to be volatile in nature or significantly more concentrated than or different in nature to that already present on site, then capping of contamination with the building footprint is still considered the most suitable remedial option.

If additional contamination is encountered that is volatile or significant different in nature than that already discovered on site, the most viable remediation method for this site is likely to be excavation and disposal or pathway management through the installation of a vapour membrane within the ground or basement (lowest) floor construction.

Excavation and disposal is likely to be the only viable method if volatile contamination is encountered, due to the limited space on site, site bounding restrictions of adjacent building and likely time constraints that methods such as soil stabilisation, chemical oxidation, and monitored attenuation would impose upon the proposed development.

The above is however, contingent upon the exact nature of contamination encountered and liaison and agreement with the client, developer, regulators and any other stakeholders.

5.0 REMEDIATION ACTION REQUIRED

5.1 Introduction

The remedial measures required from the data already gathered within the detailed site contamination assessment works for the site are detailed in this section of the report and comprise an asbestos survey, installation of barrier pipe and suitable use of PPE to limit exposure of site personnel to contamination beneath the site.

Recommendations for procedures upon encountering unexpected / unidentified contamination are also outlined as a precautionary measure.

5.2 Remediation Action – Asbestos Survey

It is recommended that an asbestos survey of the existing structure be carried out to confirm whether further sources of asbestos are present on site. Any asbestos material encountered should be removed by a licensed asbestos contractor in line with the Control of Asbestos Regulations (CAR 2012) prior to the construction phase of the proposed development.

5.3 Remediation Action – Installation of Barrier Pipe

Due to the presence of elevated concentrations of the PAH indicative compounds benzo(a)pyrene and dibenzo(ah)anthracene, which are above the UKWIR guidance levels, the installation of suitable barrier pipe is recommended for service runs in the new development.

Service pipes should be laid in clean new trenches and lined and filled with a suitable clean packing material. Junctions of pipes and penetrations into the building floor-slab or other handstanding should be suitable sealed. All works shall be carried out and inspected by suitable qualified personnel. Photographic records should be taken during the works for the validation process.

Consultation with the water supplier shall be undertaken to identify suitable grade pipe, sealant and suitable trench dimensions and fill materials for the service trenches.

All soils excavated as part of the works on site should be placed on bunded geo-membrane and covered to prevent the generation of wind-blown dust. The materials for use below the building footprints and areas of hardstanding should be excavated and placed as soon as possible following excavation to avoid the creation of dust or be removed off-site as soon as possible (if excess material is present on site), once the waste has been classified and a disposal destination has been selected. It is recommended that for surplus site soils that the Client consider the use of a soil treatment facility as oppose to landfill, not only is this a more sustainable approach but also a more cost effective one.

5.4 Remediation Action – Protection of Site Workers

Remediation measures are not deemed considered necessary for the future end users of the site as the building footprint is considered to sever direct contact pathways between the contamination identified on site and the proposed end users.

Construction works, especially ground works, are likely to come into contact with the contamination identified on site however, and as such may be at risk from the contamination with the Made Ground. Given the levels of identified contamination on site it is considered that this can be mitigated through good site practices and robust sitework risk assessment as per guidance set out in HSE and CIRIA.

- HSE 1992 HG(G)66 – Protection of workers and the public during the development of contamination land HMSO
- HSE 1998 – Code of practice for the Control of Substances Hazardous to Health and Control of Carcinogenic Substances 2nd Edition
- CIRIA Report 132 – A Guide for Safe Working on Contaminated Sites

A site briefing should be supplied to all personnel highlighting that contamination was encountered within the Made Ground soils on site and that suitable PPE should be employed. Eating, drinking and smoking should be strictly confined to designated clean areas and good hygiene should be encouraged.

Works carried out on sites where any asbestos fibres have been identified must be carried out by a suitable contractor and a site specific Health and Safety Plan for site construction workers must be produces in line with CAR 2012.

5.5 Remediation Action – Discovery of Previously Unidentified Contamination

The additional sampling works carried out in October 2019 have greatly increased the resolution of the contamination assessment for the site and as such the likelihood of encountering unexpected or previously unidentified contamination during the future site development works is considered to be very low.

Although greatly reduced the risk of encountering unexpected contamination cannot be completely eliminated. In the unlikely scenario that unexpected contamination is encountered suitable protocols should be in place.

If suspected contamination is encountered;

- Works in the area of suspected contamination should be halted and covered with a geo-membrane.
- A suitably qualified Geo-Environmental engineer should attend the site to assess visual and olfactory indications of contamination.
- Should it be deemed necessary samples will be taken within containers suitable for subsequent laboratory chemical contamination testing.
- Dependent upon the chemical contamination testing and consultation with the relevant authorities either
    - No contamination indicated by additional testing – development works can recommence
    - Contamination within samples – Further remediation works may be recommended and agreed with local authority. Works should not commence until additional remedial action have been undertaken. Refer to Section 4.6 for the most viable remedial options for the type of contaminants which could plausibly be encountered on the site in the unlikely event of previously unidentified contamination is encountered.

5.6 Remediation Quantities

Remedial works are not considered necessary for the site, with the exception of the unlikely event that a volatile contamination source is encountered during the development works.

5.7 Waste Classification

Waste Acceptance Criteria (WAC) testing and assessment was carried out on 2no. composite samples of natural soils recovered from the north and south of the site from soils expected to require disposal in the proposed development. These natural soils indicated levels of the WAC determinands which were below the relevant levels for inert waste, with the exception of fluoride in the southern area sample which was slightly in excess of the required levels. This level may still allow an inert waste classification however, depending upon the disposal site.

Elevated total priority contaminant concentrations were identified for PAH compounds and asbestos from the shallow Made Ground from beneath the building footprint. The levels identified may require a hazardous waste classification for disposal of this material. The material with a maximum level of 0.060% from TP2a may require a hazardous waste classification if disposal is required.

Any waste classification should be confirmed with the receiving facility, who will require the total soil chemical analysis present in Appendix D of this report.

5.8 Remediation Validation

In the unlikely event that remedial works are required these shall be performed under the supervision of a suitably qualified person, such as a PGE Geo-Environmental Engineer who will fill the role of a Remedial Quality Assurance Engineer (RQA) which is required for validation purposes.

During any remedial works and during site clearance, a watching brief shall be maintained such that should the sub-soil conditions in other areas of the site appear to be inconsistent with those found in the areas sampled, then this can be bought to the attention of the RQA Engineer and these recommendations reviewed.

A Validation Report should be prepared by a suitable qualified completion of any remedial works to confirm the installation of clean trenches and barrier pipe and the certification of the removal of spoil to suitable waste disposal facility. The objective of the Verification Report will be to document all aspects of the works undertaken and will include all records collected and maintained by the Client and their appointed construction team / remediation contractor throughout the project duration.

Should any additional contamination be encountered during the site works and further testing and / or remedial works be undertaken due to this; details of any such works / testing should also be detailed in the Validation report.

If a Validation Report is necessary, it will be prepared in accordance with the Environment Agency guidance document Verification of Remediation of Land Contamination (report SC030114/R1 dated 2010).

A Validation Report should describe the site, remediation objectives, remediation techniques, verification data, supported by sketches and as-built drawings, figures, in-situ testing records, photographic records and any additional information that may supplement the report. For the validation of the remediation works detailed records should be maintained of:

- details on the barrier pipe and trench fill material.
- details of any materials removed from the site and the disposal destination (licensed facility).
- the source and validation certification of any imported clean soil type materials.
- a complete photographic record of all the works undertaken on site.

Copies of any Validation Report will be provided to the concerned regulatory authorities, who will be asked to state whether they are satisfied with the level of detail provided and confirm that it appears to be reasonable given the data presented. Based on the information supplied, they will then make a statement about whether the site is fit for its proposed residential end use to allow discharge of the related planning conditions.

Any substantial change to the remediation objectives will be agreed with the Local Planning Authority, as appropriate, prior to commencement and communicated to all relevant parties.

5.8 Health, Safety and Environmental Requirements

The construction operatives working on this site should take precautions commensurate with the degree of contamination identified in the previous contamination assessment reports produced for the site and detailed within the Construction Phase Health and Safety Plan.

Best practicable environmental protection should always be employed during the remediation and construction works. Appropriate Health & Safety precautions including the use of signage, site inductions and toolbox talks to raise awareness of the risks on site, regular dampening down of stockpiles and site surfaces to minimise the generation of wind-blown dusts and the covering of stockpiles (where possible) and the use of PPE should be adopted. Respiratory PPE may be required for use by ground workers if suspect asbestos-containing materials are encountered.

Any groundwater encountered will be left in-situ if possible and if it is necessary to be removed off site, the water must be removed off site by a suitable tanker or treated, such as via the site oil / water interceptor system, prior to discharge.

6.0 REMEDIATION QUALITY ASSURANCE

Any site remediation should be considered as a comprehensive process which requires clear and effective management. The Remediation Quality Assurance (RQA) procedures detailed in the Sections above have been included within the Remediation Method Statement to ensure that any remediation objectives would be achieved and that:

- Any remediation is competent and of a high standard.
- The approach and any actions taken are well documented.
- The Client should be confident that the remediation works are suitable for the indicated proposed end site use.

Throughout the site remediation works a suitably qualified and experienced Engineer or Scientist (the RQA Engineer) shall direct the operations for remediation and maintain records of the works carried out whilst supervising all site work. A Validation Report will then be produced and forwarded to the concerned parties.

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Investigation of Potentially Contaminated Sites – Code of Practice, British Standards Institution BS 10175:2001.

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Mobilising Natures Army: Monitored Natural Attenuation – dealing with pollution using natural processes, Environment Agency. 2004

Remediation Targets Methodology: Hydrogeological Risk Assessment for Land Contamination, Environment Agency. 2006

LFTGN01. Hydrogeological Risk Assessment for landfill and the derivation of groundwater control and trigger levels. Environment Agency 2003

NOTES AND LIMITATIONS

This report is produced for the sole use of the Client, and no responsibility of any kind, whether for negligence or otherwise, can be accepted for any Third Party who may rely upon it.

The conclusions and recommendations given in this report are based on our understanding of the proposed plans for the site in the future. If, however, the site is developed for a varying use, then a different interpretation might be appropriate.

The report has been prepared following the guidelines and principles established in the British Standards. It necessarily relies on the co-operation of other organisations and the free availability of information and total access. Where data supplied by the Client, including that from previous site investigations, have been used, it has been assumed that the information is correct. No responsibility can be accepted by Paddock Geo Engineering for inaccuracies within the data supplied.

No responsibility can, therefore, be accepted for conditions arising from information that was not available to the investigating team because of information being withheld or access being denied.

The scope of this Ground Investigation was discussed and agreed with the Client. No responsibility is accepted for conditions not encountered, which are outside of the agreed scope of work.

This report may suggest an opinion on a possible configuration of strata or conditions between exploratory points and below the maximum depth of investigation. However, this is for guidance only and no liability can be accepted for its accuracy. Comments on the groundwater conditions are based on observations made at the time of the investigation unless otherwise stated. It should be noted, however, that groundwater levels might vary due to seasonal or other effects.

It should be noted that this report is based solely on the samples collected in the borehole locations investigated. During the works and following general site clearance, should the sub-soil conditions in other areas of the site appear to be inconsistent with those found in the areas sampled then this geotechnical appraisal and site contamination assessment may need to be reviewed.

This report is prepared and written in the context of the proposals stated in the introduction to this report and it should not be used in a differing context. Furthermore, new information, improved practices and changes in legislation may require an alteration to the report in whole or in part after its submission. Therefore, with any changes in circumstances, or after one year from the date of the report, the report should be referred to Paddock Geo Engineering Limited for re-assessment (and, if necessary, for an estimate for the cost of such).

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The report is provided for the sole use by the Client and is confidential to him/her and his/her professional advisors. No responsibility whatsoever for the contents of this report will be accepted to any other person other than the Client.

APPENDIX A

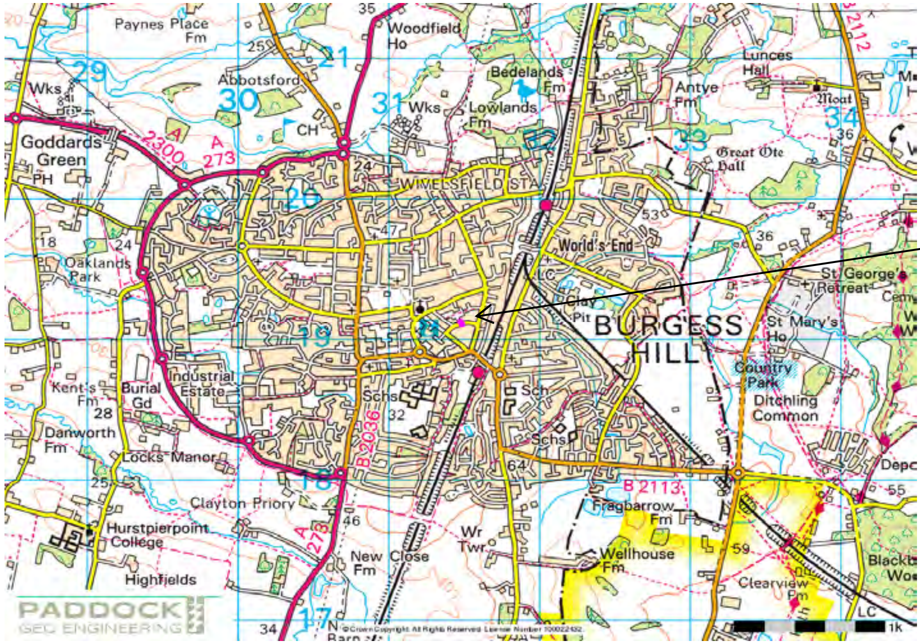
Site Location Plan

Aerial Photograph

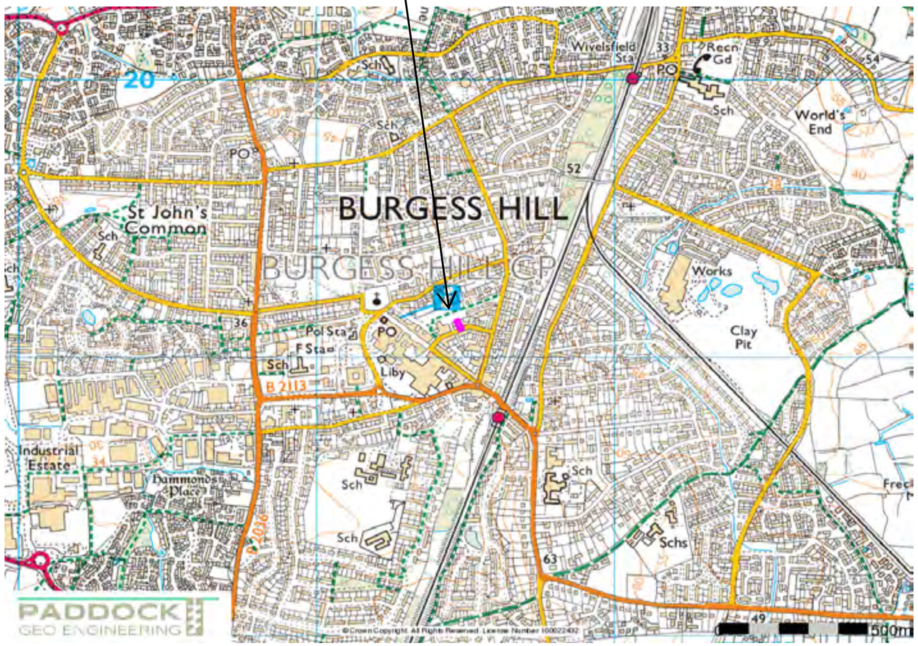
Site Plan

Proposed Site Layout Plan

SITE LOCATION PLAN



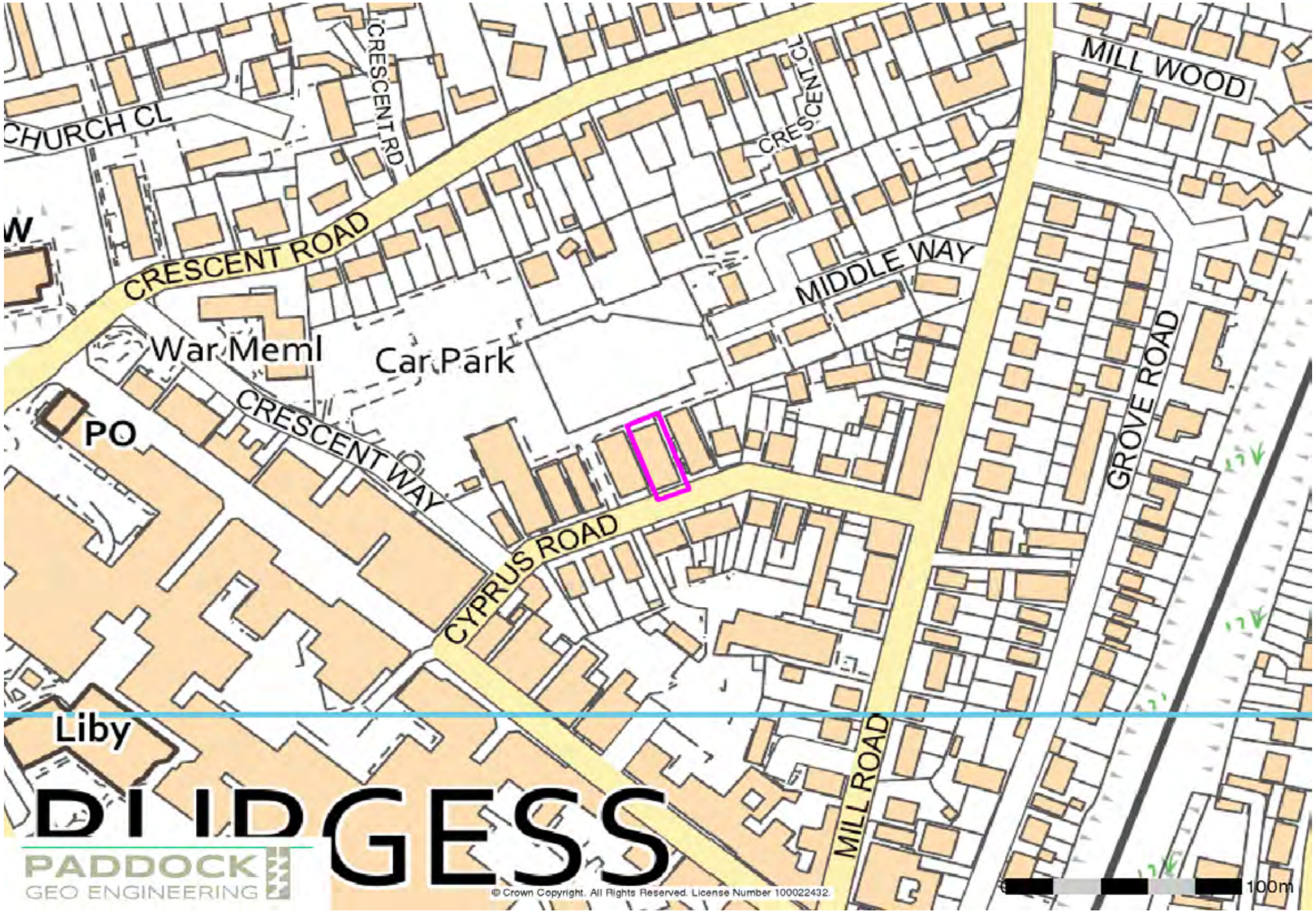
Site Location



PADDOCK GEO ENGINEERING

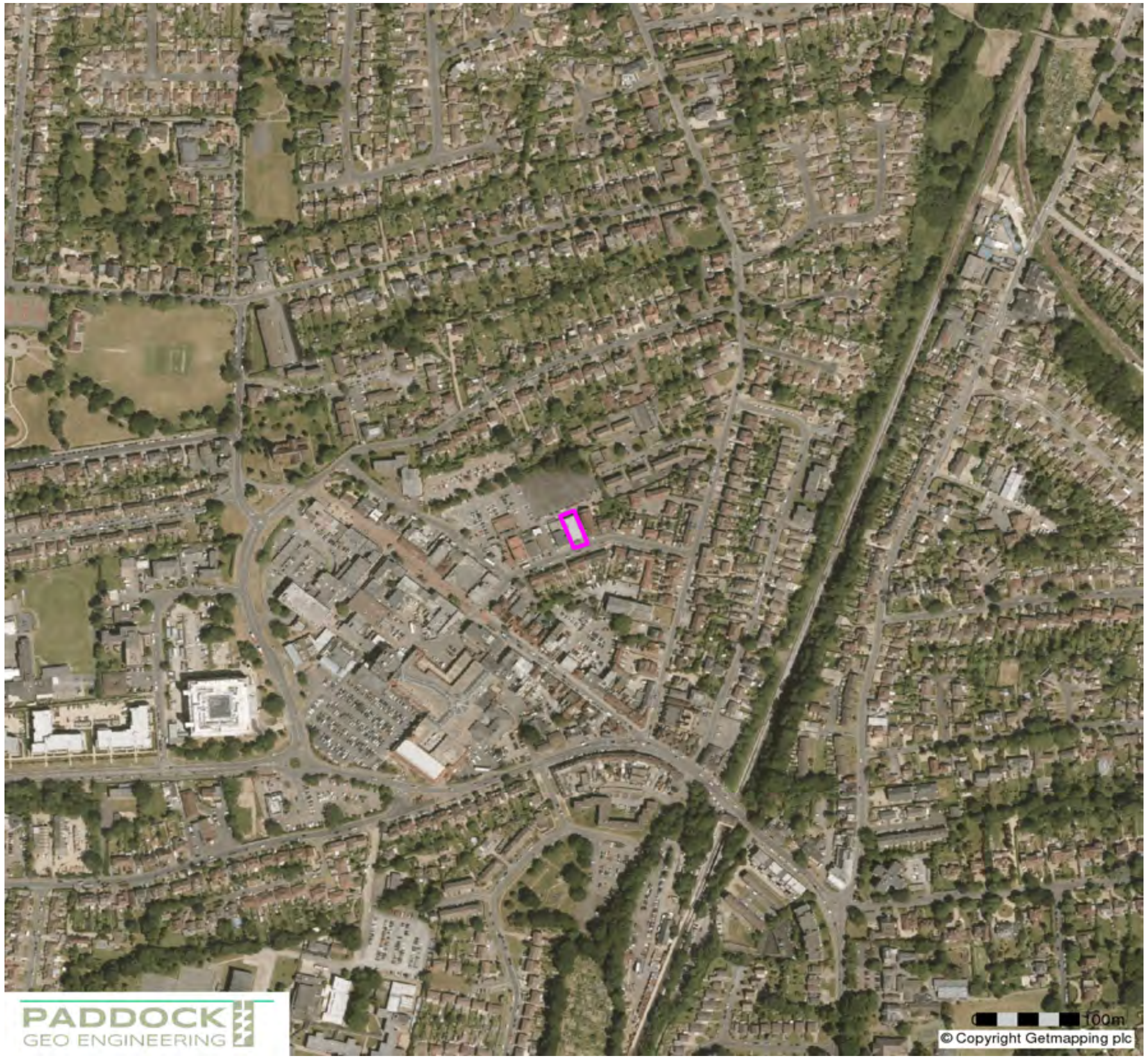
CLIENT:	Burgess Hill Town Council
PROJECT No:	P18-193rms
PROJECT TITLE:	Burgess Hill Community Entertainment and Events Centre, Cypress Road, Burgess Hill, RH15 8DX

SITE PLAN



PADDOCK GEO ENGINEERING	**CLIENT:**	Burgess Hill Town Council
	PROJECT No:	P18-193rms
	PROJECT TITLE:	Burgess Hill Community Entertainment and Events Centre, Cypress Road, Burgess Hill, RH15 8DX

AERIAL PHOTOGRAPH



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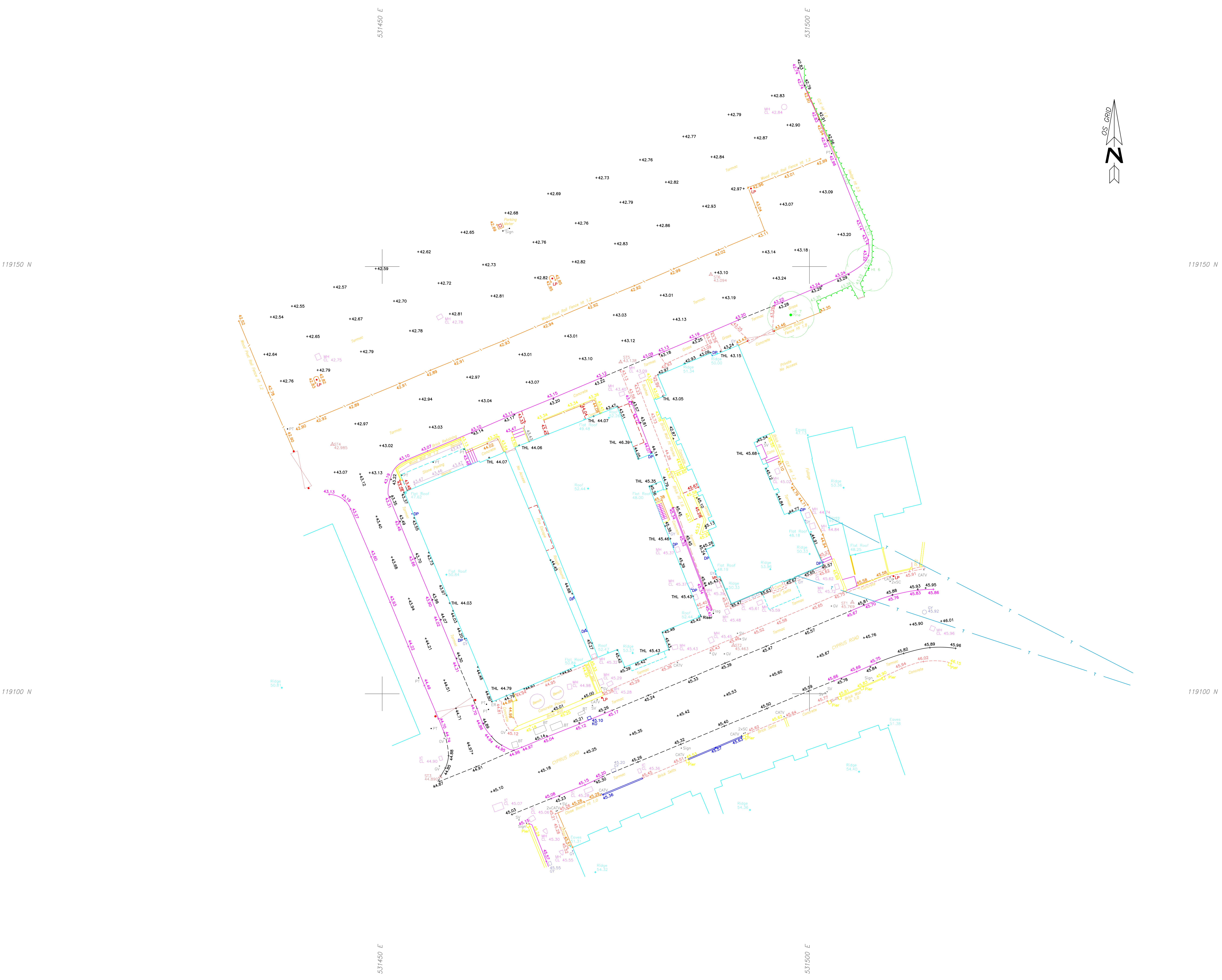

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TEL 01708 438408 FAX 01708 438405 email: london@lasersurveys.com

DATUM NOTES

CO-ORDINATES USED ARE BASED ON O/S NATIONAL GRID, OBTAINED USING THE ACTIVE GPS NETWORK AND ADJUSTED TO A LOCAL GRID WITH A SCALE FACTOR OF 1.0000.

LEVELS ARE RELATED TO :- ORDNANCE SURVEY ACTIVE GPS NETWORK.

SURVEY CONTROL STATIONS SHOWN

ABBREVIATIONS (where applicable)

AV	Air Valve	MK	Marker
BK	Brick	MS	Milestone
BL	Bollard	MT	Meter
BS	Bus Stop	MY	Mercury
BT	British Telecom	OH	Overhead
C/B	Close Boarded	PAV	Paving
CL	Cover Level	PB	Post Box
CLK	Chainlink	PE	Pipe
CO	Column	PM	Parking Meter
Conc	Concrete	P/R	Post and Rail
CP	Catch Pit	PT	Post
CPS	Concrete Paving Slabs	P/W	Post and Wire
CTV	Cable Television	RE	Rodding Eye
CW	Combined Water	RET	Retaining
DC	Drainage Channel	RS	Road Sign
DP	Drain Pipe	RSJ	Rolled Steel Joist
EP	Electricity Pole	SC	Stop Cock
ER	Earthing Rod	SK	Soakaway
FB	Flower Bed	SPT	Septic Tank
FE	Fence	ST	Silt Trap
FH	Fire Hydrant	SV	Stop Valve
FL	Floor Level	SVC	Security Video Camera
FP	Flag Pole	SW	Storm Water
FW	Foul Water	TCB	Telephone Call Box
GP	Gate Post	THL	Threshold Level
GV	Gas Valve	TL	Traffic Light
GY,G	Gully	TK	Tank
HT	Height	TP	Telegraph Pole
IC	Inspection Cover	UG	Underground
IL	Invert Level	UTF	Unable to trace Further
IN	Interceptor	UTR	Unable To Raise
I/R	Iron Railings	VP	Vent Pipe
JB	Junction Box	WL	Water Level
KO	Kerb Outlet	WM	Water Meter
LB	Litter Bin	WO	Wash Out
LP	Lamp Post		
MH	Manhole Cover		

NOTES

* Drainage pipe sizes (where shown) have been gauged from the surface for safety reasons and should be regarded as approximate only.
* Tree species (where shown) should be treated with caution and expert identification is advised.
* Although this is a digital survey the accuracy and amount of detail shown is only commensurate with the graphical scale of mapping as specified. Care should be exercised when working to larger scales.
* Visible features in the vicinity of the boundaries as shown above, may not represent the extent of legally conveyed ownership.
* Whilst every effort has been made to achieve accuracy on this plan, CRUCIAL clearance dimensions, levels and invert levels should be checked prior to design and construction.
* Kerb levels have been taken in the bottom of the channel.

SHEET LAYOUT
NOT TO SCALE

FORMER ROYAL BRITISH LEGION CYPRUS ROAD BURGESS HILL RH15 8DX

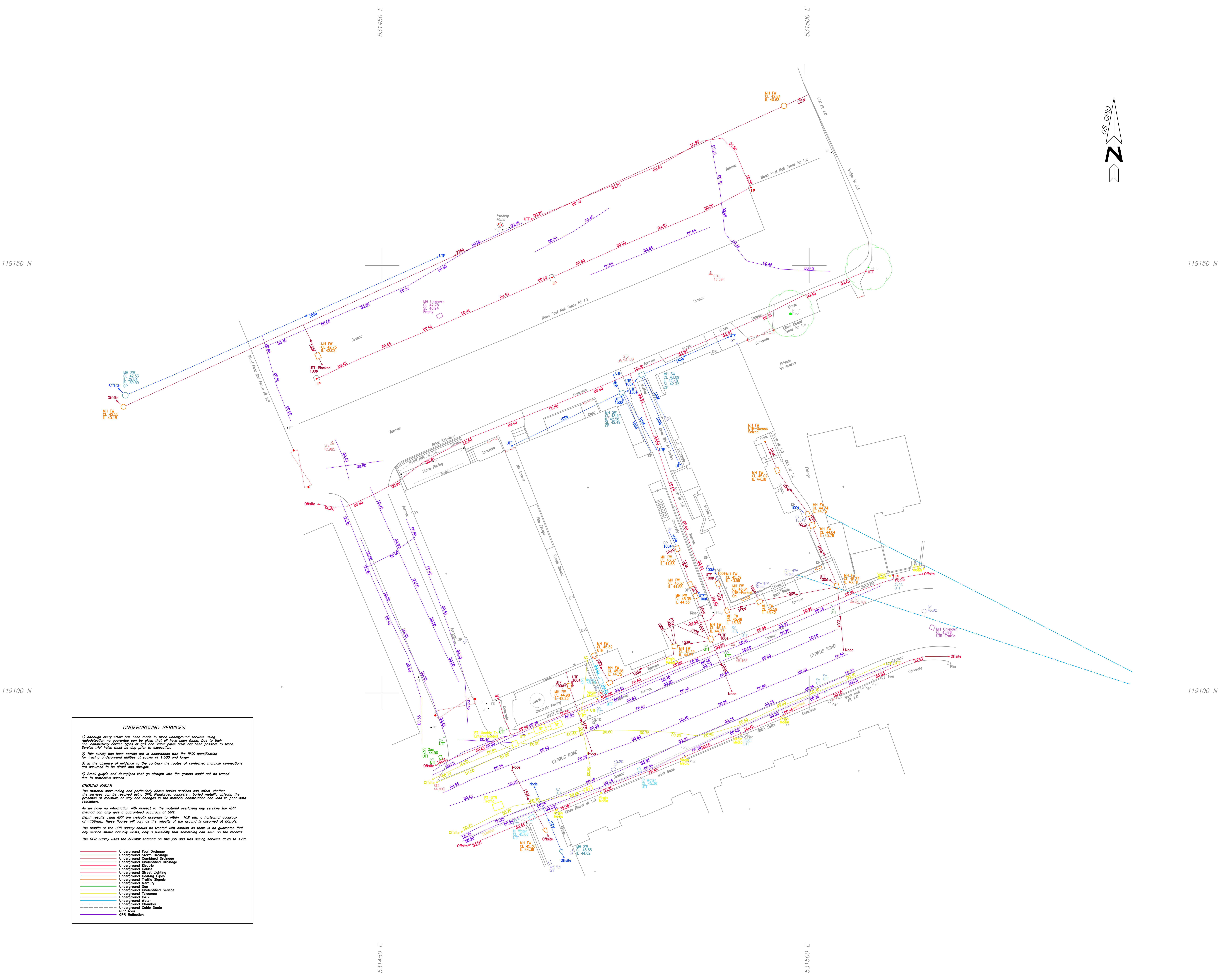
TOPOGRAPHICAL SURVEY

SURVEYED FOR Sinclair Johnston & Partners Ltd
930 Great Suffolk Street
London
SE1 0BX

SURVEYOR Z HUNDLEY
DATE NOVEMBER 2018

NO	DATE	REVISION

DRAWING NO	G 9170/1	REV	0
DRAWING TITLE	TOPOGRAPHICAL		
SCALE	1 : 200 (A1)		
SEE ALSO DWG NOS			
SHEET	1 of 2		
REF NO	G 9170		



UNDERGROUND SERVICES

1) Although every effort has been made to trace underground services using radiodetection no guarantee can be given that all have been found. Due to their non-conductivity certain types of gas and water pipes have not been possible to trace. Service trial holes must be dug prior to excavation.

2) This survey has been carried out in accordance with the RICS specification for tracing underground utilities at scales of 1:500 and larger

3) In the absence of evidence to the contrary the routes of confirmed manhole connections are assumed to be direct and straight.

4) Small gully's and downpipes that go straight into the ground could not be traced due to restrictive access

GROUND RADAR

The material surrounding and particularly above buried services can effect whether the services can be resolved using GPR. Reinforced concrete , buried metallic objects, the presence of moisture or clay and changes in the material construction can lead to poor data resolution.

As we have no information with respect to the material overlaying any services the GPR method can only give a guaranteed accuracy of 50%.

Depth results using GPR are typically accurate to within 10% with a horizontal accuracy of ± 150mm. These figures will vary as the velocity of the ground is assumed at 80m/s.

The results of the GPR survey should be treated with caution as there is no guarantee that any service shown actually exists, only a possibilty that something can seen on the records.

The GPR Survey used the 500Mhz Antenna on this job and was seeing services down to 1.8m

- Underground Foul Drainage
- Underground Storm Drainage
- Underground Combined Drainage
- Underground Unidentified Drainage
- Underground Electric
- Underground Cables
- Underground Street Lighting
- Underground Heating Pipes
- Underground Traffic Signals
- Underground Mercury
- Underground Gas
- Underground Unidentified Service
- Underground Telecoms
- Underground CATV
- Underground Water
- Underground Chamber
- Underground Cable Ducts
- GPR Area
- GPR Reflection

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SURVEY CONTROL STATIONS SHOWN

ABBREVIATIONS (where applicable)

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CL	Cover Level	PB	Post Box
CLK	Chainlink	PE	Pipe
CO	Column	PM	Parking Meter
Conc	Concrete	P/R	Post and Rail
CP	Catch Pit	PT	Post
CPS	Concrete Paving Slabs	P/W	Post and Wire
CTV	Cable Television	RE	Rodding Eye
CW	Combined Water	RET	Retaining
DC	Drainage Channel	RS	Road Sign
DP	Drain Pipe	RSJ	Rolled Steel Joist
EP	Electricity Pole	SC	Stop Cock
ER	Earthing Rod	SK	Soakaway
FB	Flower Bed	SPT	Septic Tank
FE	Fence	ST	Silt Trap
FH	Fire Hydrant	SV	Stop Valve
FL	Floor Level	SVC	Security Video Camera
FP	Flag Pole	SW	Storm Water
FW	Foul Water	TCB	Telephone Call Box
GP	Gate Post	THL	Threshold Level
GV	Gas Valve	TL	Traffic Light
GY,G	Gully	TK	Tank
HT	Height	TP	Telegraph Pole
IC	Inspection Cover	UG	Underground
IL	Invert Level	UTF	Unable to trace Further
IN	Interceptor	UTR	Unable To Raise
I/R	Iron Railings	VP	Vent Pipe
JB	Junction Box	WL	Water Level
KO	Kerb Outlet	WM	Water Meter
LB	Litter Bin	WO	Wash Out
LP	Lamp Post		
MH	Manhole Cover		

FW	Foul Water
SW	Storm Water
CW	Combined Water
PL	Pit Level
SL	Silt Level
D	Depth
S/C	Surcharged
B/D	Backdrop Pipe
NPV	No Pipes Visible
AG	Above Ground

NOTES

- * Tree species (where shown) should be treated with caution and expert identification is advised.
- * Although this is a digital survey the accuracy and amount of detail shown is only commensurate with the graphical scale of mapping as specified. Care should be exercised when working to larger scales.
- * Visible features in the vicinity of the boundaries as shown above, may not represent the extent of legally conveyed ownership.
- * Whilst every effort has been made to achieve accuracy on this plan, CRUCIAL clearance dimensions, levels and invert levels should be checked prior to design and construction.
- * Kerb levels have been taken in the bottom of the channel.

SHEET LAYOUT
NOT TO SCALE

FORMER ROYAL BRITISH LEGION CYPRUS ROAD BURGESS HILL RH15 8DX

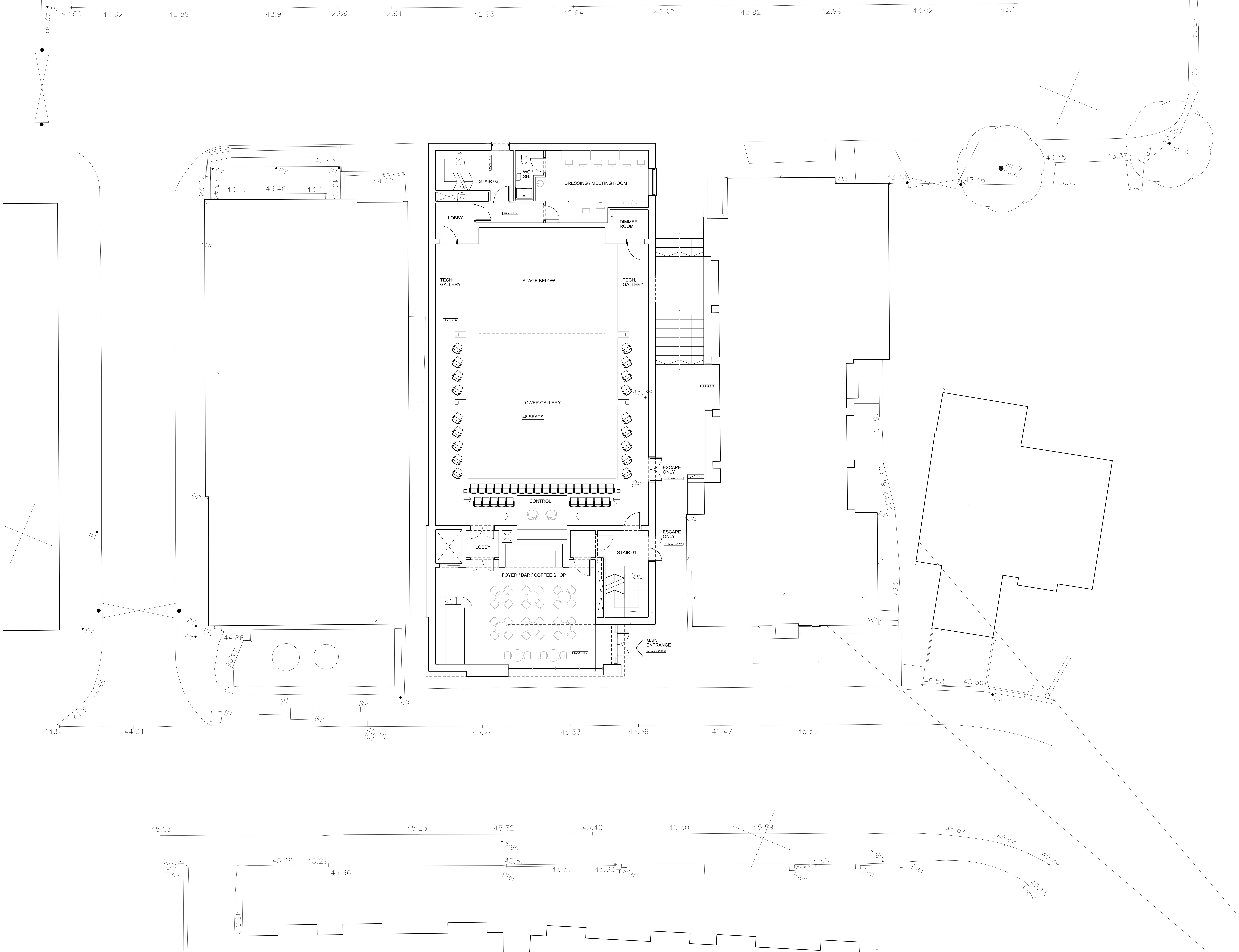
UNDERGROUND SERVICES SURVEY

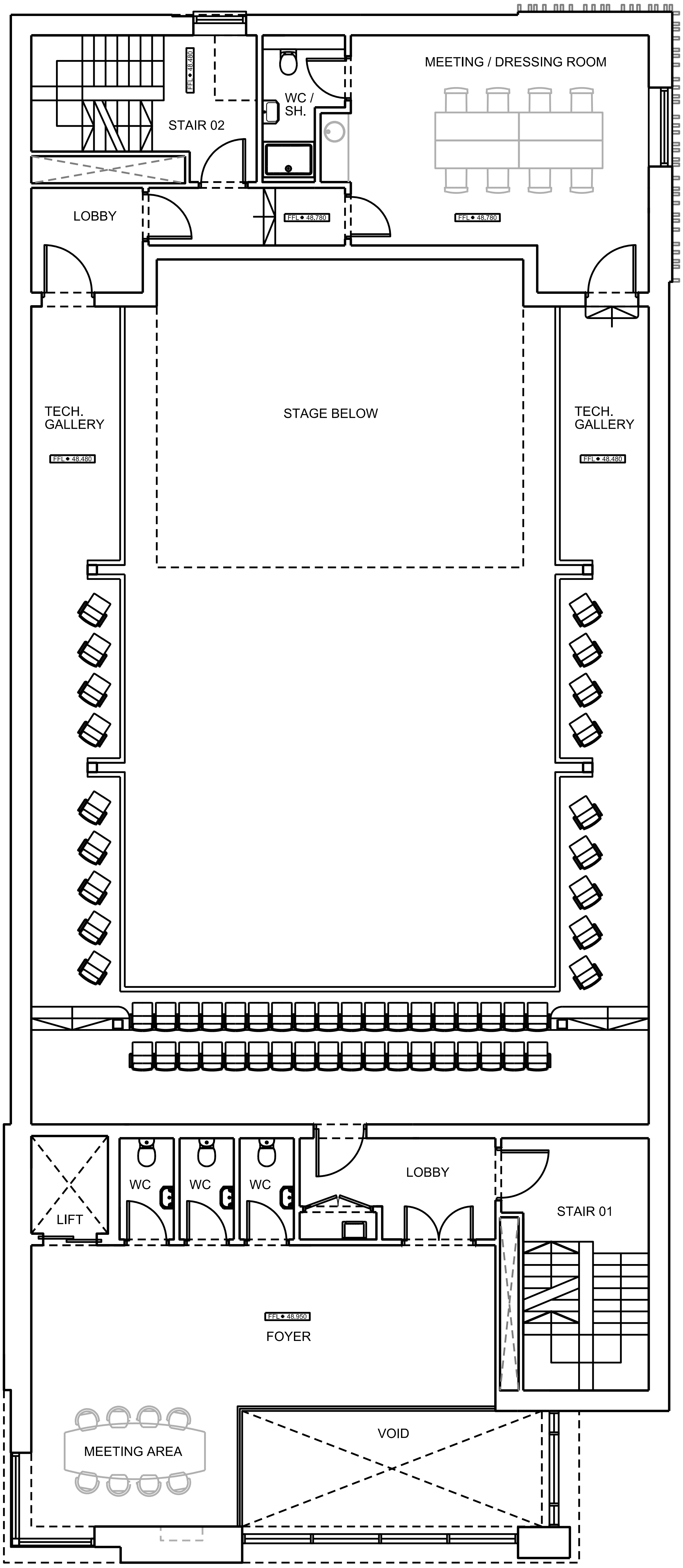
SURVEYED FOR Sinclair Johnston & Partners Ltd
930 Great Suffolk Street
London
SE1 0BX

SURVEYOR R HARRIS
DATE NOVEMBER 2018

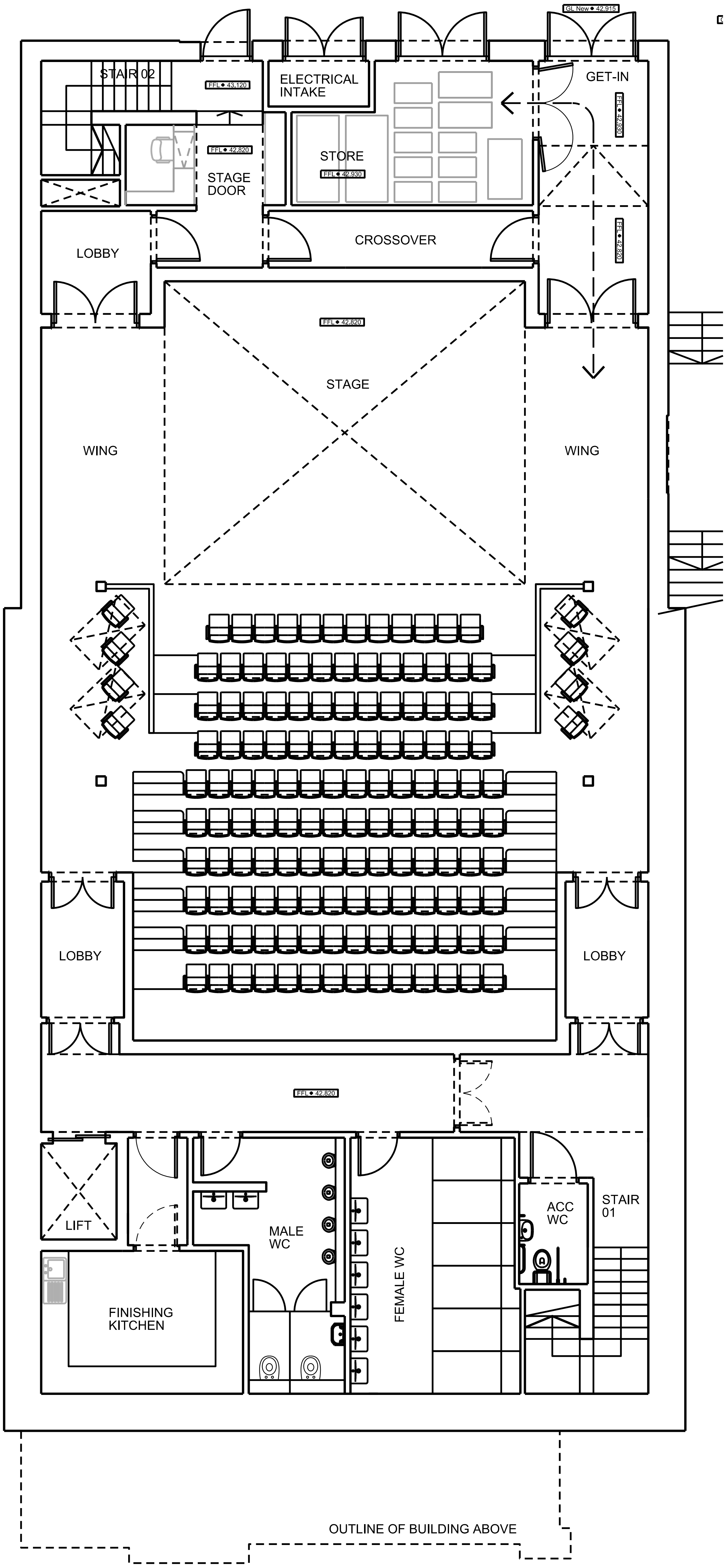
	DATE	REVISION

DRAWING NO	G 9170/2	REV	0
DRAWING TITLE	UNDERGROUND		
SCALE	1 : 200 (A1)		
SEE ALSO DWG NOS			
SHEET	2 of 2		
REF NO	G 9170		

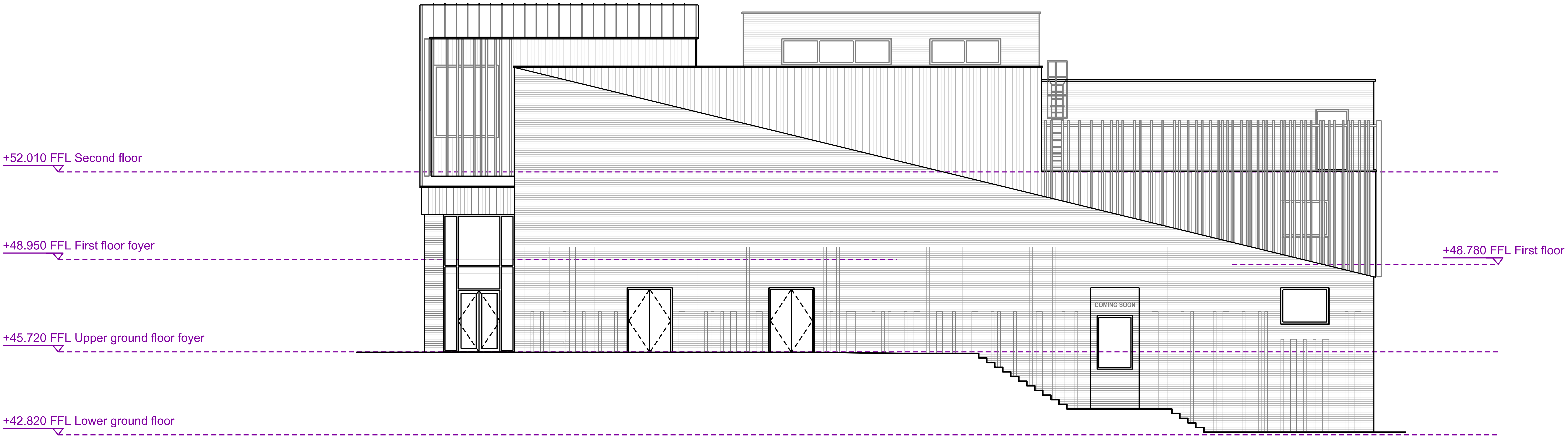

STAIR 02
WC / SH.
DRESSING / MEETING ROOM
LOBBY
DIMMER ROOM
TECH. GALLERY
STAGE BELOW
TECH. GALLERY
LOWER GALLERY
46 SEATS
ESCAPE ONLY
CONTROL
LOBBY
STAIR 01
ESCAPE ONLY
FOYER / BAR / COFFEE SHOP
MAIN ENTRANCE

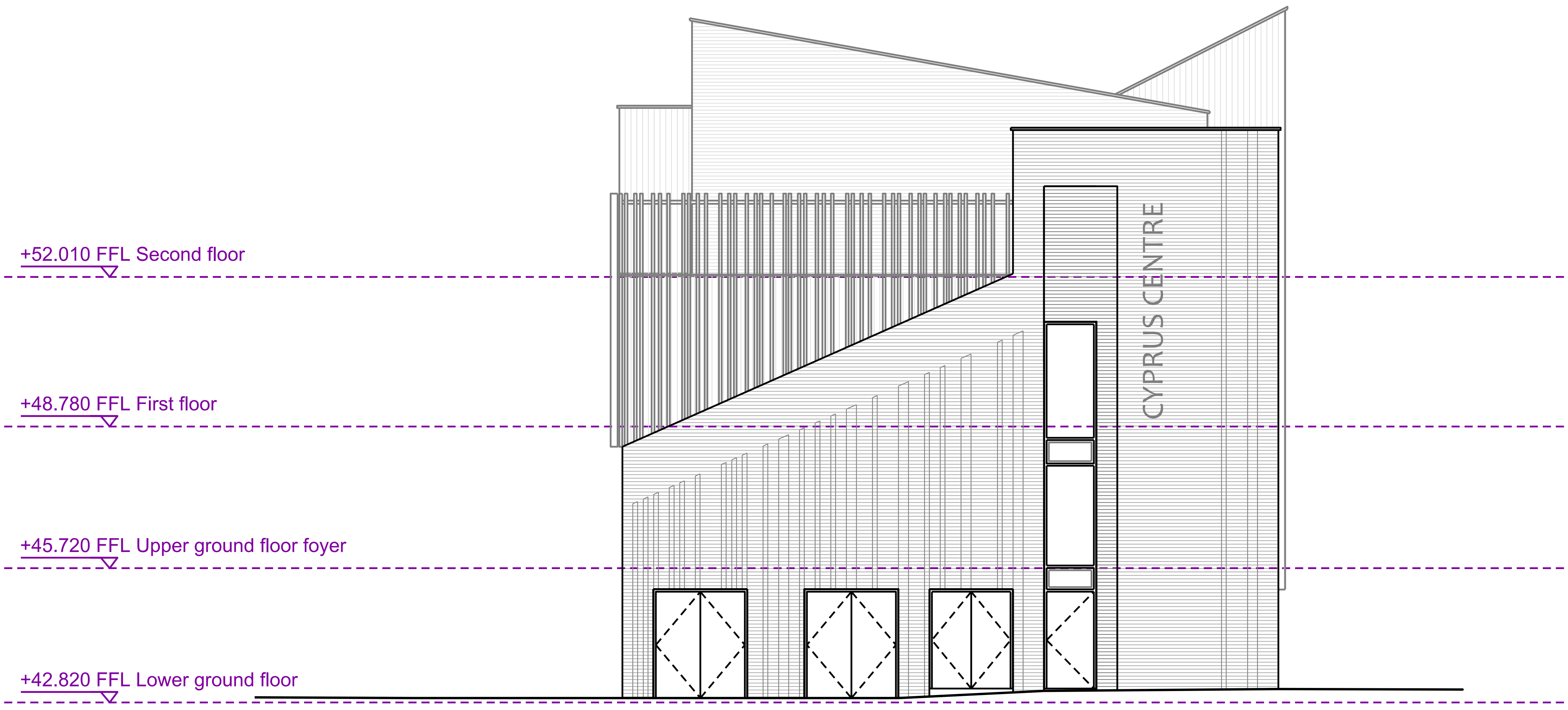


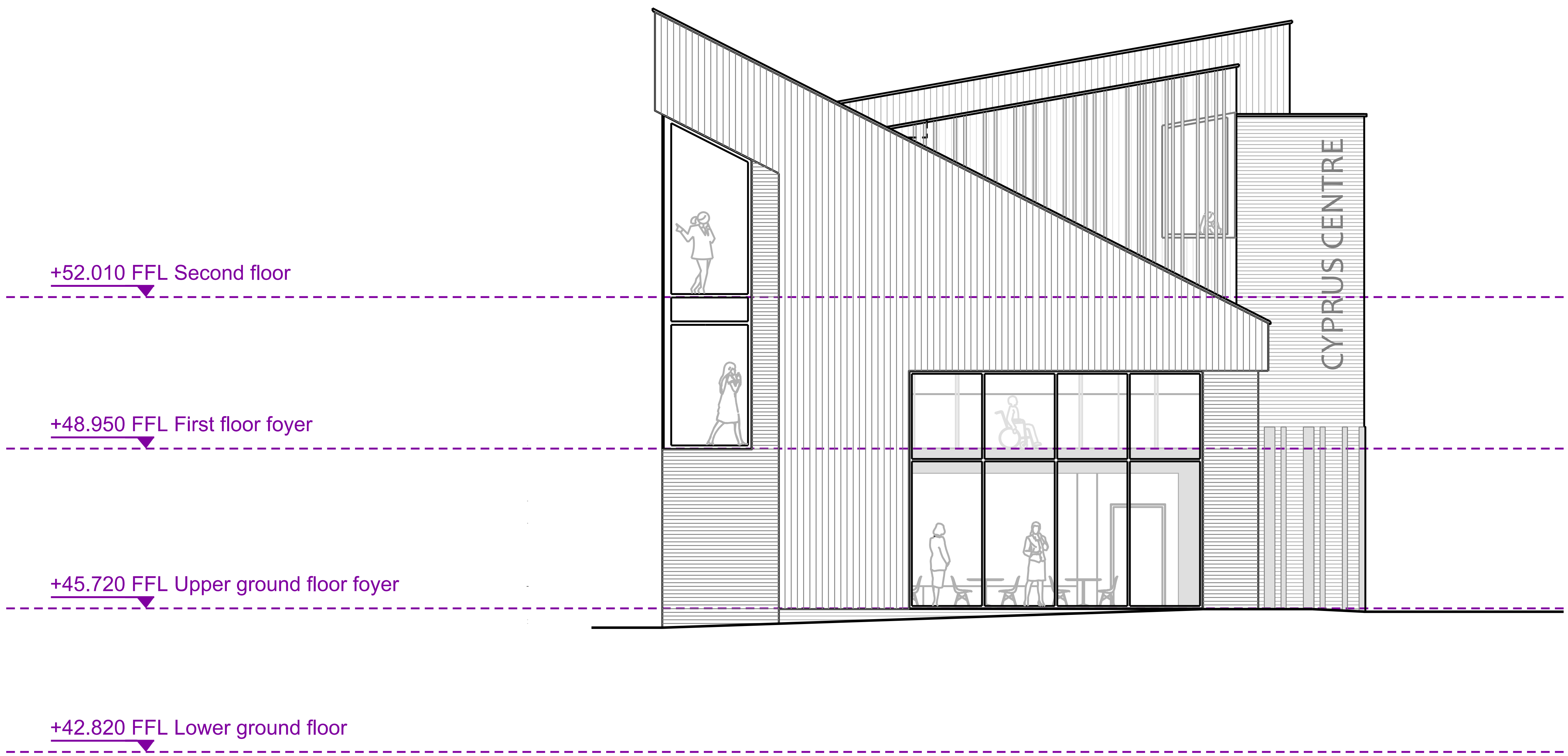
STAIR 02
FFL ◆ 48.480
WC /
SH.
MEETING / DRESSING ROOM
LOBBY
FFL ◆ 48.780
FFL ◆ 48.780
TECH.
GALLERY
FFL ◆ 48.480
STAGE BELOW
TECH.
GALLERY
FFL ◆ 48.480
WC
WC
WC
LOBBY
STAIR 01
LIFT
FFL ◆ 48.950
FOYER
MEETING AREA
VOID



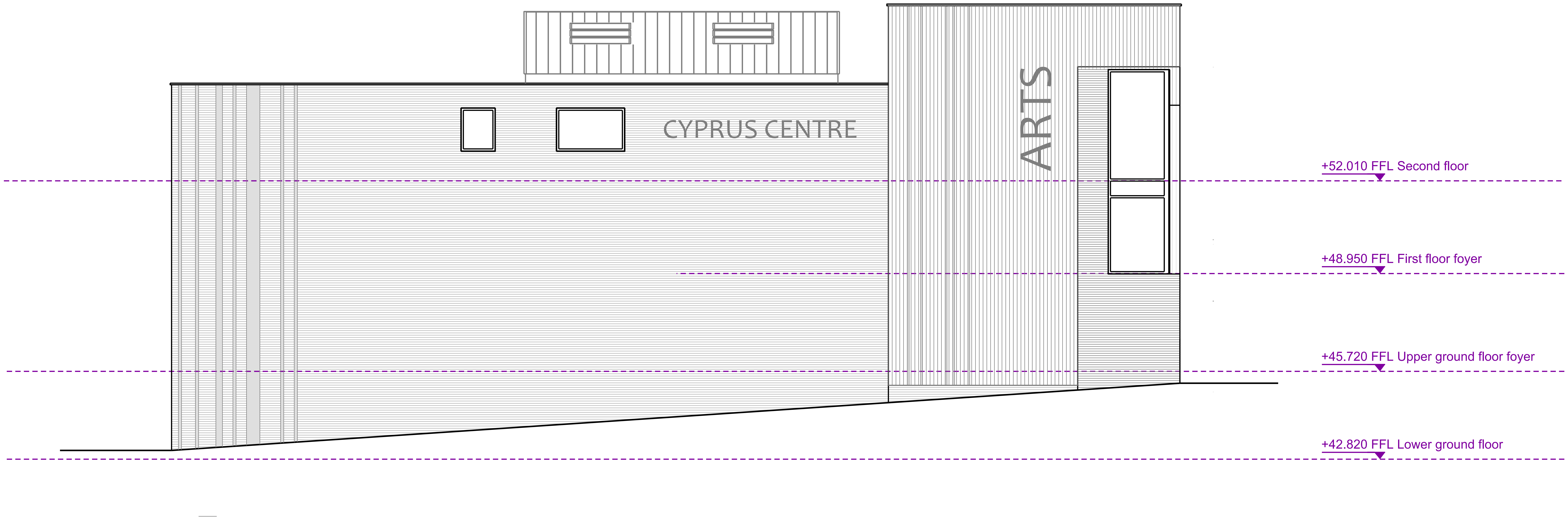
STAIR 02
ELECTRICAL INTAKE
GET-IN
STORE
STAGE DOOR
LOBBY
CROSSOVER
STAGE
WING
WING
LOBBY
LOBBY
LIFT
MALE WC
FEMALE WC
ACC WC
STAIR 01
FINISHING KITCHEN
OUTLINE OF BUILDING ABOVE

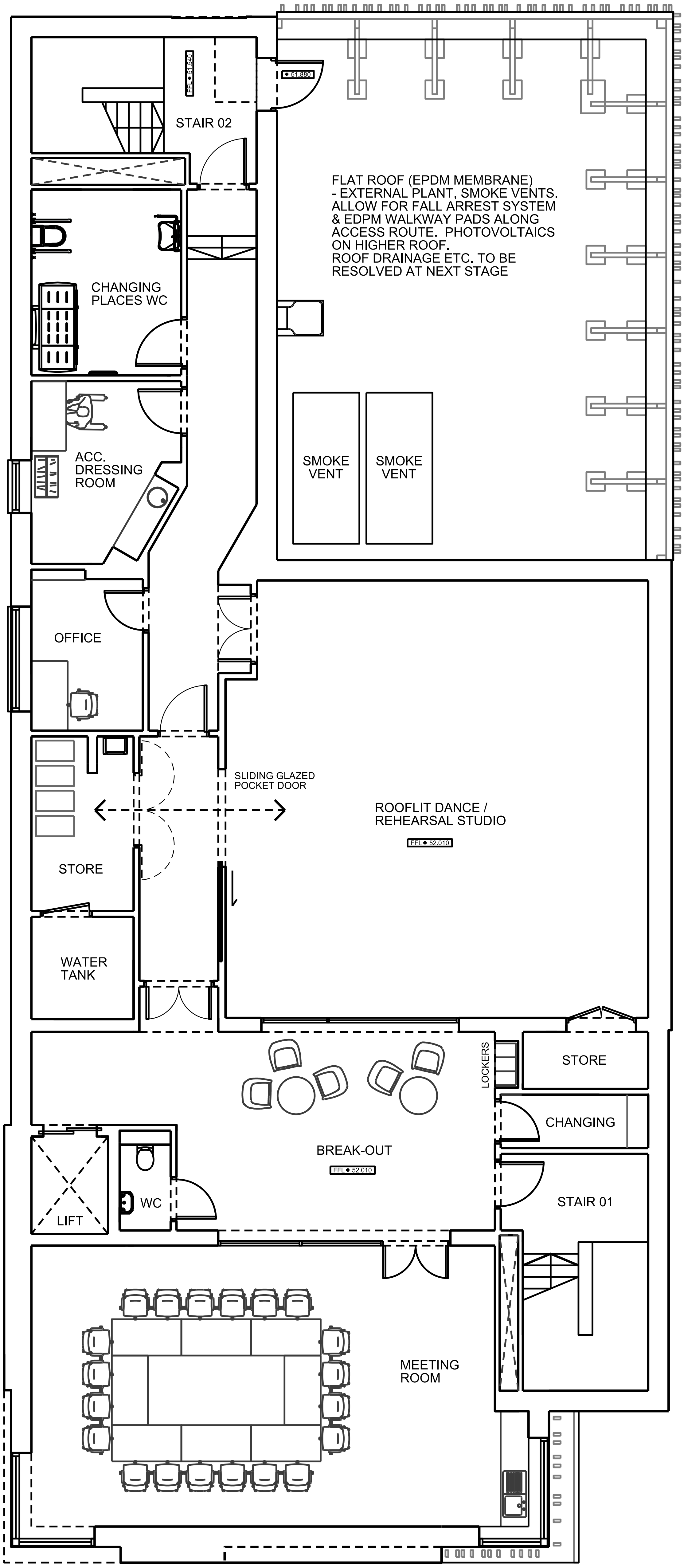

+52.010 FFL Second floor
+48.950 FFL First floor foyer
+48.780 FFL First floor
+45.720 FFL Upper ground floor foyer
+42.820 FFL Lower ground floor
COMING SOON

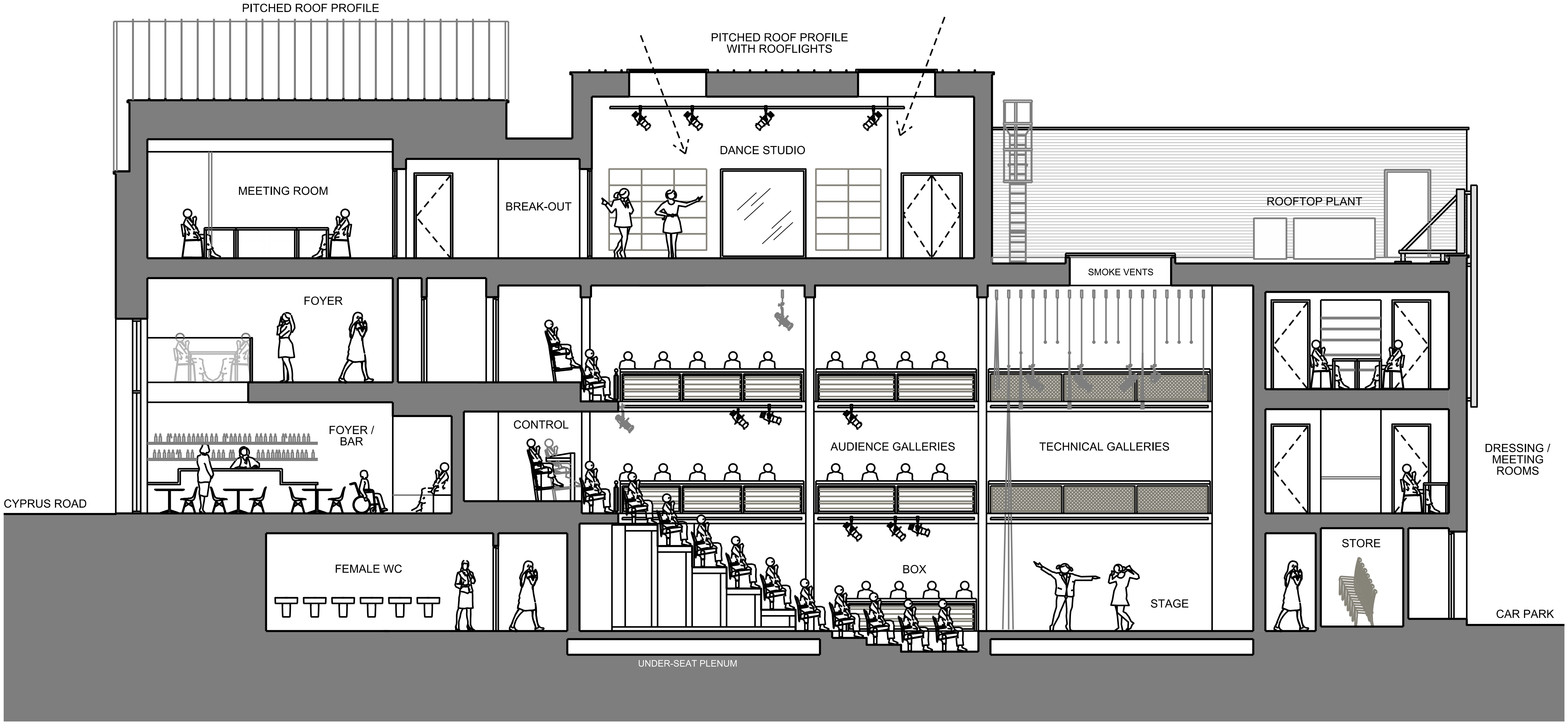

+52.010 FFL Second floor
+48.780 FFL First floor
+45.720 FFL Upper ground floor foyer
+42.820 FFL Lower ground floor
CYPRUS CENTRE



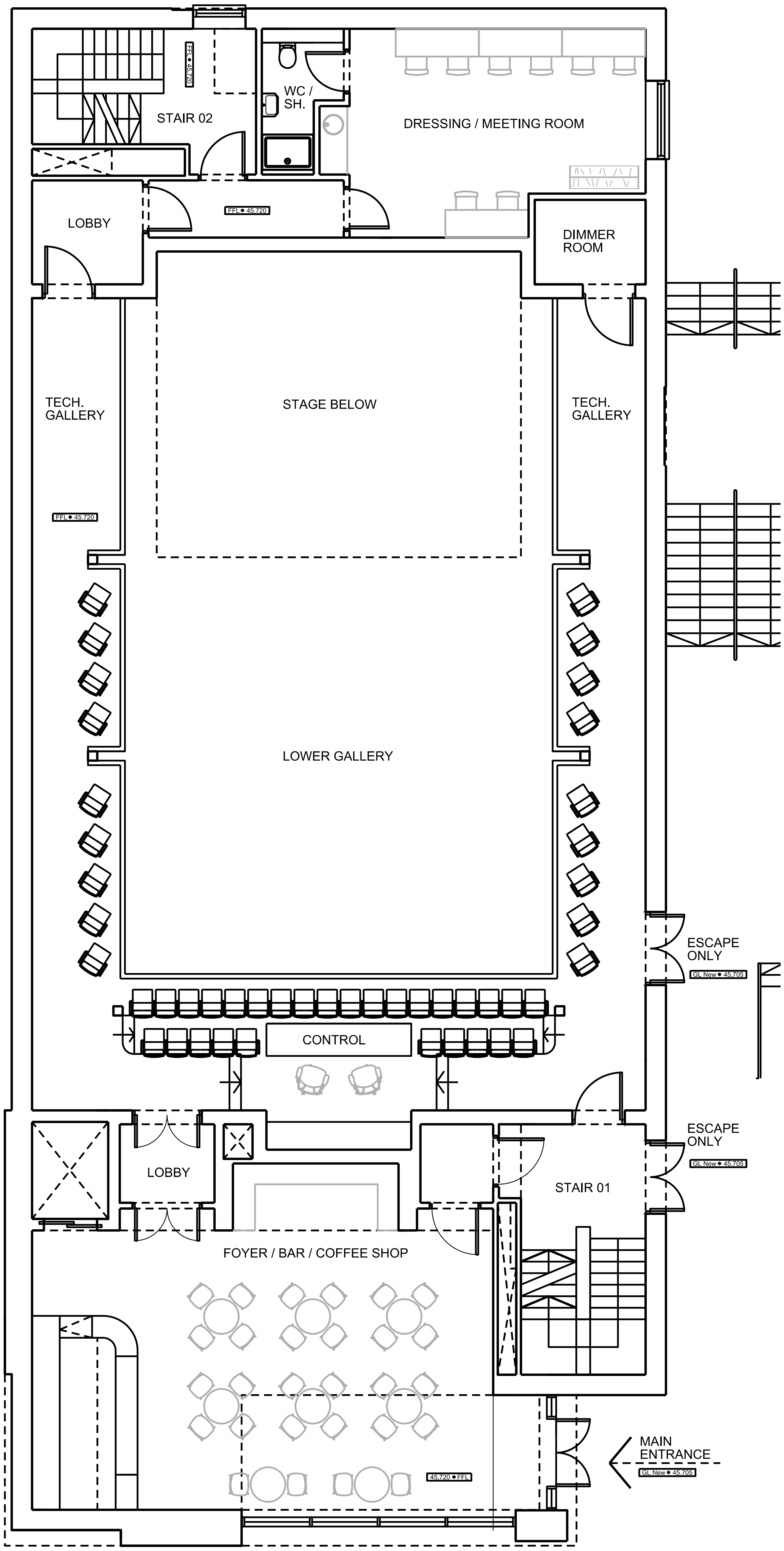
+52.010 FFL Second floor
+48.950 FFL First floor foyer
+45.720 FFL Upper ground floor foyer
+42.820 FFL Lower ground floor
CYPRUS CENTRE


CYPRUS CENTRE
ARTS
+52.010 FFL Second floor
+48.950 FFL First floor foyer
+45.720 FFL Upper ground floor foyer
+42.820 FFL Lower ground floor


STAIR 02
FFL 51.560
51.880
FLAT ROOF (EPDM MEMBRANE)
- EXTERNAL PLANT, SMOKE VENTS.
ALLOW FOR FALL ARREST SYSTEM
& EDPM WALKWAY PADS ALONG
ACCESS ROUTE. PHOTOVOLTAICS
ON HIGHER ROOF.
ROOF DRAINAGE ETC. TO BE
RESOLVED AT NEXT STAGE
CHANGING PLACES WC
ACC. DRESSING ROOM
SMOKE VENT
SMOKE VENT
OFFICE
SLIDING GLAZED POCKET DOOR
ROOFLIT DANCE / REHEARSAL STUDIO
FFL 52.010
STORE
WATER TANK
LOCKERS
STORE
CHANGING
BREAK-OUT
FFL 52.010
STAIR 01
LIFT
WC
MEETING ROOM



PITCHED ROOF PROFILE
PITCHED ROOF PROFILE
WITH ROOFLIGHTS
MEETING ROOM
BREAK-OUT
DANCE STUDIO
ROOFTOP PLANT
SMOKE VENTS
FOYER
FOYER /
BAR
CONTROL
AUDIENCE GALLERIES
TECHNICAL GALLERIES
DRESSING /
MEETING
ROOMS
CYPRUS ROAD
FEMALE WC
BOX
STAGE
STORE
CAR PARK
UNDER-SEAT PLENUM


STAIR 02
WC / SH.
DRESSING / MEETING ROOM
LOBBY
DIMMER ROOM
TECH. GALLERY
STAGE BELOW
TECH. GALLERY
LOWER GALLERY
ESCAPE ONLY
CONTROL
LOBBY
STAIR 01
ESCAPE ONLY
FOYER / BAR / COFFEE SHOP
MAIN ENTRANCE

APPENDIX B

Source-Pathway-Receptor Ground Models

APPENDIX B – SOURCE PATHWAY RECEPTOR MODEL PRIOR TO REMEDIATION WORKS

Updated Source-Pathway-Receptor Model

Potential On-Site Contaminant Sources	Potential Pathways	Potential Receptors	Pathway Complete	Risk Level Classification
Elevated PAH compounds and asbestos in Made Ground beneath the floors of the current structure. ***Insignificant ground gas and volatile contaminants identified.***	Dermal/Direct Contact	Current Site Users (Disused Club)	N	
	Direct Ingestion		N	
	Direct Inhalation		N	
	Inhalation of Radon Gas		N	
	Inhalation of Wind Blown Dust		N	
	Vapour Migration		N	
	Gas Migration		N	
	Dermal/Direct Contact	Future Site Users (Place of Worship (Applied - Residential without Plant Uptake)	N	
	Direct Ingestion		N	
	Direct Inhalation		N	
	Inhalation of Radon Gas		N	
	Inhalation of Wind Blown Dust		N	
	Vapour Migration		N	
	Ground Gas Migration		N	
	Direct Contact	Service	N	
	Migration of Contaminants – Non-Aqueous Phased		N	
	Migration of Contaminants – Aqueous Phased		N	
	Migration of Contaminants – Non-Aqueous Phased	Adjacent Properties	N	
	Migration of Contaminants – Aqueous Phased		N	
	Vapour Migration		N	
	Inhalation of Wind Blown Dust	Ecological Impacts	N	
	Migration of Contaminants – Non-Aqueous Phased		N	
	Migration of Contaminants – Aqueous Phased		N	
	Migration of Contaminants from site – Non-Aqueous Phased	Controlled groundwater	N	
	Migration of Contaminants from site – Aqueous Phased		N	
	Migration of Contaminants – Non-Aqueous Phased	Surface Waters	N	
	Migration of Contaminants – Aqueous Phased		N	

APPENDIX C

Remediation Options Matrix

Remediation Option Applicability Matrix: Organic Substances

Remediation Option	Applicable Media	Applicable Substances						
		VOCs	Halogenated hydrocarbons	Non-halogenated hydrocarbons	PAHs	PCBs	Dioxins + Furans	Pesticides + herbicides
Civil Engineering Methods								
Containment - Cover systems	S	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Containment - Hydraulic barriers	W	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Containment - In-ground barriers	S, W	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Excavation and Disposal	S	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Biological Methods								
Natural Attenuation	W	Yes	Yes	Yes	Yes	No	No	Yes
Biopiles	S	Yes	No	Yes	Yes	No	No	Yes
Bioventing	S	Yes	Yes	Yes	Yes	No	No	No
Biosparging	S, W	Yes	Yes	Yes	Yes	No	No	Yes
Landfarming	S	Yes	No	Yes	Yes	No	No	Yes
Slurry phase biotreatment	S	Yes	Yes	Yes	Yes	No	?	Yes
Windrow turning	S	Yes	No	Yes	Yes	No	No	Yes
Chemical Methods								
Chemical oxidation	S, W	Yes	Yes	Yes	Yes	No	No	Yes
Chemical dehalogenation	S	Yes	Yes	Yes	No	No	Yes	No
Soil flushing	S	Yes	Yes	Yes	Yes	No	No	No
Solvent extraction	S	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Surface amendments	S	No	No	No	No	No	No	No
Physical Methods								
Dual Phase SVE	S, W	Yes	Yes	Yes	No	No	No	No
Air sparging	W	Yes	Yes	Yes	No	No	No	No
Soil vapour extraction (SVE)	S	Yes	Yes	Yes	No	No	No	No
Permeable reactive barriers (PRBs)	W	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Soil washing	S	No	Yes	Yes	Yes	Yes	No	Yes
Stabilisation and Solidification Methods								
Hydraulic binders (e.g., cement)	S	No	No	?	Yes	Yes	Yes	?
Vitrification	S	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Thermal Methods								
Incineration	S	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Thermal desorption	S	Yes	Yes	Yes	Yes	Yes	No	Yes

Yes (green)	Most Suitable Method
Yes	Potentially applicable
No	Not applicable
?	A pre-treatment step may be necessary prior to the method being suitable
S	Soils, made ground and sediments
W	Groundwater and surface water

Remediation Option Applicability Matrix: Inorganic Substances

Remediation Option	Applicable Media	Applicable Substances				
		Heavy metals	Non-metals	Asbestos	Cyanides	Explosives
Civil Engineering Methods						
Containment - Cover systems	S	Yes	Yes	Yes	Yes	Yes
Containment - Hydraulic barriers	W	Yes	Yes	Yes	Yes	Yes
Containment - In-ground barriers	S, W	Yes	Yes	Yes	Yes	Yes
Excavation and Disposal	S	Yes	Yes	Yes	Yes	Yes
Biological Methods						
Natural Attenuation	W	Yes	Yes	No	No	Yes
Biopiles	S	No	No	No	No	Yes
Bioventing	S	No	No	No	No	No
Biosparging	S, W	No	No	No	No	No
Landfarming	S	No	No	No	No	Yes
Slurry phase biotreatment	S	No	No	No	Yes	Yes
Windrow turning	S	No	No	No	No	Yes
Chemical Methods						
Chemical oxidation	S, W	No	Yes	No	No	No
Chemical dehalogenation	S	No	No	No	No	No
Soil flushing	S	Yes	No	No	No	No
Solvent extraction	S	No	No	No	No	Yes
Surface amendments	S	Yes	Yes	No	No	No
Physical Methods						
Dual Phase SVE	S, W	No	Yes	No	No	No
Air sparging	W	No	No	No	No	No
Soil vapour extraction (SVE)	S	Yes	No	No	No	No
Permeable reactive barriers (PRBs)	W	No	No	No	No	Yes
Soil washing	S	Yes	Yes	No	No	No
Stabilisation and Solidification Methods						
Hydraulic binders (e.g., cement)	S	Yes	Yes	Yes	?	No
Vitrification	S	Yes	Yes	Yes	Yes	Yes
Thermal Methods						
Incineration	S	Yes	Yes	Yes	Yes	Yes
Thermal desorption	S	Yes	No	No	Yes	No

Yes (green)	Most Suitable Method
Yes	Potentially applicable
No (red)	Not applicable
? (blue)	A pre-treatment step may be necessary prior to the method being suitable
S	Soils, made ground and sediments
W	Groundwater and surface water

PADDOCK GEO ENGINEERING

CLIENT:	Burgess Hill Town Council
PROJECT No:	P18-193rms
PROJECT TITLE:	Burgess Hill Community Entertainment and Events Centre

APPENDIX D

Laboratory Chemical Contamination Test Certificates

Matt Paddock
Paddock Geo Engineering
14 Burns Road
Bletchley
Milton Keynes
MK3 5AL

t: 01908 271366

e: Paddock Engineering

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 18-21194

Project / Site name:	Burgess Hill Community Entertainment and Events Centre, Cyprus Road, RH15	**Samples received on:**	03/12/2018
Your job number:	P18-193 S01	**Samples instructed on:**	05/12/2018
Your order number:	P18-193	**Analysis completed by:**	18/12/2018
Report Issue Number:	1	**Report issued on:**	18/12/2018
Samples Analysed:	7 soil samples		

Signed

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Analytical Report Number: 18-21194

Project / Site name: Burgess Hill Community Entertainment and Events Centre, Cyprus Road, RH15
Your Order No: P18-193

Lab Sample Number				1107899	1107900	1107901	1107902	1107903
Sample Reference				BH1	BH1	BH1	BH1	BH2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70	3.00	6.50	12.50	22.45
Date Sampled				26/11/2018	26/11/2018	26/11/2018	26/11/2018	26/11/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	22	13	11	16	12
Total mass of sample received	kg	0.001	NONE	1.1	0.50	0.48	0.60	1.1
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.7	9.1	9.1	9.7	9.2
Total Sulphate as SO_4	%	0.005	MCERTS	0.077	0.019	0.014	0.069	0.027
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.22	0.048	0.018	0.0021	0.015

Analytical Report Number: 18-21194

Project / Site name: Burgess Hill Community Entertainment and Events (
Your Order No: P18-193

Lab Sample Number				1107904	1107905			
Sample Reference				BH2	BH2			
Sample Number				None Supplied	None Supplied			
Depth (m)				5.45	9.50			
Date Sampled				26/11/2018	26/11/2018			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	11	11			
Total mass of sample received	kg	0.001	NONE	0.95	0.46			

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9.2	9.2			
Total Sulphate as SO_4	%	0.005	MCERTS	0.021	0.016			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.036	0.015			

Analytical Report Number : 18-21194

Project / Site name: Burgess Hill Community Entertainment and Events Centre, Cyprus Road, RH15

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1107899	BH1	None Supplied	0.70	Grey clay and sand with gravel.
1107900	BH1	None Supplied	3.00	Brown clay and sand with gravel.
1107901	BH1	None Supplied	6.50	Brown clay and sand with gravel.
1107902	BH1	None Supplied	12.50	Brown clay and sand with gravel.
1107903	BH2	None Supplied	22.45	Brown clay and sand with gravel.
1107904	BH2	None Supplied	5.45	Brown clay and sand with gravel.
1107905	BH2	None Supplied	9.50	Grey clay and sand with gravel.

Analytical Report Number : 18-21194

Project / Site name: Burgess Hill Community Entertainment and Events Centre, Cyprus Road, RH15

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L038	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 18-21364

Replaces Analytical Report Number : 18-21364, issue no. 1

Project / Site name:	Burgess Hill Community Entertainment Centre, Cyprus Road, RH15	**Samples received on:**	03/12/2018
Your job number:	P18-193	**Samples instructed on:**	03/12/2018
Your order number:		**Analysis completed by:**	19/12/2018
Report Issue Number:	2	**Report issued on:**	19/12/2018
Samples Analysed:	4 soil samples		

Signed: ____

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Analytical Report Number: 18-21364

Project / Site name: Burgess Hill Community Entertainment Centre, Cyprus Road, RH15

Lab Sample Number				1108945	1108946	1108947	1108948	
Sample Reference				TP1A	TP2A	TP2A	TP4	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				0.70	0.40	0.90	0.80	
Date Sampled				26/11/2018	26/11/2018	26/11/2018	26/11/2018	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	8.4	9.9	19	21	
Total mass of sample received	kg	0.001	NONE	0.50	0.49	0.54	0.45	
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile	Chrysotile	Chrysotile	-	
Asbestos in Soil	Type	N/A	ISO 17025	Detected	Detected	Detected	Not-detected	
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	< 0.001	0.060	0.005	-	
Asbestos Quantification Total	%	0.001	ISO 17025	< 0.001	0.060	0.005	-	
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	9.8	10.0	8.0	8.5	
Total Sulphate as SO_4	mg/kg	50	MCERTS	2500	1900	530	620	
Loss on Ignition @ 450°C	%	0.2	MCERTS	1.1	1.7	4.0	3.3	
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.53	
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	1.6	
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.31	
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	1.2	
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.42	0.76	15	
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.13	0.30	4.6	
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	1.5	2.3	31	
Pyrene	mg/kg	0.05	MCERTS	< 0.05	1.4	2.0	25	
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.82	1.5	16	
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.70	1.2	11	
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	1.1	1.7	15	
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.40	0.86	7.3	
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.87	1.4	13	
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.49	0.85	6.3	
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	1.7	
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.54	0.99	6.8	
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	8.29	13.8	157	
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	8.0	4.5	19	9.9	
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.40	0.39	1.2	0.99	
Boron (water soluble)	mg/kg	0.2	MCERTS	2.3	2.9	2.7	2.5	
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	17	11	25	25	
Copper (aqua regia extractable)	mg/kg	1	MCERTS	20	12	38	29	
Lead (aqua regia extractable)	mg/kg	1	MCERTS	32	29	150	68	
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	14	8.0	17	20	
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	2.2	1.5	
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	34	22	41	38	
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	46	41	150	110	
Petroleum Hydrocarbons								
TPH C10 - C40	mg/kg	10	MCERTS	< 10	97	110	310	

Analytical Report Number: **18-21364**
Project / Site name: **Burgess Hill Community Entertainment Centre, Cyprus Road, RH15**
Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1108945	TP1A	0.70	106	Loose Fibres	**Chrysotile**	< 0.001	**< 0.001**
1108946	TP2A	0.40	152	Loose Fibres & Hard/Cement Type Material	**Chrysotile**	0.060	**0.060**
1108947	TP2A	0.90	123	Loose Fibres	**Chrysotile**	0.005	**0.005**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Analytical Report Number : 18-21364

Project / Site name: Burgess Hill Community Entertainment Centre, Cyprus Road, RH15

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1108945	TP1A	None Supplied	0.70	Brown sand with rubble and brick.
1108946	TP2A	None Supplied	0.40	Light brown sand with gravel.
1108947	TP2A	None Supplied	0.90	Brown clay and sand with gravel.
1108948	TP4	None Supplied	0.80	Light brown clay and sand with brick.

Analytical Report Number : 18-21364

Project / Site name: Burgess Hill Community Entertainment Centre, Cyprus Road, RH15

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L047-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 18-21367

Project / Site name:	Burgess Hill Community Entertainment Centre, Cyprus Road RH15	**Samples received on:**	03/12/2018
Your job number:	P18-193 S01	**Samples instructed on:**	03/12/2018
Your order number:	P18-193	**Analysis completed by:**	17/12/2018
Report Issue Number:	1	**Report issued on:**	17/12/2018
Samples Analysed:	2 10:1 WAC samples		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Waste Acceptance Criteria Analytical Results

Report No:	**18-21367**						
					Client:	**PADDOCK**	
Location	**urgess Hill Community Entertainment Centre, Cyprus Road RH1**						
Lab Reference (Sample Number)	1108967 / 1108968				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	26/11/2018				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	TP1B+BH2						
Depth (m)	1.00						
Solid Waste Analysis							
TOC (%)**	0.4				3%	5%	6%
Loss on Ignition (%) **	-				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg)	20				500	--	--
Total PAH (WAC-17) (mg/kg)	4.6				100	--	--
pH (units)**	-				--	>6	--
Acid Neutralisation Capacity (mol / kg)	-				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.0067			0.0571	0.5	2	25
Barium *	0.0071			0.0612	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0039			0.033	0.5	10	70
Copper *	0.0043			0.037	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	0.0019			0.0165	0.5	10	30
Nickel *	0.0014			0.012	0.4	10	40
Lead *	0.0030			0.026	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0018			0.015	4	50	200
Chloride *	1.9			16	800	4000	25000
Fluoride	1.6			14	10	150	500
Sulphate *	13			110	1000	20000	50000
TDS*	82			710	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	2.96			25.4	500	800	1000
Leach Test Information							
Stone Content (%)	17						
Sample Mass (kg)	0.80						
Dry Matter (%)	88						
Moisture (%)	12						

Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation ** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

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Waste Acceptance Criteria Analytical Results

Report No:	**18-21367**						
					Client:	**PADDOCK**	
Location	**urgess Hill Community Entertainment Centre, Cyprus Road RH1**						
Lab Reference (Sample Number)	1108969 / 1108970				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	26/11/2018				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	TP3+BH1						
Depth (m)	1.00						
Solid Waste Analysis							
TOC (%)**	0.5				3%	5%	6%
Loss on Ignition (%) **	-				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg)	47				500	--	--
Total PAH (WAC-17) (mg/kg)	8.2				100	--	--
pH (units)**	-				--	>6	--
Acid Neutralisation Capacity (mol / kg)	-				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.0082			0.0720	0.5	2	25
Barium *	0.0067			0.0586	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.013			0.11	0.5	10	70
Copper *	0.0031			0.027	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	0.0015			0.0133	0.5	10	30
Nickel *	< 0.0003			< 0.0030	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	< 0.0004			< 0.0040	4	50	200
Chloride *	34			300	800	4000	25000
Fluoride	0.16			1.4	10	150	500
Sulphate *	39			340	1000	20000	50000
TDS*	160			1400	4000	60000	100000
Phenol Index (Monhydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	3.38			29.4	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	0.78						
Dry Matter (%)	85						
Moisture (%)	15						
Results are expressed on a dry weight basis, after correction for moisture content where applicable.					*= UKAS accredited (liquid eluate analysis only)		
Stated limits are for guidance only and i2 cannot be held responsible for any discrepencies with current legislation					** = MCERTS accrediited		

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Analytical Report Number : 18-21367

Project / Site name: Burgess Hill Community Entertainment Centre, Cyprus Road RH15

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1108967	TP1B+BH2	None Supplied	1.00	Brown clay and sand with gravel and stones.
1108969	TP3+BH1	None Supplied	1.00	Brown clay and sand with gravel.

Analytical Report Number : 18-21367

Project / Site name: Burgess Hill Community Entertainment Centre, Cyprus Road RH15

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270. MCERTS accredited except Coronene.	L064-PL	D	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	ISO 17025
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 19-64467

Project / Site name:	Burgess Hill Community Centre, Cyprus Road, RH15 8DX	**Samples received on:**	04/10/2019
Your job number:	P18-193 G02	**Samples instructed on:**	04/10/2019
Your order number:	P18-193	**Analysis completed by:**	15/10/2019
Report Issue Number:	1	**Report issued on:**	15/10/2019
Samples Analysed:	12 soil samples		

Signed: Karoline Marek

Karolina Marek
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 19-64467

Project / Site name: Burgess Hill Community Centre, Cyprus Road, RH15 8DX
Your Order No: P18-193

Lab Sample Number				1323425	1323426	1323427	1323428	1323429
Sample Reference				WS01	WS02	WS03	WS04	WS05
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.80	1.10	1.00	1.80
Date Sampled				01/10/2019	01/10/2019	01/10/2019	01/10/2019	01/10/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	6.6	24	14	3.9	16
Total mass of sample received	kg	0.001	NONE	0.49	0.54	0.47	0.34	0.59
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.7	8.3	7.7	8.0	8.2
Total Sulphate as SO_4	mg/kg	50	MCERTS	5100	410	950	4800	360
Loss on Ignition @ 450°C	%	0.2	MCERTS	1.0	1.9	3.2	1.3	3.1
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.41	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.68	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.22	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.33	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.93	1.4	6.3	0.49
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.19	0.43	1.9	0.21
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	1.6	3.7	22	2.8
Pyrene	mg/kg	0.05	MCERTS	< 0.05	1.3	2.9	19	2.7
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.62	1.8	12	1.8
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.66	1.8	11	1.8
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.61	2.5	14	2.4
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.45	0.72	7.4	1.3
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.54	1.9	11	2.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.25	0.79	7.4	1.2
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.23	2.0	0.34
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.29	0.98	9.2	1.5
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	7.46	19.2	124	18.6
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.2	19	12	9.5	15
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.30	1.5	1.0	0.36	1.1
Boron (water soluble)	mg/kg	0.2	MCERTS	5.9	1.7	4.8	4.2	1.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.4	0.9	< 0.2	0.3
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	13	22	20	16	19
Copper (aqua regia extractable)	mg/kg	1	MCERTS	88	42	37	29	36
Lead (aqua regia extractable)	mg/kg	1	MCERTS	25	36	150	18	51
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	13	35	17	16	20
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	19	44	34	19	39
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	36	70	660	33	100
Petroleum Hydrocarbons								
TPH C10 - C40	mg/kg	10	MCERTS	40	< 10	320	140	110

Analytical Report Number: 19-64467

Project / Site name: Burgess Hill Community Centre, Cyprus Road, RH1!

Your Order No: P18-193

Lab Sample Number				1323430	1323431	1323432	1323433	1323434
Sample Reference				WS06	WS07	WS08	WS09	WS10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.40	1.10	0.80	0.30	1.00
Date Sampled				01/10/2019	02/10/2019	02/10/2019	02/10/2019	02/10/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	14	10	16	18	16
Total mass of sample received	kg	0.001	NONE	0.50	0.46	0.59	0.59	0.54
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.9	8.4	8.3	8.1	7.9
Total Sulphate as SO_4	mg/kg	50	MCERTS	1100	5000	420	800	550
Loss on Ignition @ 450°C	%	0.2	MCERTS	2.2	1.7	2.1	4.1	2.6
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.39	17	0.42
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	0.33	0.74	2.4	0.74
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	35	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.21	38	0.20
Phenanthrene	mg/kg	0.05	MCERTS	1.5	1.8	4.3	250	4.0
Anthracene	mg/kg	0.05	MCERTS	0.57	0.48	1.4	66	1.3
Fluoranthene	mg/kg	0.05	MCERTS	4.8	8.6	19	220	17
Pyrene	mg/kg	0.05	MCERTS	4.2	7.6	17	180	15
Benzo(a)anthracene	mg/kg	0.05	MCERTS	3.2	5.0	10	82	10
Chrysene	mg/kg	0.05	MCERTS	2.7	4.6	9.7	83	9.5
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	3.3	5.7	12	77	13
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.7	3.2	6.9	26	6.3
Benzo(a)pyrene	mg/kg	0.05	MCERTS	3.2	5.5	11	63	12
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.5	2.9	6.3	31	5.7
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.42	0.74	1.7	9.7	1.6
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.7	3.4	7.2	35	7.5
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	28.8	49.7	109	1210	104
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15	9.3	12	26	17
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.68	1.1	0.90	0.94	0.81
Boron (water soluble)	mg/kg	0.2	MCERTS	2.6	2.6	1.3	2.5	2.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19	28	24	21	20
Copper (aqua regia extractable)	mg/kg	1	MCERTS	35	35	82	52	33
Lead (aqua regia extractable)	mg/kg	1	MCERTS	79	37	73	150	120
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	13	15	19	18	20
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	29	32	31	33	36
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	160	45	75	87	73
Petroleum Hydrocarbons								
TPH C10 - C40	mg/kg	10	MCERTS	77	130	330	1700	340

Analytical Report Number: 19-64467

Project / Site name: Burgess Hill Community Centre, Cyprus Road, RH15
Your Order No: P18-193

Lab Sample Number				1323435	1323436			
Sample Reference				WS11	WS12			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.30	0.70			
Date Sampled				02/10/2019	02/10/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	7.0	16			
Total mass of sample received	kg	0.001	NONE	0.51	0.53			
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected			
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	9.5	8.3			
Total Sulphate as SO_4	mg/kg	50	MCERTS	2500	720			
Loss on Ignition @ 450°C	%	0.2	MCERTS	1.0	2.4			
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.20			
Phenanthrene	mg/kg	0.05	MCERTS	1.5	1.7			
Anthracene	mg/kg	0.05	MCERTS	0.42	0.29			
Fluoranthene	mg/kg	0.05	MCERTS	3.9	2.1			
Pyrene	mg/kg	0.05	MCERTS	3.6	1.7			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.8	0.83			
Chrysene	mg/kg	0.05	MCERTS	1.6	0.81			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	2.1	0.86			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.95	0.54			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.8	0.78			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.93	0.42			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.25	< 0.05			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.1	0.55			
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	20.0	10.8			
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	5.5	18			
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.28	0.93			
Boron (water soluble)	mg/kg	0.2	MCERTS	2.1	1.1			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15	25			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	17	29			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	17	76			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	9.2	17			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	17	36			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	19	63			
Petroleum Hydrocarbons								
TPH C10 - C40	mg/kg	10	MCERTS	100	53			

Analytical Report Number : 19-64467

Project / Site name: Burgess Hill Community Centre, Cyprus Road, RH15 8DX

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation.
The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1323425	WS01	None Supplied	0.20	Brown clay and sand with gravel and rubble.
1323426	WS02	None Supplied	0.80	Brown clay.
1323427	WS03	None Supplied	1.10	Brown clay and sand with gravel.
1323428	WS04	None Supplied	1.00	Light brown clay and sand with gravel.
1323429	WS05	None Supplied	1.80	Brown clay and sand with gravel.
1323430	WS06	None Supplied	1.40	Brown clay and sand with gravel and rubble.
1323431	WS07	None Supplied	1.10	Brown clay and sand with gravel and rubble.
1323432	WS08	None Supplied	0.80	Brown clay and sand with gravel and rubble.
1323433	WS09	None Supplied	0.30	Brown loam and clay with gravel and vegetation.
1323434	WS10	None Supplied	1.00	Brown loam and clay with gravel and vegetation.
1323435	WS11	None Supplied	0.30	Brown clay and sand with gravel and rubble.
1323436	WS12	None Supplied	0.70	Brown loam and clay with gravel and rubble.

Analytical Report Number : 19-64467

Project / Site name: Burgess Hill Community Centre, Cyprus Road, RH15 8DX

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L047-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

APPENDIX E

PGE In-House GACs

GENERIC HUMAN HEALTH SCREENING TOTAL SOIL CONCENTRATION ASSESSMENT CRITERIA (GAC)

DETERMINAND		RESIDENTIAL (mg/kg)		COMMERCIAL (mg/kg)
Chemical	**GAC Sources and units**	**With Home Grown produce**	**Without Home Grown produce**	
Asbestos Screen & ID*	-	Detected	Detected	Detected
Cyanide - Total	SNIFFER	53.25	53.25	53.25
Cyanide - Free	SNIFFER	53.25	53.25	53.25
Loss on Ignition @ 450°C	-	-	-	-
Sulphate (as SO_4) - Total	BRE****	2400	2400	2400
Sulphide	ICRCL	2500	2500	2500
Sulphur - Total	ICRCL	2500	2500	2500
Phenol (Total Monohydric)	CLEA	420	420	3200
pH	ICRCL	<5,>12	<5,>12	-
Metals and Metalloids (CLEA Metals)				
Arsenic	LQM S4UL	37	40	640
Beryllium	LQM S4UL	1.7	1.7	12
Cadmium	LQM S4UL	11	85	190
Chromium III	LQM S4UL	910	910	8600
Lead	DEFRA C4SL	190	310	2300
Mercury (Total)	LQM S4UL (Inorganic)	40	56	1100
Selenium	LQM S4UL	250	430	12000
Copper (phytotoxicity)	LQM S4UL	2400 (111)	7100	68000
Nickel	LQM S4UL	180	180	980
Zinc (phytotoxicity)	LQM S4UL	3700 (330)	40000	730000
Vanadium	LQM S4UL	410	1200	9000
Boron - Water Soluble	LQM S4UL	290	11000	240000
Total Petroleum Hydrocarbons**				
TPH (EC6-EC10) - PRO	LQM S4UL (2.5% SOM)	65	100	4800
TPH (EC10-EC21) - DRO	LQM S4UL (2.5% SOM)	300	600	23000
TPH (EC21-EC40) - Min. Oil	LQM S4UL (2.5% SOM)	1500	1900	28000
Total TPH (EC10-EC40)	LQM S4UL (2.5% SOM)	600	900	23000
Polycyclic Aromatic Hydrocarbons***				
Naphthalene	LQM S4UL (2.5% SOM)	5.6	5.6	460
Flourene	LQM S4UL (2.5% SOM)	400	3800	68000
Benzo[a]pyrene	LQM S4UL (2.5% SOM)	2.7	3.2	35
Dibenzo[a,h]anthracene	LQM S4UL (2.5% SOM)	0.28	0.32	3.6

Notes

The Generic Assessment Criteria (GAC) are based on CLEA Soil Guidance Values published values and CIEH/LQM S4CLs where available or ICRCL, DoE, BRE and HSE levels where necessary.
Where gaps remain GACs were calculated using the latest CLEA spreadsheet using DEFRA C4SL toxicology and physiochemical parameters from DEFRA SP1010.

*	Guidance level set at any fibre identification.
**	TPH 3 band is employed as a screening tool to instigate detailed speciated analysis to the TPHCWG methodology. Based on mean of fractions included
***	Testing based on USEPA Priority 16 compounds. GACs for four compounds and total PAH with published GACs only, used as a screening tool.
****	BRE SD1 - DS-1 Concrete Sulphate Design Class limit. Sulphate is not considered to pose a significant risk to human health under normal circumstances.

PADDOCK GEO ENGINEERING

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GENERIC HUMAN HEALTH HYDROCARBON TOTAL SOIL CONCENTRATION ASSESSMENT CRITERIA (GAC)

DETERMINAND		RESIDENTIAL (mg/kg)		COMMERCIAL (mg/kg)
Chemical	**GAC Sources and units**	**With Home Grown produce**	**Without Home Grown produce**	
TPH CWG				
Aliphatic EC 5-6	LQM S4UL (2.5% SOM)	78	78	5900
Aliphatic EC >6-8	LQM S4UL (2.5% SOM)	230	230	17000
Aliphatic EC >8-10	LQM S4UL (2.5% SOM)	65	65	4800
Aliphatic EC >10-12	LQM S4UL (2.5% SOM)	330	330	23000
Aliphatic EC >12-16	LQM S4UL (2.5% SOM)	2400	2400	82000
Aliphatic EC >16-35	LQM S4UL (2.5% SOM)	92000	92000	1700000
Aliphatic EC >35-44	LQM S4UL (2.5% SOM)	92000	92000	1700000
Aromatic EC 5-7 (Benzene)	LQM S4UL (2.5% SOM)	140	690	46000
Aromatic EC >7-8 (Toluene)	LQM S4UL (2.5% SOM)	290	1800	110000
Aromatic EC >8-10	LQM S4UL (2.5% SOM)	83	110	8100
Aromatic EC >10-12	LQM S4UL (2.5% SOM)	180	590	28000
Aromatic EC >12-16	LQM S4UL (2.5% SOM)	330	2300	37000
Aromatic EC >16-21	LQM S4UL (2.5% SOM)	540	1900	28000
Aromatic EC >21-35	LQM S4UL (2.5% SOM)	1500	1900	28000
Aromatic EC >35-44	LQM S4UL (2.5% SOM)	1500	1900	28000
Aliphatic and Aromatic EC >44	LQM S4UL (2.5% SOM)	1500	1900	28000
Polycyclic Aromatic Hydrocarbons				
Acenaphthene	LQM S4UL (2.5% SOM)	510	4700	97000
Acenaphthylene	LQM S4UL (2.5% SOM)	420	4600	97000
Anthracene	LQM S4UL (2.5% SOM)	5400	35000	540000
Benzo[a]anthracene	LQM S4UL (2.5% SOM)	11	14	170
Benzo[a]pyrene	LQM S4UL (2.5% SOM)	2.7	3.2	35
Benzo[b]fluoranthene	LQM S4UL (2.5% SOM)	3.3	4	44
Benzo[ghi]perylene	LQM S4UL (2.5% SOM)	340	360	4000
Benzo[k]fluoranthene	LQM S4UL (2.5% SOM)	93	110	1200
Chrysene	LQM S4UL (2.5% SOM)	22	31	350
Dibenzo[ah]anthracene	LQM S4UL (2.5% SOM)	0.28	0.32	3.6
Fluoranthene	LQM S4UL (2.5% SOM)	560	1600	23000
Fluorene	LQM S4UL (2.5% SOM)	400	3800	68000
Indeno[123-cd]pyrene	LQM S4UL (2.5% SOM)	36	46	510
Naphthalene	LQM S4UL (2.5% SOM)	5.6	5.6	460
Phenanthrene	LQM S4UL (2.5% SOM)	220	1500	22000
Pyrene	LQM S4UL (2.5% SOM)	1200	3800	54000
Coal Tar (BaP as marker)	LQM S4UL (2.5% SOM)	0.98	1.2	15

Notes
The Generic Assessment Criteria (GAC) are based on CIEH/LQM S4ULs.

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