PHASE 1 PRELIMINARY RISK ASSESSMENT

Of

THE DIORAMA,
17-19 PARK SQUARE EAST
LONDON
NW1 4LH

For

THE DIORAMA ESTATES LIMITED

Giving our all

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APPROVAL & DISTRIBUTION SHEET

PROJECT DETAILS	
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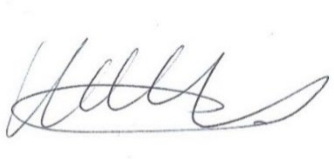

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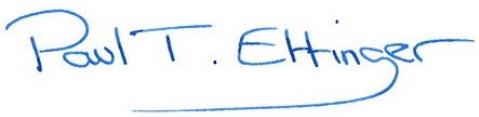

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FOREWORD

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1. INTRODUCTION AND BACKGROUND

CET Infrastructure (CET) was instructed on 3rd October 2019 by The Diorama Estates Limited to undertake a Phase 1 Preliminary Risk Assessment (PRA) of a study site located at The Diorama, 17 – 19 Park Square East, London, NW1 4LH, where a redevelopment is proposed to reinstate the residential buildings on the site, enhance the commercial space and construct an extension to the existing basement.

Assessment of the risks that may be associated with potentially contaminated land are generally undertaken on a phased or tiered basis, in accordance with current UK policy and technical guidance given in Contaminated Land Publication CLR11 "Model Procedures for the Management of Land Contamination" (2004) and British Standard BS10175 "Investigation of Potentially Contaminated Sites – Code of Practice" (A1:2013) as well as other relevant documents. The relevant phases of risk assessment are as follows:

- Development of a Conceptual Model that identifies potential source-pathway-receptor linkages (pollutant linkages) based initially on a consideration of desk-based and site reconnaissance information on the characteristics of the site and its environmental setting;
- Risk estimation and evaluation using generic assessment criteria. This allows refinement of the Conceptual Model based on information on the condition of the land (site investigation data) and involves comparison between observed concentrations of contaminants in environmental media against relevant and applicable generic assessment (or screening) criteria; and
- Risk estimation and evaluation using site specific assessment criteria. This involves further refinement of the Conceptual Model based on more detailed, site specific information on the condition of the land, and the use of relevant and applicable exposure models and site-specific assumptions to estimate risks.

Preliminary Risk Assessment is a qualitative judgement about the potential human health and environmental risks that may be related to a site and represents the first of the three phases outlined above.

This PRA report is based upon a defined programme of work and terms and conditions agreed with the Client. In preparing this report, all reasonable skill and care has been taken, accounting for project objectives, agreed scope of work and prevailing site conditions. Construction Testing Solutions Limited trading as CET Infrastructure accepts no liability to any parties whatsoever, following the issue of this report, for any matters arising outside the agreed scope of the work. It should be noted that this report is issued in confidence to the Client and that CET Infrastructure has no responsibility to any third parties to whom this report may be circulated, in part or in full, and any such parties cannot rely on the contents of the report. Unless specifically

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2. OBJECTIVES

The objectives of this study were to:

- Establish the historical and current uses of the subject site and adjacent land, including any areas located within a 250m radius of the subject site that have been used for landfill disposal purposes;
- Determine the environmental setting of the land as characterised by:

  i. Geology;
  ii. Hydrogeology;
  iii. Hydrology;
  iv. Licensed waste management activities;
  v. Pollution controls and authorisations;
  vi. Historical pollution incidents;
  vii. Radon hazards; and
  viii. Ecosystem designations.

- Comment on the potential for contamination of the soil and water environment in contact with the subject site arising from the use of the site, surrounding land or as the result of other factors; and
- Identify the potential human health and environmental risks that may be associated with the subject site considering past, current and planned future uses of the land and its environmental setting.

3. SOURCES OF INFORMATION

In preparing this report, CET Infrastructure has relied upon the sources of information set out below:

Report Ref:	Document Reference	Prepared by
1	*Envirocheck Report (Ref: 220971989_1_1):* • *The Envirocheck Main Legend Maps;* • *Ordnance Survey Historical Maps;* • *The Envirocheck Report;* • *The Envirocheck Flood Map;* • *The Envirocheck Groundwater Vulnerability Map; and* • *The Envirocheck Sensitive Land Uses Map.*	Landmark Information Group
2	Geology of Britain Viewer	British Geological Survey
3	Site reconnaissance carried out on 10th October 2019	Mr Callum Dowd, Geotechnical Engineer – CET Infrastructure & Dr Marianne Brett, Environmental Scientist – CET Infrastructure

4. SITE DESCRIPTION AND SETTING

SITE LOCATION

The study site is located at The Diorama, 17 – 19 Park Square East, London, NW1 4LH. The area of investigation consists of a plot of land that is about 0.13Ha in area and centred on National Grid Reference TQ 28764 82284.

WALKOVER SURVEY

A CET Geotechnical Engineer conducted a site visit on 10th October 2019 during cloudy but dry conditions. The rear of the site was accessed from Albany Terrace and the front of the three properties from Park Square East, Marylebone, London, NW1 4LH (Plate A).

The site is adjacent to Park Square to the west and surrounded on all other sides by residential properties. Several manhole covers were recorded around the perimeter of the site, indicating the presence of underground services (Plate B).

An area of fly-tipped material (Plate C) was located in the east of the site adjacent to the buildings. This area also contained a large pipe with a wheel-controlled valve, this ran under the adjacent footpath from a brick structure on the site, suggesting a potential historical oven (Plate D).

The front of the properties all contained light wells (Plate E), in which, electrical services, pipes and air conditioning units were connected (Plate F).

London plane trees up to about 30m in height were recorded adjacent to the site boundary and bordering the adjacent park.

There were no visual or olfactory indications of contamination at the time of the survey.

Photographic plates of the site at the time of the walkover survey are included in Appendix A.

5. HISTORICAL MAP SURVEY

A review of relevant historical maps for the area surrounding the subject site has been undertaken and is summarised below. The historical maps mentioned in this report are included in Appendix B, and all distances are indicative values that are estimated and should not be relied upon.

Historic maps dated from 1869 to 1880 showed the site to have been occupied by a Baptist Chapel up until 1940 – 1951. By 1953 – 1954 the maps listed the building as "The Arthur Stanley Institute of Middlesex Hospital". Then, by 1966 – 1988 the site was shown as being the "Bedford College Annexe of the University of London". After 1988 the maps did not give a specific name to the buildings on the site.

The area surrounding the study site to a radius of about 250m comprised largely residential properties with parkland and related access roads. The "Holy Trinity Church" and "Portland Road Station" were located at about 50-100m to the south east. A building called the "Colosseum" was situated about 110m to the north of the study site with a drinking fountain situated about 75m to the south.

By the early 1950s the area to the east of the site from about 100m to 250m saw a change from residential to an area of works. By 2013 the area had seen redevelopment into "Regent's Place", a 13 acre, fully mixed-use campus.

A summary of potential sources of contamination of note are recorded in the historical maps of the area and are tabulated below. All distances have been estimated from the available maps and should not be relied upon for accuracy.

	Mapped as	Distance & direction	Earliest appearance	Last/latest appearance	Years mapped
Source	Portland Road Station	About 100m to the south east of the site	Map dated: 1869 - 1880	Present day	On going
Source	Royal National Orthopaedic Hospital	About 250m to the south	1896	Present day	On going
Source	National Dental Hospital	About 175m south east of the site	1896	Map dated: 1958 – 1975. According to online sources 1963	67
Source	St Saviour's Hospital	About 120m east of the site	1896	Map dated: 1958 – 1975. According to online sources 1962	66
Source	Regent's Park Station	About 175m south west of the site	1916	Present day	On going
Source	Engineering works – sheet metal and galvanising	About 240m to the east of the site	1953	Map dated: 1965 – 1971	18
Source	Engineering works gave way to the electric board depot	About 240m to the east of the site	Map dated: 1965 – 1971	2009	44
Source	Assorted works – undefined	About 240m to the east of the site	1953	2009	56
Source	Made ground on site	On site	Map dated: 1869 - 1880	Present day	On going

6. ENVIRONMENTAL SETTING

GEOLOGY

Reference to the publications of the British Geological Survey (BGS) indicates that the site is located on a bedrock of the London Clay Formation - clay, silt and sand. These sedimentary rocks are marine in origin. They are detrital and comprise coarse to fine-grained slurries of debris from the continental shelf flowing into a deep-sea environment, forming distinctively graded beds. Superficial deposits of the Lynch Hill Gravel Member - sand and gravel are shown to be located on the site. These sedimentary deposits are fluvial in origin and are detrital, ranging from coarse to fine-grained.

There are no BGS recorded mineral sites within 1km of the site.

There are low, very low or no hazards for collapsible, dissolution ground stability, running sand ground stability and potential for compressible ground stability hazards within 1km of the site, as stated by the British Geological Survey.

There are moderate, low and very low for shrinking or swelling of clay hazards with the closest moderate hazard potential recorded by the BGS to be about 44m to the south of the site.

There has been a single recorded Substantiated Pollution Incident Register entry listed within 1km of the site at a distance of 793m to the south east. Listed on 2nd August 2002 by the Environment Agency - Thames Region, North East Area as having a category 4 - no impact to water and land and a category 2 - significant incident to air, which was caused by inorganic chemicals: acids.

HYDROGEOLOGY

Groundwater vulnerability across the site is designated as “Secondary Superficial Aquifer - Medium Vulnerability” that is further described as “Unproductive Bedrock Aquifer, Productive Superficial Aquifer”. Additionally, there is the potential for groundwater flooding to occur at the surface of the site. However, there is the “potential for groundwater flooding of property situated below ground level” and to the south east of the site at about 169m.

There have been 18 licensed groundwater abstractions within 1km of the site with the closest being 354m to the west for the purpose of production of energy for electricity: heat pump from a ground water source.

HYDROLOGY

The nearest surface water feature as derived from Ordnance Survey (OS) data is reportedly located around 473m to the west of the site in Regents Park and is listed as a boating lake. The site is not listed as being affected by Flood Zone 3 of the Environment Agency (EA) flood map, " Flood Zone 3 shows areas of land with an annual probability of flooding of 1% (1 in 100) or greater from rivers, and 0.5% (1 in 200) or greater from the sea".

There have been no licensed surface water abstractions within 1km of the site.

There have been no recorded Substantiated Pollution Incident Register entries with significant impact to water within 1km of the site.

There have been two pollution incidents to controlled waters within 1km of the site. One was located 467m to the south of the site where a "Category 3 - Minor Incident" involving unknown chemicals, which occurred on 11th November 1998. The other, occurred 438m to the south east at Middlesex Hospital. This again involved unknown chemicals and occurred on 11th November 1989. This was listed as a "Category 3 - Minor Incident".

There have been no local authority pollution and prevention controls within 1km of the site.

WASTE MANAGEMENT ACTIVITIES

There are no historical landfill sites or Licensed Waste Management Facilities (Landfill Boundaries), waste treatment sites, waste transfer sites or waste disposal sites itemised within 1km of the site by the Envirocheck report. There is one Licensed Waste Management Facilitie (Location) listed within 1km of the site at 999m to the south of the subject site. The location is given as "mobile plant" for the operator "Morgan Sindall (infrastructure) Plc B) Vinci Construction Grans Projects", the licence for this was surrendered on 28th March 2018.

There are no areas of potentially infilled land (non-water) within 1km of the site. There are two areas of potentially infilled land (water) within 1km of the site, which are located 580m and 797m to the north. Both are listed as "Unknown Filled Ground (Pond, marsh, river, stream, dock etc)" in 1951.

CONTEMPORARY TRADE DIRECTORY ENTRIES

There are 891 Contemporary Trade Directory (CTD) entries registered within 1km of the site. The nearest active record is located 156m to the south of the site at 209, Great Portland Street, London, W1W 5AH as “Portland Hospital". The three nearest inactive are all recorded at 111m from the site. One to the north east at 32, Albany Street, London, NW1 4EA, “Oven Cleaning”. The remaining two listed to the south east of the site at Station Arcade, Great Portland Street, London, W1W 5PW “Fresh Collection Ltd”, a dry cleaner.

FUEL STATION ENTRIES

There are three fuel station entries within 1km of the site. The closest listed is 473m to the south east of the site as “Clipstone Street Service Station, 30, Clipstone Street, Marylebone, London, Inner London, W1W 5DQ”.

PERMITTED ACTIVITIES

No Integrated Pollution Controls (IPC) have been recorded within 1km of the site.

There have been no Integrated Pollution Prevention and Control (IPPC) authorisations recorded within 1km of the site.

There has been one major accident hazard sites (COMAH) recorded within 1km of the site at 993m to the south of the site at Total Oil Marine Plc, 33 Cavendish Square, London, W1M 9HF. This entry is listed as “lower tier” and the “record ceased to be supplied under COCMOAH regulations”.

No control of or notification of installations handling hazardous substances (NIHHS) has been recorded within 1km of the site.

RADON HAZARDS

The Envirocheck report indicates that the site is located in a lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level). The Envirocheck report also states that no radon protection measures are necessary in the construction of new dwellings or extensions.

This is reflected in the document titled “Radon in Homes in England 2016 Data Report” a PHE publication with the gateway number: 2016485, pages 13 to 14. This report summarises and presents radon measurements conducted for a total of 725 homes in the Greater London area, of these only 4 were recorded to be or above

action levels, three of which were in the Bromley area and a single record in the Croydon area, located about 19km to 20km from the site. Additionally, there are no radiogenic sources nearby and as described in *Scheib, C., et al. (Geological controls on radon potential in England. Proc. Geol. Assoc. (2013), http://dx.doi.org/10.1016/j.pgeola.2013.03.004)*, "Soils in the urban environment of the Greater London Authority area are notably low in uranium." Therefore, as there is not a radiogenic source of radon in the area there is no identifiable source-pathway-receptor pollutant linkage.

SENSITIVE LAND USES

There are no sensitive land use designations within 500m or 1km of the site.

REGISTERED RADIOACTIVE SUBSTANCES

There are 186 Registered Radioactive Substances within 1km of the site with the closest listed as being 279m to the southwest of the site at "HCA International Limited, 154 Harley Street, LONDON, W1G 7LJ" where the Environment Agency (Thames Region) issued a permit on 4th December 2009 under "S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1)", further processes were also permitted and described as "Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7)".

7. PRELIMINARY RISK ASSESSMENT

APPROACH

The typical technical approach to assessing potential human health and environmental risks associated with the condition of land relies on the consideration of the relationship between contaminants, pathways and receptors, as defined below.

Contaminant	A hazardous substance or agent that has the capacity to cause harm or other damage to a receptor.
Receptor	An entity (e.g. human being, water environment, flora and fauna etc.) that is vulnerable to the adverse effects of the contaminant.
Pathway	The means by or through which a contaminant comes into contact with, or otherwise affects, the receptor.

In the UK, this relationship is termed a "pollutant linkage". The Conceptual Model (CM) is a representation of the inter-relationship of all potential contaminants, pathways and receptors in a given land use scenario. The CM is therefore a screening tool that should clearly and transparently identify relevant pollutant linkages that may warrant further assessment, as well as providing justification for those that are considered unlikely to exist. It is important to recognise that, for a health or environmental risk to exist, all three elements of the relationship or linkage must be present. Thus:

- No contaminant » There can be no adverse effect on a receptor; and
- Nothing adversely affected by the contaminant » No harm or damage can arise.

It should be noted that even where both a contaminant and a receptor are identified, no harm or damage will occur if there is no pathway by or through which contact between the two can be established. It is also important to recognise that since contaminants, pathways and receptors can all change over time, the assessor must be precise about the time frame to which the risk assessment refers.

Consideration has been given to the potential for the subject site to be determined as "contaminated land" under Part 2A of the Environmental Protection Act 1990. Under Part 2A, Local Authorities have a duty to inspect sites from time to time to identify land that falls within a statutory definition of contaminated land, as assessed in the context of its current use and setting. Part 2A inspections are intended to focus primarily on

land that may present unacceptable health and environmental risks, but that cannot be regulated by planning controls or other enforceable mechanisms. It should be noted that it is not possible for land whose condition is assessed as being 'fit-for-purpose' under the planning regime to be identified as "contaminated land" under Part 2A.

The primary purpose of this report is to assess the potential for ground contamination derived at the subject site. Reference has also been made to off-site sources of contamination, such that if ground contamination is encountered during a subsequent site investigation a reasonable judgement as to its origin either on or off the site may be undertaken.

POTENTIAL SOURCES OF CONTAMINATION

There have been no potential sources of contamination identified on the site from the walk over survey observations. Reference to historical maps show that the same building has been present since 1869. However, due to unknown origin and composition of the Made Ground it is not possible to rule out the possibility of contaminants.

Potential off-site sources include hospitals, tube train stations and works areas, however all of these are situated over 100m from the site boundary and many have not existed for a number of years. The area where works were situated have also been redeveloped into a campus of offices, accommodation and recreational areas.

POTENTIAL RECEPTORS AND EXPOSURE PATHWAYS

The receptors normally considered in land contamination assessments are taken to include, but are not restricted to, those specified in the Statutory Guidance to Part 2A. In general, receptors may be grouped as follows: -

- Humans (on-site and off-site);
- Controlled waters (surface and groundwater close to or beneath the site); and
- Buildings and materials of construction on or under the site.

Humans

On-site human receptors include current users, members of the public accessing the site, construction and maintenance workers and future site users. Relevant exposure pathways could include:

- Ingestion of liquids, soils and soil-derived dusts;
- Inhalation of dusts, gases and vapours; and
- Dermal contact with liquids, soil matter and soil-derived dusts.

The proposed redevelopment is to reinstate the residential buildings on site, enhance the commercial space and an extension to the existing basement.

It is judged that, there is a low risk of current and future site users coming into direct contact with any potentially contaminated soils via the direct contact, ingestion and dust inhalation exposure pathways.

Any proposed risk is judged to be low to moderate to construction workers although appropriate personal protective equipment (PPE) and good health and hygiene practices should be observed.

Off-site human receptors include the occupiers of neighbouring sites and visitors, utility maintenance workers and the general public. Relevant exposure pathways could include:

- Ingestion of liquid discharges or soils, and soil-derived airborne dusts migrating from the subject site;
- Inhalation of soil-derived dusts and gases/vapours from the subject site;
- Dermal contact with liquid discharges, soils, and soil-derived dusts from the subject site.

It is judged that there is a low risk to off-site human receptors from dust generation during construction works and public rights of way around the proposed site. Appropriate dust and noise suppression measures should be implemented at the site regardless of possible contamination.

It is judged that there is a low risk to off-site human receptors coming into direct contact with any potentially contaminated soils via the direct contact, ingestion and dust inhalation exposure pathways due to the absence of significant current or historical on or off-site sources of contamination.

Controlled Waters

The site is located predominantly on a bedrock of the London Clay Formation - clay, silt and sand with superficial deposits of Lynch Hill Gravel Member - sand and gravel with a combined aquifer described as “unproductive bedrock aquifer, productive superficial aquifer” giving a combined classification as “secondary superficial aquifer - medium vulnerability” suggesting a medium combined vulnerability with a low pollutant speed.

The risk to controlled waters is judged to be low due to limited sources of both on and off-site current and historical sources of contamination.

Buildings & Services

The built environment is taken to include permanent and semi-permanent structures, such as houses, offices, commercial and industrial buildings, etc. and related services such as water supply pipes, drains, power and telecommunications cables. Buildings and service runs may also contain enclosed spaces where explosive, flammable or toxic gases and vapours may accumulate, presenting risks to both occupants and the buildings.

No potentially significant sources of contamination were identified during the walkover survey, there were limited on-site, and off-site historical sources of contamination identified in the historical review, and so the risk to buildings and services is deemed to be low.

CONCEPTUAL MODEL TABLES

The Conceptual Model (CM) table attached in Appendix C provides a tabular representation of the inter-relationship between potential contaminants, pathways and receptors on the site, taking into account the proposed end use and environmental setting of the site. It should be noted that the behaviour of different contaminants in the environment will depend, among other factors, on the chemical properties, and on the prevailing site-specific conditions that may allow, or preclude, the existence of a particular exposure pathway.

8. SUMMARY & RECOMMENDATIONS

SUMMARY

The study site comprises a plot of land located at The Diorama, 17 – 19 Park Square East, London, NW1 4LH, where it is proposed to reinstate the residential buildings on the site, enhance the commercial space and extend the existing basement. The site is underlain predominantly by the London Clay Formation - clay, silt and sand with superficial deposits of Lynch Hill Gravel Member - sand and gravel.

Based on the historical and current on-site/off-site land uses identified by this assessment, it is judged that there is generally a low risk to current users and low to moderate risk to construction workers being exposed to a range of organic and inorganic contaminants including heavy metals, vapours and dust. There is a low risk to future users due to limiting exposure pathways due to areas of hardstanding. Any residual risk to construction workers during the construction phase could be further ameliorated by using appropriate personal protective equipment (PPE) and good health and hygiene practices.

The risk to future site users and controlled waters is judged to be low as there are limited sources of off-site current/historical contamination.

RECOMMENDATIONS

Due to the unknown origins and composition of the Made Ground on the site and the proposed extension works to the basement, it would be considered prudent, whilst geotechnical investigation is underway to conduct further environmental assessment with soil analysis to confirm the ground conditions. Additionally, should the proposed end use of the site change to a more sensitive receptor, the risk assessments should be reviewed, and the site conceptual model updated.

FIGURES

Site Location Plan

INFRASTRUCTURE
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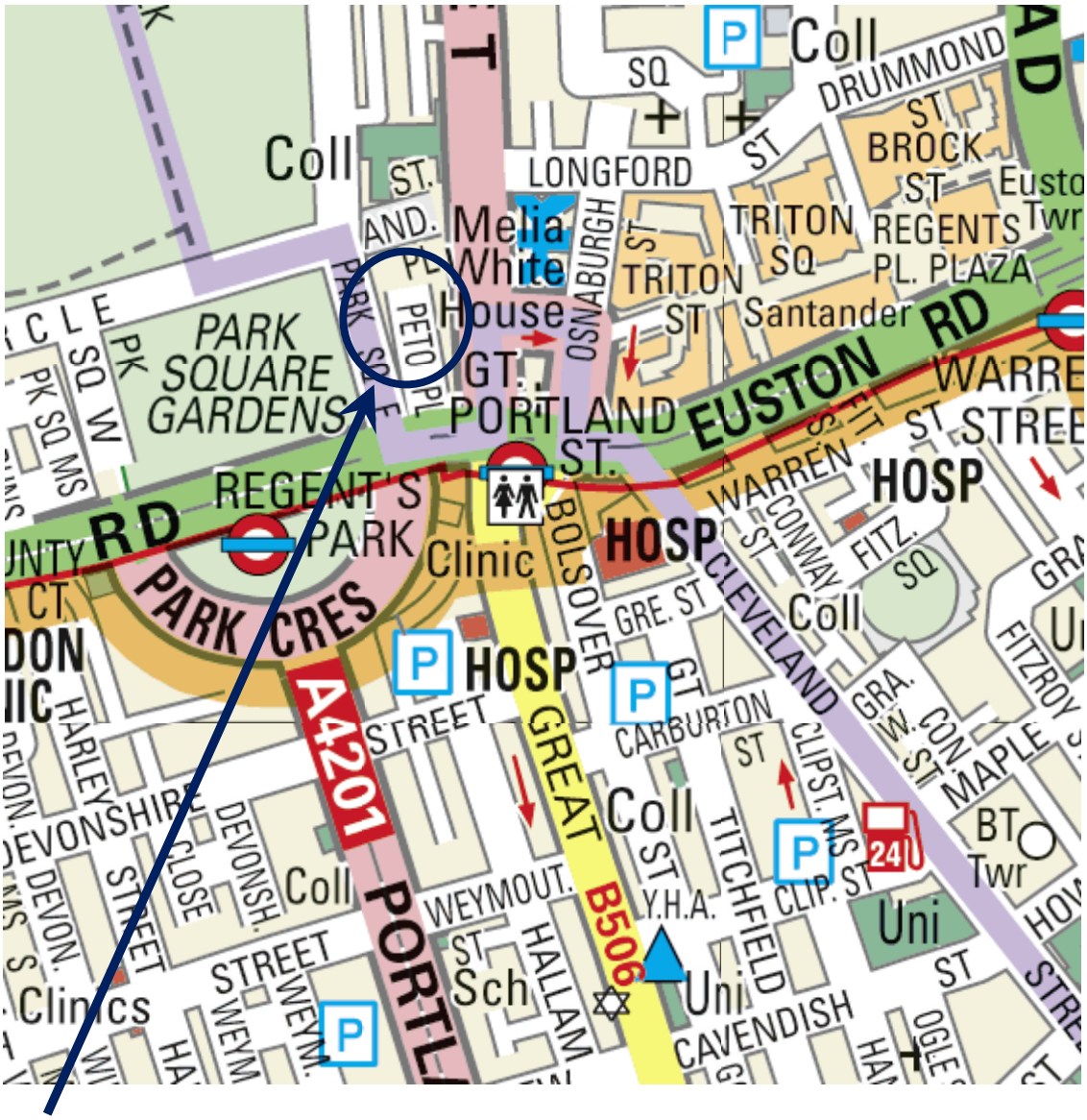
The Diorama, 17 – 19 Park Square East, London, NW1 4LH			Lead No. **1038915** Sheet 1 of 1
Created By: **KK**	Checked: **MM**	Approved: **PE**	Date: **November 2019**



SITE LOCATION PLAN

Scale: NTS

FIGURE 1

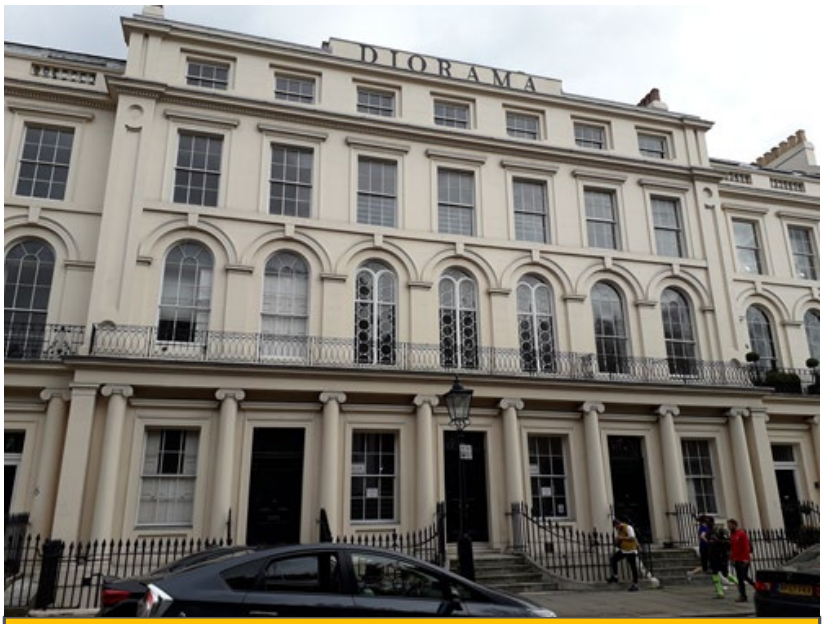
APPENDIX A

Photographic Plates

PHOTOGRAPHS

The Diorama, London

1038915



Photograph Plate A – The Diorama, London.

Photograph Plate B – Several manhole covers were recorded around the perimeter of the site, indicating the presence of underground services.

PHOTOGRAPHS

The Diorama, London
1038915

Photograph Plate C - Fly-tipped material.

Photograph Plate D - A large pipe with a wheel-controlled valve.

PHOTOGRAPHS

The Diorama, London
1038915

Photograph Plate E - The front of the property light well.

Photograph Plate F - Electrical services, pipes and air conditioning units.

APPENDIX B

Envirocheck Report including information

from environmental databases and historical maps

APPENDIX C

Conceptual Model Table

INFRASTRUCTURE
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The Diorama

Created By: Kathrine Kemsley | Checked: | Approved: Paul T. Ettinger

APPENDIX C - Conceptual Model Table

Source	Contaminants	Pathway	Receptor	Risk	Comments
On-site	• Possible contaminants in Made Ground due to unknown origin and composition.	• Ingestion of liquids, soils and soil-derived dusts; • Inhalation of dusts; • Dermal contact with liquids, soil matter and soil-derived dusts; and • Migration through porous surface geology.	Current and future users	Low	Low risk due to no significant current or historical on-site or off-site sources of contamination and limited exposure opportunities.
			Off-site users	Low	Low risk due to no significant current or historical on-site or off-site sources of contamination.
			Construction workers	Moderate	Moderate risk due to unknown origins and composition of Made Ground. However, no significant historical off-site sources of contamination were identified within 250m of the site. Good site practices and appropriate use of PPE could reduce this risk further.
			Controlled waters	Low	Low risk due to no significant current or historical on-site or off-site sources of contamination.
Off-site / Historical	• Heavy metals; • Hydrocarbons; • Inorganic / organic contaminants; and • Ground gas	• Migration through surface deposits and Made Ground; and • Discharge of runoff.	Controlled waters, buildings and services	Low	Low risk due to no significant current or historical on-site or off-site sources of contamination.
No local radon source identified	• Radon Gas	No pollutant linkage identified.		None	No radiogenic source of radon in the area and therefore there is no identified source-pathway-receptor pollutant linkage identified.