



Remediation Method Statement (RMS)

A11057

Kenavon Drive
Reading
RG1 3HS

Prepared for

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Quality Assurance

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1.0 INTRODUCTION

1.1 Background

This Remediation Method Statement (RMS) has been prepared by Omnia Environmental Consulting (OEC) following a series of environmental site investigations at the above site.

The site has been subject to a number of previous phases of site investigation with the following documents having been reviewed by OEC during the production of this report.

- Environmental Assessment, Forbury Retail Park, Kenavon Drive, Reading. Project reference 13-0258.01. Delta Simons Environmental Consultants (2013).
- Ground Investigation Interpretative Report, Kenavon Drive, Reading. Project reference 13-0258.01. Delta Simons Environmental Consultants (2013).
- Geotechnical and geoenvironmental interpretative report, Kenavon Drive Reading. Card Geotechnical Ltd (2016).
- Phase II Geoenvironmental Site Assessment, Kenavon Drive, Reading, RG1 3HS. Ref: A11057/2.0 (March 2019).

This RMS is based upon the findings of the above reports and it is therefore recommended that the RMS is read in association with these reports.

A single phase of investigation was undertaken by Delta Simons in 2013 prior to building demolition, and comprised the advancement of seventeen (17no.) dynamic sampler boreholes and five (5no.) cable percussive boreholes, the installation of shallow boreholes across the site with associated soil and groundwater sampling and follow on ground gas monitoring. Separate Environmental and Geotechnical reports were produced following this phase of investigation.

The reports identified elevated lead, PAH and localised TPH concentrations within near surface Made Ground, marginal exceedances of chromium and copper within groundwater and elevated ground gas concentrations.

Overall, the Delta Simons ground investigation considered that the site represented a low risk to receptors, with identified risks mitigated through capping layers in areas of landscaping, and basic ground gas protection measures. An asbestos survey for the buildings was recommended alongside discussion with the local water authority with regard to their requirements for pipework infrastructure.

A single phase of investigation was undertaken by Card Geotechnics Ltd in 2016 which comprised the advancement of eleven (11no.) window sample boreholes and five (5no.) cable percussive boreholes with associated soil and groundwater sampling and follow on ground gas monitoring. The Card Geotechnics investigation identified elevated concentrations of lead, asbestos, PAH and phytotoxic elements within near surface Made Ground and elevated concentrations of lead, mercury, cyanide and PAHs within groundwater and elevated ground gas concentrations.

The Card Geotechnics report generally considered the site to pose a low to medium risk to receptors, with identified risks mitigated through a barrier layer and possible localised remediation within a

contamination hotspot if within an area of permeable soft landscaping. Gas protection measures in line with CS-3 were proposed. Additional groundwater monitoring with analysis for free cyanide and as necessary if an elevated free cyanide result a DQRA also proposed pending on the results of additional monitoring.

OEC undertook a phase of ground investigation targeting areas not investigated during the previous site investigation works following the demolition of buildings on-site. The OEC investigation comprised the advancement of three (3no.) cable percussive boreholes, twenty-four (24no.) trial pits and four (4no.) trenches with associated soil, groundwater and surface water sampling and testing.

The investigation identified elevated concentrations of arsenic, beryllium, lead, asbestos and PAHs in near surface soils, marginal exceedances of cadmium, chromium and mercury in groundwater and elevated ground gas concentrations.

The OEC report considered that the areas investigated had the potential to present a significant risk to human health in areas of proposed soft landscaping, with asbestos fibres considered to have the potential to present a risk to both future site users and construction workers.

The report recommended that remedial works should be undertaken within areas of proposed soft landscaping with gas protection measures installed within all building footprints. The report recommended that remedial works should be set out within a standalone Remediation Method Statement (RMS).

A site location plan is presented in Appendix III Figure 1.

1.2 Report Objectives

The purpose of the Remediation Strategy is to identify and evaluate feasible remedial technologies and to validate the successful implementation of a site remediation programme to ensure the safe, cost effective and regulatory compliant re-development of the site.

This RMS is based on the proposed development layout presented in Figure 2.0. Should the proposed layout change this document should be revised, and the extent of risk mitigation measures reviewed.

1.3 Scope of Works

With regard to the proposed development of the site, the main aims of the remedial works are as follows:

- To provide a remediated site that is suitable for its proposed end use i.e. residential development;
- To provide a landform/ground surface which can accommodate the design;
- To ensure that construction/groundworkers are not put at an unacceptable short term risk during the remediation and/or redevelopment of the site; and,
- To satisfy the requirements of the regulatory authorities (i.e. the Local Planning Authority).

1.4 Proposed Development Plan

The proposed development is understood to comprise the construction of multi-storey residential apartment blocks.

The proposed layout is detailed within Figure 2.0, which is based on drawing F367-AL6086C – Kenavon Drive Stage 4 Landscape MP_16052019. It is understood that all areas of soft landscaping are communal with no private gardens present within the development.

1.5 Summary of Parties Involved

Table 1.1: Involved Parties

Name of Party	Function / Interest
Berkeley Homes (Western) Ltd	Developer
Omnia Environmental Consulting (OEC)	Geo-Environmental Consultant
Reading Borough Council (RBC)	Human Health Regulator / Local Planning Authority
The Environment Agency (EA)	Controlled Waters Regulator

1.6 Limitations

The limitations of this report are presented in Appendix I.

2.0 SITE SETTINGS

2.1 Site Details

Site Address	Kenavon Drive, Reading, Berkshire, RG1 3HS
National Grid Reference	472275, 173575
Site Area	2.8ha

All acronyms used within this report are defined in the Glossary presented in Appendix II.

A site location map is presented in Appendix III.

2.2 Current Site Use

At the time of the most recent ground investigation in January 2019, the area of investigation comprised an irregular plot of land approximately 240m in length and 125m in width located immediately south of Kenavon Drive, Reading. The site was formerly occupied by a retail park which included Homebase and Toys 'R' Us units with associated car parking and limited soft landscaping around the perimeter of the site. The northern boundaries were bounded by Kenavon Drive coinciding with wooden hoarding around the perimeter of the site. Forbury Road follows the western boundary of the site converging with Kenavon Drive to the north. The southern boundary of the site was denoted by a pedestrian footpath named 'Blake's Wharf' with the course of the River Kennet immediately beyond. Residential properties were to the east of the site.

The site was accessed via Kenavon Drive and at the time of the site investigation was used as a vehicular access for site demolition plant and groundworkers.

At the time of the investigation, the site was undergoing demolition activities and the former retail units were demolished to slab level. The site area was used for the storage of plant with portacabins serving as staff welfare and offices located close to the north-eastern boundary of the site.

2.3 Geology and Ground Conditions

Ground conditions as presented within the previous report are summarised below:

2.3.1 Ground Conditions Encountered

The previous reports indicate that the site was underlain by Made Ground, comprising hardstanding underlain by a variable sequence ranging from brown and grey gravelly fine to coarse SAND to a black fine to coarse sandy GRAVEL. Made Ground contained variable quantities of anthropogenic material comprising brick, concrete, and metal with occasional to frequent cobble sized gravels of brick and concrete to a maximum depth of 3.85m bgl.

Made Ground was underlain by superficial deposits comprising either Taplow Gravel Member (brownish grey, very gravelly fine to coarse SAND) or Alluvium (dark greyish brown slightly sandy, slightly gravelly CLAY) to a maximum depth of 4.00m bgl.

Superficial deposits were further underlain by bedrock of the Seaford & Newhaven Chalk Formations comprising a white Chalk with flints proven to a maximum depth of 40.00m bgl.

2.4 Hydrogeology and Hydrology

The previous reports indicated that the site is underlain by superficial deposits classified as Secondary (A) Aquifers and bedrock classified as a Principal Aquifer. The site is also located within a Groundwater Source Protection Zone 3 (SPZ3).

The previous reports did not identify any surface or potable water abstractions within 500m of the site.

The closest surface watercourse is the canalised River Kennet which bounds the site immediately to the south.

2.4.1 Groundwater

The previous reports indicated that groundwater was encountered at the following depths:

Table 2.1 Groundwater Encountered on site

Phase of Investigation	Location	Depth (mbgl)	Strata
CGL	WS1	4.7	Chalk
	WS3	4.0	Chalk
	WS5	5.3	Alluvium
	WS6	3.1	Taplow Gravel
	WS11	4.0	Chalk
	CP1	6.0	Chalk
	CP2	5.5	Alluvium
	CP3	3.0	Made Ground
		5.0	Alluvium
	CP4	5.8	Alluvium
	CP5	4.0	Chalk
DS	CP101	3.80	Chalk
	CP102	6.00	Chalk
	CP103	3.80	Chalk
	CP104	5.50	Alluvium
	CP105	4.70	Taplow Gravel
OEC	BH1001a	5.00	Chalk
	BH1002	4.50	Chalk
		8.00	Chalk
	BH1003	4.50	Chalk
	TT1004	3.00	Alluvium

Standing water was also encountered at depths ranging from during return monitoring visits between the depths ranging from 2.55 – 3.53m bgl within locations WS5, BH1001a, BH1002 and BH1003.

2.5 Summary of Contaminant Distribution

2.5.1 Tier I Risk Assessment Results

In order to provide a robust assessment of the risks posed to identified receptors results from all phases of investigation (Delta Simons, Card Geotechnics, and Omnia Environmental Consulting) have been reviewed for the below assessment:

A total of fifty-five (55no.) samples were collected over three phases of investigation and submitted for a Tier 1 risk assessment. The Tier 1 risk assessment determined that concentrations of the following determinants exceeded the screening criteria for a residential end use without homegrown produce and therefore had the potential to pose a significant risk to human health within areas of proposed soft landscaping.

- Asbestos;
- Heavy Metals (Arsenic, Beryllium, Lead);
- PAHs at location DS106; and,
- TPH in Made Ground at location DS106; and,
- TPH odour at depth (2.70-3.00m) at location DS108.

The Card Geotechnical report recommended localised remediation in the vicinity of WS8 due to elevated TPH and PAH concentrations in the near surface. Remediation, comprising localised removal of soils, was recommended at this location if the area was located beneath proposed soft landscaping. Following review of the Card Geotechnical laboratory data, it is considered that the implementation of a clean cover system in the near surface across this area will be sufficiently protective of the identified receptors given the limited concentrations encountered.

Elevated concentrations of carbon dioxide (CO₂) were detected during all phases of investigation with a Characteristic Situation 3 (CS-3) classification recommended for the site.

The previous reports concluded that soils beneath the site had the potential to present a significant risk to human health within areas of soft landscaping across the site based on a residential end use without homegrown produce across the site. Elevated concentrations of phytotoxic contaminants were also recorded across the site and were considered to have the potential to pose a risk to plants and vegetation.

Generally the site was considered to pose a low to medium risk to receptors, with identified risks to human health and future planting mitigated through the installation of a barrier layer within areas of proposed soft landscaping. The risks posed by ground gas would be mitigated through the adoption of gas protection measures suitable for a CS-3 classification within building footprints.

However, following the completion of controlled waters risk assessments from all three phases of investigation, the site was not considered to have the potential to present a significant risk to controlled waters and as such no groundwater remedial works were recommended.

2.5.2 Exposure Pathways

The main exposure pathway for Heavy Metals and PAHs is via dermal contact and ingestion. The main exposure pathway for asbestos fibres is through fibre inhalation and the main exposure pathway for TPH is via indoor vapour inhalation.

Given the location of elevated soil concentrations across the site, it was considered that active exposure pathways would remain post-development within areas of proposed soft landscaping and that the identified concentrations also had the potential to present a risk to potable water supply

infrastructure through permeation. The identified concentrations were also considered to have the potential to pose a risk to workers during the construction phase which would be mitigated by the completion of COSHH assessments for all activities taking place in the affected areas by the Principal Contractor to ensure the selection of suitably protective PPE.

2.6 Identified Development Constraints

The following potential development constraints have been identified:

- Elevated Heavy Metal, PAH, and Asbestos concentrations in near surface Made Ground across the site;
- Elevated TPH concentrations in the vicinity of WS8 and DS106; and,
- Elevated concentrations of CO₂ across the site.

Given the past industrial land use of the site, soil arisings are likely to be classified as a waste unless one of the following pieces of legislation is in place ahead of the commencement of works:

- A waste exemption;
- Environment Agency Position Statement; or,
- DoW CoP Materials Management Plan (MMP).

It is therefore considered that a Materials Management Plan (MMP) will need to be completed in accordance with DoW CoP, prior to the commencement of works on site if materials are to be reused. Once produced and signed off by the appropriate person (Qualified Person), this would allow the reuse of materials on site if there would otherwise be a requirement to import soils.

Based upon the information obtained, Table, 2.2 demonstrates that each of the potential pollutant linkages, based upon the contaminant-pathway-receptor model will need to be satisfactorily addressed by the anticipated remedial works across the site.

Table 2.2: Pollutant Linkage Assessment

Receptor	Potential Risk	Current Residual Risk	Mitigation
Human Health	Ingestion	YES	<u>Construction Phase</u> During the development phase, construction workers are likely to be in direct contact with impacted Made Ground across the site. It is therefore recommended that a risk assessment is undertaken for activities being undertaken within the affected areas by the Principal Contractor.
	Dermal contact		<u>Post-Development</u> Elevated concentrations of heavy metals, PAH, TPH and asbestos have been identified within near surface Made Ground across the site that are considered to have the potential to present a significant risk to human health in areas of proposed soft landscaping. It is therefore recommended that a clean cover system is installed within proposed areas of soft landscaping to render the pollution linkage inactive.
	Inhalation of fibres	YES	<u>Construction Phase</u> The presence of asbestos content in near surface Made Ground at locations CP02, CP04, CP05, WS7, TP1024 and TP1016 should be highlighted to the developer to ensure suitable PPE is adopted for operatives during construction. As part of the contractor's duty of care a risk assessment should be prepared, in line with current asbestos legislation (Control of Asbestos Regulations, 2012) prior to the construction phase to ensure the provision of suitable PPE. <u>Post-Development</u> Elevated concentrations of asbestos have been identified in the vicinity of locations CP02, CP04, CP05, WS7, TP1024 and TP1016 that are considered to have the potential to present a significant risk to human

Receptor	Potential Risk	Current Residual Risk	Mitigation
			health within proposed areas of soft landscaping. It is therefore recommended that a building and enclosed structures in the immediate vicinity. It is therefore recommended that a clean cover system is installed within proposed areas of soft landscaping to render the pollution linkage inactive.
	Asphyxiation	YES	Elevated concentrations of CO ₂ have been identified across the site and are considered to have the potential to present a significant risk within the proposed building footprints. It is therefore recommended that ground gas protection measures suitable for a Characteristic Situation 3 (CS-3) classification are installed within all building footprints.
	Fire and explosion	NO	Not considered a risk.
Buildings	Fire and explosion	NO	Not considered a risk.
	Chemical attack on building materials and services	NO	Not considered a risk.
Natural Environment	Contamination of water resources	NO	Not considered a risk.

3.0 REMEDIATION STRATEGY

3.1 General

The main aims of the remediation strategy are as follows:

- To provide a final ground surface suitable for the proposed use of the site i.e. residential dwellings;
- To comply with the requirements of the Local Planning Authority (Reading Borough Council) and their Environmental Health Department to ensure future users of the site are not put at risk from any chemical contamination arising from its former use(s) or nature of materials present; and,
- To ensure construction workers are not put at an unacceptable short term risk in redeveloping the site.

3.2 Remedial Measures

Based on the findings of the site investigation and the development constraints listed above, the following remediation strategy has been devised for the site. The proposed scope of the works is summarised below and detailed in the subsequent sub-sections. Full details of the methodology are set out in Section 6.2 of the Method Statement. In summary this comprises:

- Excavation of near surface Made Ground within all areas of proposed soft landscaping where soft landscaping will be formed directly over Made Ground at formation level.
- Treatment or off-site disposal of excavated materials in line with current guidelines;
- Installation of a clean cover system within all areas of proposed soft landscaping where soft landscaping will be formed directly over Made Ground at formation level;
- Installation of ground gas protection measures suitable for a Characteristic Situation 3 (CS-3) classification within proposed building footprints; and,
- A validation report should be produced on completion of the works. This report will serve to confirm the works were undertaken in accordance with the relevant legislation, the remediation statement, method statements and planning conditions.

4.0 REMEDIAL WORKS

4.1 General

Elevated concentrations of heavy metals, PAHs, TPH and asbestos have been identified in near surface Made Ground across the site which were considered to have the potential to pose a significant risk to human health in areas of proposed soft landscaping, and as such remedial works are recommended within all areas of proposed soft landscaping across the site.

Review of the proposed layout indicates that all areas of soft landscaping are proposed as communal space with no proposed areas of private gardens.

4.1.1 Installation of a Clean Cover System in Areas of Proposed Soft Landscaping

A clean cover system should be installed within all areas of proposed soft landscaping formed directly over Made Ground at formation level. In areas where soft landscaping is located on podiums no remedial works are required. Areas of proposed soft landscaping and planting are illustrated in Figure 3.0 with the required remedial works set out in the following sections.

4.1.2 Excavation of Impacted Soils from Areas of Proposed Communal Soft Landscaping

In areas where communal soft landscaping will be formed directly over Made Ground at formation level soils should be excavated to a minimum depth of 300mm below finished ground levels (bfgl) and removed for off-site disposal at a suitably licenced waste disposal site using a registered waste carrier.

It is recommended that excavations are locally deepened to a minimum of 900mm bfgl to form Tree Pits in the location of proposed tree planting in accordance with guidance set out in BS3882:2015.

4.1.3 Placement of High-Visibility Geotextile

Upon excavation of proposed soft landscaping areas to a minimum depth of 300mm bfgl, a high-visibility geotextile membrane should be emplaced to act as a marker layer and to prevent the intermixing of clean imported soils with underlying soils containing potentially elevated concentrations.

4.1.4 Placement of Clean Soils in Areas of Proposed Soft Landscaping

Following the excavation of soils and the placement of a high-visibility geotextile membrane it is recommended that the clean cover system should involve the placement of a minimum of 300mm of clean soil capping, in line with current best practice, to sever the exposure pathway and render the pollution linkage inactive.

As stated in Section 4.1.2 the thickness of the cover system should be increased to a minimum of 900mm to form 'Tree Pits' where tree planting is proposed in accordance with guidance set out in BS3882:2015. Consideration should be given to tree stabilisation where trees are planted above a geotextile membrane, through discussion with an Arboriculturalist.

A mixture of true subsoils and topsoil will likely need to be imported. Given that subsoil settles less than topsoil, it should not be used at the surface whilst the thickness of topsoil should not normally exceed 300mm. All soils utilised for the installation of the clean cover system should conform with

the chemical suitability criteria set out in Table 5.2. Imported soils should be obtained from a clean source with a BS3882 supply certificate in the case of topsoil.

Areas potentially requiring the installation of a clean cover system are illustrated on Figure 3.0 within Appendix III.

4.2 Underground Utilities Pipework

Given the brownfield nature of the site, it is recommended that contact is made with the potable water supplier to ensure that potable water supply pipework is selected in accordance with the requirements of the local Water Authority. It is recommended that best practice is followed with all underground potable water infrastructure with pipework laid within trenches infilled with clean pea shingle.

4.3 Installation of Gas Protection Measures

The ground gas assessments presented in DS Report 13-0258.01, CGL Report CG/18679 and OEC Report A11057/2.0, classified the site as Characteristic Situation 3 (CS-3) in accordance with guidance set out in CIRIA C665 and BS8485:2015.

The reports concluded that gas protection measures would be required for a CS-3 classification and should be selected by reference to Section 7, Tables 5, 6 & 7 as presented within BS8485:2015.

The design of ground gas protection measures, associated validation and additional documentation from the appointed membrane installers will be detailed within a standalone ground gas protection specification document (A11057v4.0).

The location of areas requiring the installation of ground gas protection measures are shown on Figure 4.0 (Appendix III).

The gas protection measures should be installed as set out in OEC Report A11057v4.0.

5.0 VALIDATION

In order to determine that all remedial works have been completed in accordance with the RMS, validation will need to be undertaken to confirm that the exposure pathway has been severed and the pollution linkages rendered inactive.

5.1 Validation of Clean Cover System

In order to confirm that the remedial works set out in Section 4.0 have been fully implemented and the pollution linkages have been successfully broken, validation works are required as follows:

5.1.1 Validation of Geotextile Membrane Placement and Clean Cover System

In order to determine that sufficient soil capping has been placed where soft landscaping is formed directly over Made Ground at formation level validation of the excavation depth should be undertaken post placement of soil capping.

Once capping has been placed, hand excavated pits should be advanced to a depth of 300mm bfgl in areas of soft landscaping to validate the placement of a geotextile membrane and the correct implementation of the clean cover system.

Photographic evidence should be obtained displaying that the excavations within areas of proposed soft landscaping have reached a minimum depth of 300mm bfgl.

Samples should be taken from the excavated material and analysed for key contaminants of concern for confirmation of chemical suitability.

Upon receipt of successful laboratory results a validation report should be produced to demonstrate that:

- Imported chemically suitable clean soil has been used in the placement of the clean cover system;
- The correct cover system thickness has been installed;
- Summary table cross referencing the quantity of soil imported (tonnes or /volume), area being capped (m²), capping system thickness; and,
- To confirm the installation of the geotextile membrane.

5.2 Validation Sample Frequency

The sampling frequency for materials to be managed under the Remediation Strategy is presented within Table 5.1 below. Samples should be analysed and compared to the guidance levels listed in Table 5.2.

Imported soils should be obtained from a known clean source, and in the case of topsoil should be supplied with BS3882 supply certificates.

Table 5.1: Chemical Validation Frequency

Purpose	Area	Testing Frequency	Chemical Analysis
Validation Testing within the proposed Communal Soft Landscaping.	Communal Open Space	1 sample per 150m ³ with a minimum of 3 samples per source of material	➤ Full CLEA Metals; ➤ Cyanide; ➤ PAH (USEPA 16); ➤ TPH (Banded); and, ➤ Asbestos Identification.

5.3 Validation Criteria

The Clean Cover system should meet the chemical suitability criteria set out in Table 5.2. It is considered that the values set out below will be suitably protective of the identified receptors.

The origin of the validation screening values set out above is presented within Appendix IV.

Table 5.2 – Chemical Suitability Criteria – Proposed Areas of Soft Landscaping

Determinant	Units	Screening Value
Metals		
Arsenic	mg/kg	37
Beryllium	mg/kg	1.7
Cadmium	mg/kg	11
Chromium (III)	mg/kg	910
Chromium (VI)	mg/kg	6
Copper	mg/kg	2,400
Lead	mg/kg	200
Mercury	mg/kg	40
Nickel	mg/kg	180
Selenium	mg/kg	250
Zinc	mg/kg	3,700
General Inorganics		
Asbestos	%	<0.001
Cyanide	mg/kg	50
PAHs		
Naphthalene	mg/kg	2.3
Acenaphthylene	mg/kg	170
Acenaphthene	mg/kg	210
Fluorene	mg/kg	170
Phenanthrene	mg/kg	95
Anthracene	mg/kg	2,400
Fluoranthene	mg/kg	280
Pyrene	mg/kg	620
Benzo(a)Anthracene	mg/kg	7.2
Chrysene	mg/kg	15
Benzo(b)Fluoranthene	mg/kg	2.6
Benzo(k)Fluoranthene	mg/kg	77
Benzo(a)Pyrene	mg/kg	2.2
Indeno(123-cd)Pyrene	mg/kg	27
Dibenzo(a,h)Anthracene	mg/kg	0.24
Benzo(ghi)Perylene	mg/kg	320

Determinant	Units	Screening Value
Banded TPH		
TPH C ₅ -C ₆	mg/kg	42
TPH C ₆ -C ₈	mg/kg	100
TPH C ₈ -C ₁₀	mg/kg	27
TPH C ₁₀ -C ₁₂	mg/kg	74
TPH C ₁₂ -C ₁₆	mg/kg	140
TPH C ₁₆ -C ₂₁	mg/kg	260
TPH C ₂₁ -C ₃₅	mg/kg	1,100

5.4 Verification of Gas Protection Measures Installation

Verification of the membrane installation should be undertaken for the scheme allowing for each stage of the installation to be inspected, including observation of the membrane across the cavity span, and internally pre-screed.

Details of the ground gas specification and verification plan will be included in a standalone document (A11057v4.0) which should be submitted to the local authority and acceptance obtained prior to any gas protection measures being installed on site.

In summary, the verification procedure will require the following to be undertaken;

- A visual inspection by a suitably qualified independent verifier (Environmental Consultant); and,
- Regular supplementary testing including high-pressure air lance testing of site seams and service pipe entry penetrations, along with seam pick testing of the perimeter, water/gas proofing details to be undertaken by a third-party independent specialist.

During the verification processes, a photographic record of verification works should be kept by the qualified independent verifier (Environmental Consultant) and incorporated into a Verification Report upon completion of all mitigation works.

6.0 RECORD KEEPING & VERIFICATION

6.1 Record Keeping

During the course of the remediation and site enabling works, the Principal Contractor (PC) should undertake the following record keeping protocols:

- Detailed daily site diary including material movements and photographs of the excavation works.

Record keeping on site, in particular movements and analysis of specific material types should be retained by the PC. This record should remain on site during the course of the works.

6.2 Verification

The records listed should then be incorporated into a Validation Report on completion of the remediation works.

The Validation Report will include the following:

- Copy of Consignment Notes relating to the movement of wastes to licensed waste management facilities where available;
- Detailed drawings showing all sampling locations from where TPH impacted soils have been removed;

The requirement for the Gas Verification report is set out in the gas specification document ref: A11057v4.0. In summary this will include the following:

- Ground Gas Protection Measures Drawings, as provided by the Architect;
- Specifications of Gas Resistant Membrane materials used; and,
 - A Photographic evidence of Verification works, including any Non-compliance and rectification measures.

6.3 Supervision and verification of works

It is recommended that a watching brief is implemented during the completion of remedial works specified within this document with independent checks, as set out in Section 5.0, undertaken by a suitably qualified and experienced Environmental Consultant. The level of attendance should be agreed with the Client.

6.4 Previously Unidentified Contaminants

Should any additional significantly impacted material be encountered during the development works should be halted and contact made with the Environmental Consultant to determine the course of action. This is likely to include additional investigation and as necessary variation to the agreed RMS. Contact should be made with the regulator to confirm the proposed scope of works and any variation to the RMS.

APPENDIX I
LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between OE Ltd and the Client as indicated in Section 1.2.
 2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information, it has been assumed it is correct. No attempt has been made to verify the information.
 3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination, which are enforced, by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
 4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
 5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
 6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
 7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.
 8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
 9. OE cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by OE is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by OE in this connection without their explicit written agreement there to by OE.
 10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.
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APPENDIX II

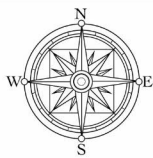
GLOSSARY

AST	ABOVE GROUND STORAGE TANK
BGS	BRITISH GEOLOGICAL SURVEY
BSI	BRITISH STANDARDS INSTITUTE
BTEX	BENZENE, TOLUENE, ETHYLBENZENE, XYLENES
CIEH	CHARTERED INSTITUTE OF ENVIRONMENTAL HEALTH
CIRIA	CONSTRUCTION INDUSTRY RESEARCH ASSOCIATION
CLEA	CONTAMINATED LAND EXPOSURE ASSESSMENT
CSM	CONCEPTUAL SITE MODEL
	DENSE NON-AQUEOUS PHASE LIQUID (CHLORINATED SOLVENTS, PCB)
DNAPL	
DWS	DRINKING WATER STANDARD
EA	ENVIRONMENT AGENCY
EQS	ENVIRONMENTAL QUALITY STANDARD
GAC	GENERAL ASSESSMENT CRITERIA
GL	GROUND LEVEL
GSV	GAS SCREENING VALUE
HCV	HEALTH CRITERIA VALUE
ICSM	INITIAL CONCEPTUAL SITE MODEL
LNAPL	LIGHT NON-AQUEOUS PHASE LIQUID (PETROL, DIESEL, KEROSENE)
ND	NOT DETECTED
LMRL	LOWER METHOD REPORTING LIMIT
NR	NOT RECORDED
PAH	POLY AROMATIC HYDROCARBON
PCB	POLY-CHLORINATED BIPHENYL
PID	PHOTO IONISATION DETECTOR
QA	QUALITY ASSURANCE
SGV	SOIL GUIDELINE VALUE
SPH	SEPARATE PHASE HYDROCARBON
SP.TPH (CWG)	TOTAL PETROLEUM HYDROCARBON (CRITERIA WORKING GROUP)
SPT	STANDARD PENETRATION TEST
SVOC	SEMI VOLATILE ORGANIC COMPOUND
UST	UNDERGROUND STORAGE TANK
VCCS	VIBRO CONCRETE COLUMNS
VOC	VOLATILE ORGANIC COMPOUND
WTE	WATER TABLE ELEVATION
UNITS	
M	METRES
KM	KILOMETRES
%	PERCENT
%V/V	PERCENT VOLUME IN AIR
MB	MILLI BARS (ATMOSPHERIC PRESSURE)
L/HR	LITRES PER HOUR
µG/L	MICROGRAMS PER LITRE (PARTS PER BILLION)
PPB	PARTS PER BILLION
MG/KG	MILLIGRAMS PER KILOGRAM (PARTS PER MILLION)
PPM	PARTS PER MILLION
MG/M ³	MILLIGRAM PER METRE CUBED

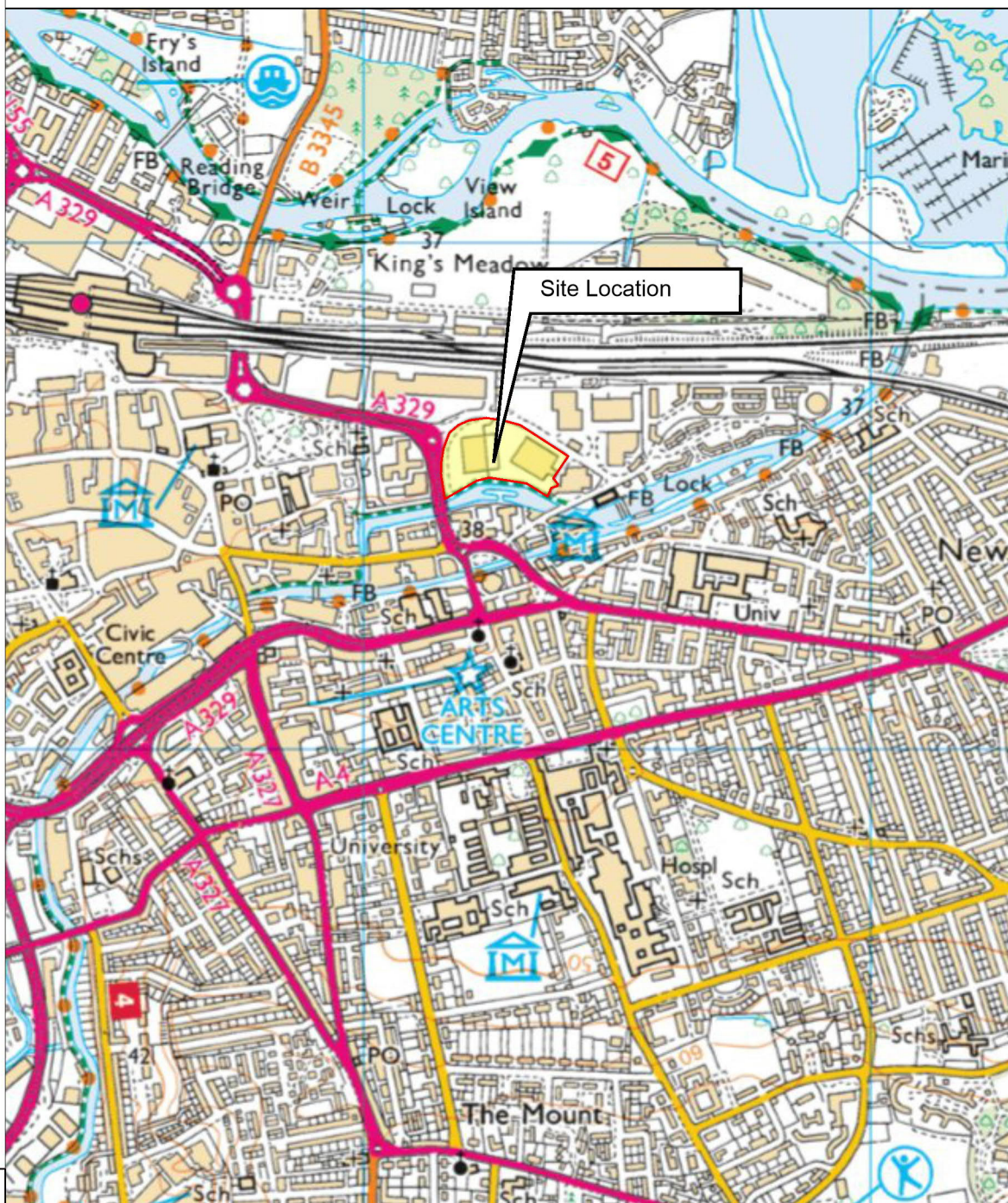
M BGL	METRES BELOW GROUND LEVEL
M BCL	METRE BELOW COVER LEVEL
MAOD	METRES ABOVE ORDNANCE DATUM (SEA LEVEL)
KN/M ²	KILO NEWTONS PER METRE SQUARED
µM	MICRO METRE

APPENDIX III

DRAWINGS



 Approximate Site Boundary



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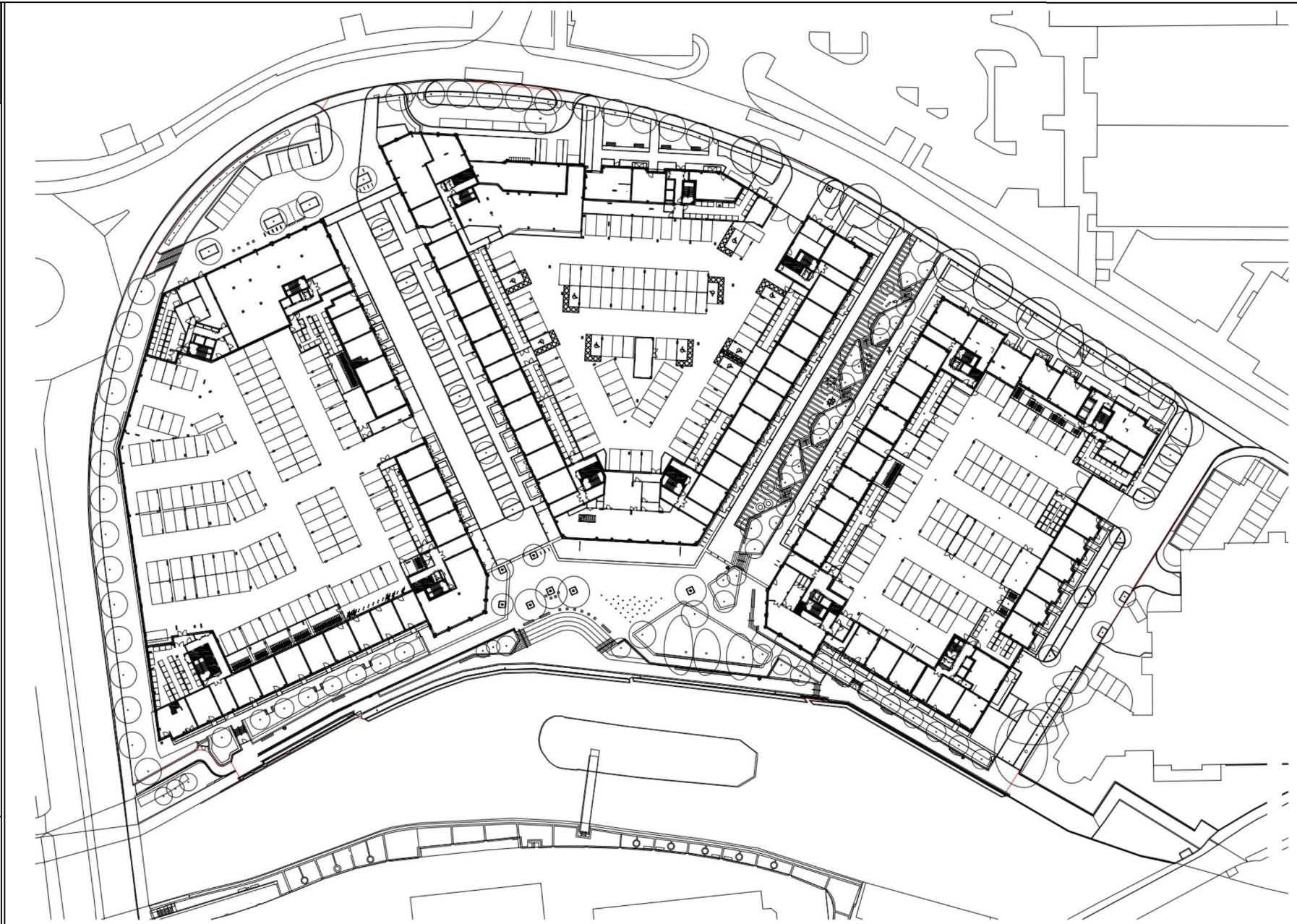
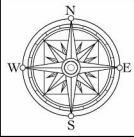
Job Title: Kenavon Drive, Reading	Client: Berkeley Homes	Job No: A11057 Drawn by: AK Approved by: GW Scale: 1sq = 1km	DATE 13/05/19	Drawing Title: Figure 1.0 Site Location Map
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Job Title:

Kenavon Drive, Reading

Client:

Berkeley Homes

Project No:

A11057

Date:

13/05/19

Drawn By:

A.King

Authorised By:

T. Mitchell

Scale:

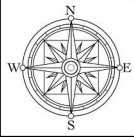
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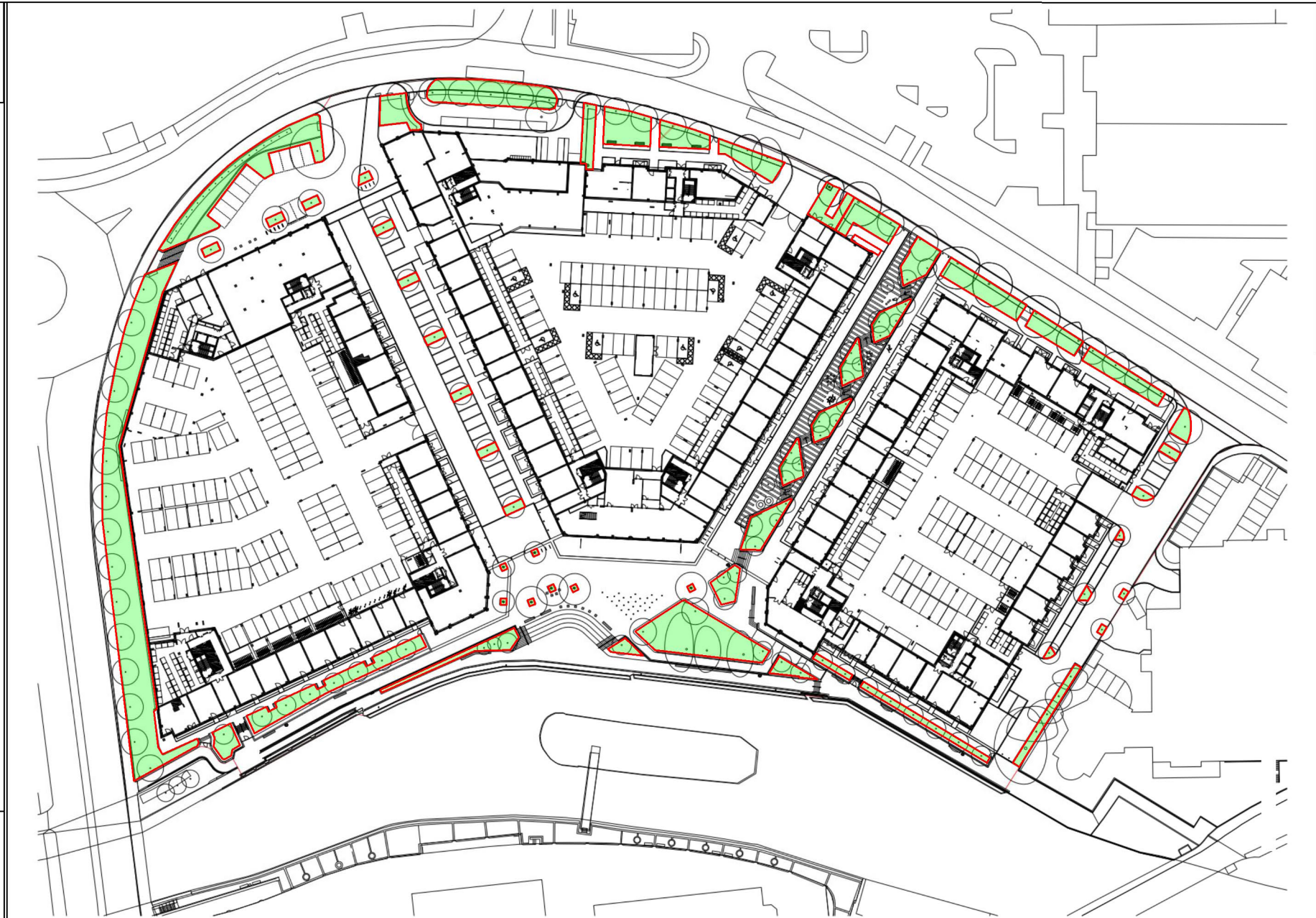
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Figure 2.0 - Proposed Layout

Key



Areas of Proposed Soft Landscaping



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A.King

Authorised By:

T. Mitchell

Scale:

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Notes:

Drawing Title:

Figure 3.0
Areas of Proposed Soft
Landscaping

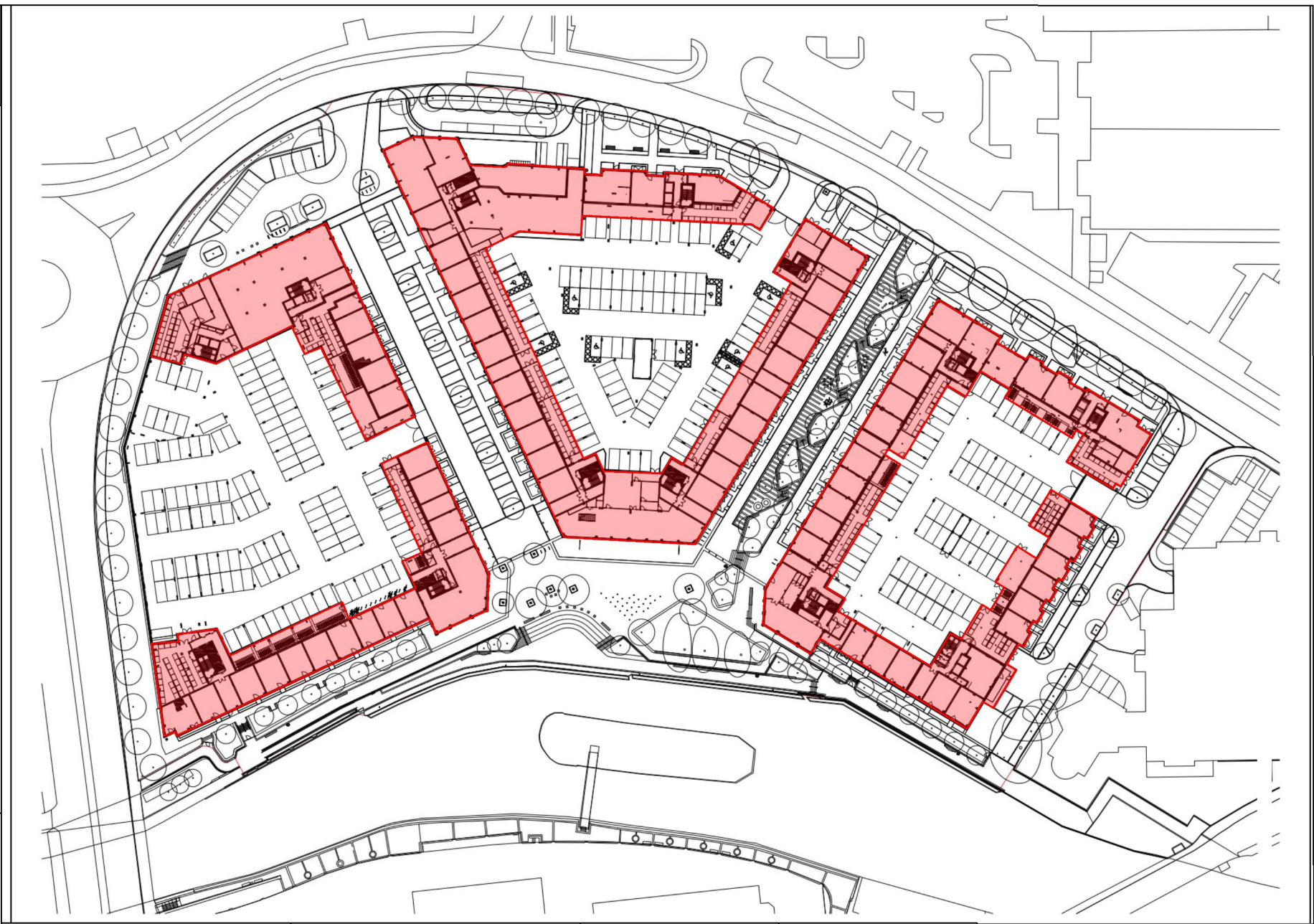
Key



 Areas requiring installation of gas protection measures

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		Drawn By:	Authorised By:	
		A.King	T. Mitchell	Figure 4.0 Areas requiring gas protection measures
		Scale:	Notes:	
		See Scale Bar		