

Berkeley Homes (East Thames) Limited

Royal Arsenal Riverside – Linear Park Remediation Strategy and Verification Plan





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Royal Arsenal Riverside – Linear Park

Remediation Strategy and Verification Plan

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- 1 INTRODUCTION
- 1.1 Terms of Reference
- 1.1.1 Tweedie Evans Consulting Ltd (TEC) has been appointed by Berkeley Homes (East Thames) Limited to prepare a Remediation Strategy and Verification Plan in support of the proposed development at Royal Arsenal Riverside, Linear Park. All works were undertaken in accordance with our proposal letter dated 12 May 2017 and referenced CH.1508005.014_016.bidlet.
- 1.2 Background
- 1.2.1 The site is situated within the wider Berkeley Homes (East Thames) Ltd, Royal Arsenal Riverside development in Woolwich (Figure 1). The centre of the site is situated at approximate National Grid Reference 543605, 1791550 and covers an area of approximately 1.75 hectares. The nearest postcode is SE18 6BU.
- 1.2.2 The proposed development of the Linear Park is understood to comprise redevelopment of the site for recreational purposes with open parkland and water features (Figure 2).
- 1.2.3 For illustrative purposes, the Linear Park development has been segregated into four separate zones (Figure 3).
- 1.2.4 The following reports have been produced by TEC for the site for submission as part of the planning application:
- Royal Arsenal Riverside – Linear Park (Zone 1) – Preliminary Geoenvironmental and Geotechnical Assessment. Prepared for Berkeley Homes (East Thames) Ltd by TEC. Report reference 1508005.005.01 dated May 2015;
 - Waterfront Park – Preliminary Geoenvironmental Assessment. Prepared for Berkeley Homes (East Thames) Ltd by TEC. Report reference 1508016.001.01 dated August 2015;
 - Royal Arsenal Riverside – Phase 18 – 19 – Preliminary Geoenvironmental and Geotechnical Assessment. Prepared for Berkeley Homes (East Thames) Limited by TEC. Report reference 1508005.001.01 dated May 2016; and
 - Royal Arsenal Riverside – Linear Park – Preliminary Geoenvironmental and Geotechnical Assessment. Prepared for Berkeley Homes (East Thames) Limited by TEC. Report reference 1508005.014.01 dated March 2018.
- 1.2.5 In addition, the wider Royal Arsenal Riverside development has been extensively investigated by both TEC and third party consultants, as detailed within the following reports:
- Royal Arsenal Riverside – Phase 8 – Preliminary Geoenvironmental and Geotechnical Assessment. Prepared for Berkeley Homes (East Thames) Limited by TEC. Report reference 1508005.001.01 dated January 2016;
 - Royal Arsenal Riverside – Phase 9 - 11 – Preliminary Geoenvironmental Assessment. Prepared for Berkeley Homes (East Thames) Limited by TEC. Report reference 1508005.002.01 dated April 2016; and
 - The Warren, Woolwich Royal Arsenal – Geo-Environmental Risk Assessment prepared for Berkeley Homes by Scott Wilson Ltd as part of the URS

Environmental Statement for the Waterfront Masterplan, Royal Arsenal. Report Reference D116539/LAND dated March 2008.

- 1.2.6 The remediation of Zone 4 (Royal Arsenal Riverside – Linear Park – The Source) has been detailed within a separate Remediation Strategy and Verification Plan as detailed within the following:
- Royal Arsenal Riverside – Linear Park – The Source – Remediation Strategy and Verification Plan. Prepared by TEC for Berkeley Homes (East Thames) Limited. Report reference 1508005.015.01, dated November 2017.
- 1.2.7 The refined conceptual site model produced for the site as part of TEC report ref: 1505014.001.01 identified potential Significant Pollutant Linkages associated with the proposed development. Reference should be made to this document for full details regarding the site conditions and assessment works undertaken. A summary of the salient issues in relation to ground contamination is provided in Section 2.
- 1.2.8 Therefore, this Remediation Strategy and Verification Plan is based on the information contained within the TEC report produced for the site and has been undertaken to aid with discharge of Condition 13 (Contamination) Parts 3 and 4, as well as Condition 15 (imported soil) and Condition 16 (reporting of unexpected contamination). This report relates to Zones 1 to 3 only.
- 1.2.9 This Remediation Strategy and Verification Plan has been undertaken in accordance with CLR 11 'Model Procedures for the Management of Land Contamination' (DEFRA & Environment Agency, 2004) and will require agreement in writing of the Regulatory Authorities prior to commencing any remediation on site.

2 SITE CONDITION SUMMARY

2.1 Introduction

2.1.1 A summary of the salient issues relating to the site and the proposed development, in relation to ground contamination, is presented below. Reference to the previous reporting should be made for detailed information.

2.2 Previous Report Summary and Contamination Risk Appraisal

2.2.1 The site is situated within part of the extensive former MoD site, which included the manufacture of arms and munitions together with a number of other potentially contaminative historic processes including a former gas works and power station. While these processes were considered to provide a potential source of on-site contamination, it is understood that and parts of the site and the wider development area have been subject to remediation in the past.

2.2.2 Intrusive works have been undertaken across the site during several phased investigations and recorded the presence of made ground to depths in excess of 4.9mbgl (Zone 1), which was generally noted to be variable in nature.

2.2.3 Olfactory evidence of hydrocarbon contamination was recorded within WS04 (Zone 3), noted to be in proximity of the former garage, from a depth of 0.8mbgl. Field screening of total Volatile Organic Compounds (VOC's) using a photo-ionisation detector (PID) recorded concentrations of up to 68.2ppm within this material. Notwithstanding this, laboratory analysis of this material reported the lower banded TPH concentrations considered to be associated with petroleum (i.e. C5 – C10) as below laboratory limit of detection, while elevated concentrations of heavier ended TPH (i.e. C12 – C35) were all reported below the current screening values considered appropriate for the proposed site end use.

2.2.4 While laboratory analysis recorded no exceedances of the Tier 1 SSVs when considering a public open space near residential housing end use, an asbestos screen undertaken on all scheduled samples recorded the presence of loose chrysotile fibres, amosite and crocidolite insulation lagging and chrysotile and amosite lagging across the site.

2.2.5 While elevated Total Volatile Organic Carbons (VOCs) were reported within WS04 (max. 68.2ppm) within Zone 3, laboratory analysis of this material reported no exceedances of the relevant Tier 1 SSVs.

2.2.6 Leachate analysis undertaken on representative samples of the made ground recorded concentrations of PAH below laboratory limit of detection. While elevated leachable concentrations of copper, lead and vanadium were recorded, given the absence of gross contamination within the shallow made ground across the site and the depth to encountered groundwater (>10.0mbgl), the risk to controlled waters was considered to be low.

2.2.7 Therefore, the main potential Significant Pollutant Linkages identified were as follows:

- Human Health (including future site end users) – exposure to potential contaminants (asbestos) within made ground at the site through the inhalation pathway in areas of proposed soft landscaping and where made ground remains.
- Human Health (including construction workers and future maintenance workers) – exposure to potential contaminants (asbestos) within made ground

at the site through the inhalation pathway during construction and future maintenance works.

2.2.8 It was therefore concluded that where the soft landscaping is proposed and where made ground remains, in such areas after finished site levels are achieved, exposure to potential contaminants cannot be discounted and a suitable cover system will be required in such areas where made ground remains after any site clearance works are completed. In addition, given the recorded presence of asbestos within the underlying made ground materials, it is likely that the cover system would require an engineered capping system in accordance with BRE 465.

2.2.9 Furthermore, given the identified contaminants of potential concern within the made ground encountered onsite, good brownfield site working practices were recommended to be adopted by construction workers to mitigate against identified potential risks. Furthermore, it was recommended that site clearance and excavation works should take full regard of the presence of asbestos within the made ground on site.

2.3 Refined Conceptual Model

2.3.1 On the basis of the assessment work undertaken by TEC to-date, a refined conceptual model was developed for the site. Reference should also be made to TEC's previous report for the site for detailed information. The Relevant Pollutant Linkages (RPL), identified in relation to ground contamination and identified receptors, are considered by TEC to be:

- RPL1 Risk to site end users via exposure to Contaminants of Potential Concern within the made ground materials through the inhalation pathway in areas of proposed soft landscaping, where made ground remains;
- RPL2 Risk to brownfield site construction workers and future site maintenance workers via exposure to Contaminants of Potential Concern within the made ground materials through the inhalation pathway; and
- RPL3 Potential risk of statutory nuisance and human health risk via disturbance of in-situ ground materials during development works resulting in the generation of dust, including fine particulate matter.

3 REMEDIATION OBJECTIVES AND CRITERIA

3.1.1 CLR11 defines remediation objectives as site-specific objectives that relate solely to the reduction or control of risks associated with one or more pollutant linkages that are demonstrated, through risk assessment, to represent unacceptable risks. CLR11 also defines remediation criteria as measures against which compliance with remediation objectives will be assessed.

3.1.2 Remediation objectives and criteria for the identified RPL in relation to the proposed development are presented in Table 3.1.

Table 3.1: Remediation Objectives and Criteria

Relevant Pollutant Linkage (RPL)	Remediation Objectives	Remediation Criteria
RPL1: Chronic risk to site end users via exposure to Contaminants of Potential Concern within the made ground in areas of the proposed soft landscaping through inhalation.	<ul style="list-style-type: none"> • Long-term effective containment of contaminated made ground, i.e. eliminating exposure to contaminated made ground • Management of contaminant pathway • Ensure the site is suitable for use in relation to the proposed residential development • Satisfy planning requirements in relation land contamination 	Compliance to be based on the provision and maintenance of an appropriate cover system in all areas of the site, where made ground remains following site preparation.
RPL2: Risk to construction workers and future site maintenance workers via exposure to Contaminants of Potential Concern (CoPC) within the made ground through inhalation.	<ul style="list-style-type: none"> • Long-term effective containment of contaminated made ground • Management of the pathway and receptor 	Adoption of appropriate good brownfield working practices, including a suitable asbestos management plan, and implementation of appropriate site maintenance procedures and risk assessments. For future maintenance workers, compliance is to be based on the provision and maintenance of an appropriate cover system following site preparation, where made ground remains.
RPL3: Short term disturbance of in situ ground materials during the development works resulting in the potential generation of dust, including fine particulate matter resulting in potential risk of statutory nuisance and risk to human health.	<ul style="list-style-type: none"> • Effective control of dust and dust generating activities. 	Employ best practice methods at all times.

4 SCOPE OF REMEDIATION WORKS

4.1.1 Based upon the identified Relevant Pollutant Linkages, the following Remediation Strategy has been prepared to provide appropriate mitigation against the identified risks.

Remediation Area

4.1.2 The proposed development of the Royal Arsenal Riverside – Linear Park as a whole is understood to comprise redevelopment of the site for recreational purposes with open parkland and water features.

4.2 Outline Remedial Measures

4.2.1 Remedial measures to achieve the site-specific remediation objectives set out in Table 3.1 for RPL1 – RPL3, relating to identified receptors, are presented below.

RPL1

4.2.2 RPL1 relates to the chronic risk to site end users via exposure to potential contaminants within the ground materials through the ingestion, inhalation and dermal contact pathways.

Hardstanding & Building Footprint

4.2.3 Based upon the proposed development layout, a limited area of the site is to be covered by hardstanding comprising the presence of granite and concrete walkways and water features. Where present, such hardstanding would remove the identified potential contaminant pathways in relation to site end users. Areas of proposed hardstanding are presented in Figure 2.

Soft Landscaped Areas - Cover System

4.2.4 Based upon the current proposed development layout, soft landscaping is understood to comprise general soft landscaped areas as well as numerous planters (Figure 2). Therefore, where made ground remains within such soft landscaped areas across the site after finished levels are achieved, exposure to potential asbestos fibres and fragments cannot be discounted. Therefore, in order to mitigate against the potential risk to site end users, it is recommended that a cover system be provided within such areas, where made ground remains. Where raised planters are utilised within the design, there is no requirement for a cover system, subject to the presence of a suitable separation from insitu materials.

Engineered Cover System

4.2.5 Given the presence of asbestos within made ground encountered across the site, a simple cover system in accordance with Building Research Establishment guidance (BRE 465), would not be considered appropriate within proposed soft landscaped areas. Therefore, an engineered cover system, designed to provide complete separation of the receptor from the hazard, would be recommended in such areas where made ground remains.

4.2.6 The engineered cover system would need to comprise a visual marker/break layer overlain by a suitable cover thickness, comprising topsoil and subsoil in accordance with the requirements of BS3882:2015 'Specification for Topsoil' and BS8601:2013 'Specification for Subsoil and Requirements for Use'. Consequently, consolidated minimum thicknesses of 450mm will be required within the general soft landscaped (grassed) areas, 600mm in areas of shrub planting and 900mm in areas of tree

planting. This shall comprise sub-soil below a maximum of 300mm topsoil. While it should be noted that the thickness of the cover system would need to be agreed by the regulators as policies and guidance on this issue varies between Local Authorities, it is understood that the suggested thickness for the cover system was accepted by the Royal Borough of Greenwich Council for nearby sites within the Royal Arsenal development.

- 4.2.7 After grading and compacting, an appropriate high visibility geotextile break layer (Terram Hi-Vis or equivalent of sufficient strength to minimise future penetration) should be laid and secured, in accordance with the manufacturer's instructions, to inhibit mixing with underlying material and minimise mixing and penetration of foreign objects such as glass, metal etc. into the clean cover. Prior to placement, the graded area should be inspected to ensure no foreign material is protruding from the surface which may cause significant damage to the geotextile.

General Cover System Requirements

- 4.2.8 Where significant planting or vegetation with deeper root systems is proposed, the depth of clean cover may need to be increased, e.g. through the use of tree pits. It is recommended that advice is taken from an appropriate landscaping specialist to determine whether the specified minimum depth of clean cover overlying the geotextile may need to be increased.
- 4.2.9 Imported material will likely be required to provide the proposed cover system within the soft landscaped areas to the required thickness. Therefore, geochemical verification testing should be undertaken of all imported material and any excavated material proposed for re-use. The testing regime for such material is detailed in Section 6 and import criteria are provided in Table 6.1.
- 4.2.10 Imported topsoil should meet the requirements of BS3882:2015 for a multipurpose topsoil and subsoil should meet the requirements of BS8601:2013. Appropriate certificates of analysis should be provided, in advance of material importation, to demonstrate compliance with these criteria.
- 4.2.11 All imported material should be free from propagules of aggressive weeds and bulk vegetative matter, and top soil and sub soil should have a maximum stone size of 20mm and 50mm respectively. In addition, all imported material should be free from fragments of glass, brick, concrete, metal fragments, wire or other potentially hazardous foreign matter which may represent a risk of traumatic injury.
- 4.2.12 Additional testing may be undertaken following site preparation to potentially refine the remedial requirements for areas of soft landscaping at the site. Section 6 of this Remediation Strategy provides the communication process should further assessment be undertaken.

RPL2

- 4.2.13 RPL2 relates to the risk to construction workers and future site maintenance workers via exposure potential contaminants (asbestos) recorded within the made ground materials ground through inhalation.
- 4.2.14 All groundworks should be undertaken in accordance current legislation and guidance for dealing with those soils contaminated with asbestos fibres. This would require being detailed within a suitable asbestos management plan, which would form part of the site's materials management plan (MMP) and Construction Environmental Management Plan (CEMP) and would include details regarding suitable control measures, appropriate monitoring that should be utilised during the groundworks etc.

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- 4.2.15 All works should comply with current legislation and guidance, including:
- The Hazardous Waste (England & Wales) Regulations 2005, (Amended 2009);
 - Approved Code of Practice Work with materials containing asbestos (L 143), published by the Health & Safety Commission 2013;
 - Control of Asbestos Regulations 2012;
 - The Construction (Design and Management) Regulations 1994, Amended 2015;
 - HSG 248 Asbestos: "The analysts' guide for sampling, analysis, and clearance procedures";
 - HSG 247 Asbestos: "The licensed Contractors' guide";
 - HSG 66 "Protection of Workers and the General Public During Development of Contaminated Land"; and
 - CIRIA C733 "Asbestos in soil and made ground: a guide to the understanding and management of risks".
- 4.2.16 In addition, given the presence of asbestos, identified within a number of locations, the status of the works under the Control of Asbestos Regulations (2012) will need to be clarified. Further information on this is detailed within CL:AIRE joint industry working group document - Asbestos in Soil and Construction & Demolition (C&D) Materials guidance titled "Control of Asbestos Regulations 2012: Interpretation for Managing and Working with Asbestos in Soil and Construction & Demolition materials: Industry Guidance".
- 4.2.17 Full site maintenance procedures and risk assessments should be documented and implemented to ensure that future maintenance workers are protected from potential residual risk during possible exposure to materials beneath the capping layer.
- 4.2.18 Given the brownfield nature of the site, the adoption of good brownfield working practices, including good site welfare and hygiene facilities and the provision of appropriate Personal Protective Equipment (PPE) should also be implemented.
- RPL3
- 4.2.19 RPL3 relates to the potential risk of statutory nuisance and risk to human health via disturbance of in-situ ground materials during remediation and development works resulting in the generation of dust, including fine particulate matter.
- 4.2.20 Development works will provide a long-term betterment with respect to dust generation as all potentially contaminated materials remaining on site will be effectively capped, e.g. by hardstanding and soft landscaping cover. However, given the proposed development works for the site, the short-term potential for the generation of dust and fine particulate matter cannot be discounted. This is due to the requirement for the excavation and handling of potentially dry materials and their transportation on and off-site. In addition, wind blow across bare ground or stockpiles of excavated and treated materials can also represent a potential significant source of dust generation.
- 4.2.21 Fugitive dust and fine particle generation from remediation and construction activities can be substantially reduced through carefully selected mitigation techniques and effective management. Once particles are airborne, it is very difficult to prevent them

from dispersing into the surrounding area. The most effective technique is to control dust at source and prevent it from becoming airborne, since suppression is virtually impossible once it has become airborne.

4.2.22 Mitigation measures detailed for RPL2, implemented to mitigate against potential airborne asbestos fibre release during groundworks, would also mitigate against potential risk from dust generation.

4.2.23 The contractor will be required to take all necessary measures to avoid creating a dust nuisance during both remediation and construction works. Therefore, works will be carried out in such a manner as to minimise dust generation in accordance with best practice guidance such as "Guidance on the assessment of dust from demolition and construction" Institute of Air Quality Management (Feb 2014), "The Control of Dust and Emissions from Construction and Demolition – Best Practice Guidance" and "Supplementary Planning Guidance" published by the Greater London Authority (November 2006 and July 2014) and, where applicable, the Materials Management Plan.

4.3 General Remedial Measures

Previously Unidentified Contamination

4.3.1 During the site clearance works, should contamination be found at any time when carrying out the development that was not previously identified, it will be reported in writing immediately to the Local Planning Authority. Following which, further investigation and risk assessment will be undertaken, and where further remediation is considered necessary, a revised remediation scheme will be produced and forwarded to the Local Planning Authority for approval in writing. Section 6 of this Remediation Strategy provides the communication process should further assessment be undertaken.

Services Protection

4.3.2 The presence of below ground services within the site cannot be discounted. Appropriate easements to these features will be required during the development works.

4.3.3 Given the encountered ground conditions, upgraded contaminant resistant below ground service materials may be required by utility providers. The specification for these materials should be agreed, in advance of development, with the appropriate statutory undertakers.

4.3.4 Should water supply pipes be placed within the made ground encountered at the site, due consideration will need to be given to the UK Water Industry Research (UKWIR) guidance.

4.3.5 All services should be placed within dedicated runs backfilled with clean imported material.

4.3.6 Any below ground electrical services shall be intrinsically safe.

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- 5 GENERAL REQUIREMENTS
- 5.1 Environmental Permits / Licences
- 5.1.1 The Contractor will be required to comply with all relevant legislation, statutory requirements and guidance, Codes of Practice, British Standards and all relevant HSE Guidance and Approved Codes of Practice.
- 5.1.2 The Contractor will be responsible for obtaining and complying with all necessary permissions, licenses and permits required to undertake the works.
- 5.2 Materials Excavation
- 5.2.1 The rate of excavation, will be limited to ensure appropriate visual characterisation of materials. Characterisation of waste materials will be undertaken by suitably experienced person.
- 5.2.2 As a minimum, made ground materials shall be segregated in accordance with current waste regulations to allow for separate treatment/disposal. Further segregation may be required should grossly contaminated materials be encountered
- 5.2.3 Works will be carried out in such a manner as to minimise dust generation in accordance with best practice guidance.
- 5.2.4 All on site waste material movements will be controlled to avoid cross contamination of materials.
- 5.3 Stockpiling
- 5.3.1 Wherever possible, groundworks methodologies should be adapted in order to avoid material movement and stockpiling due to the presence of asbestos fibres. However, if unavoidable, temporary stockpiles should be on suitable hardstanding or membrane to prevent mixing with underlying materials and such stockpiles will be covered with an impermeable membrane. In addition, in order to avoid potential cross-contamination, work methodologies should be adopted such that the trafficking over contaminated areas is minimised and, wherever possible, avoided.
- 5.4 Waste Management
- 5.4.1 Excavated contaminated material will be disposed from site to an appropriately licensed facility. Additional testing may be required in accordance with guidance outlined by the Environment Agency's document 'Waste Sampling and Testing for Disposal to Landfill' (EBPRI 11507B), dated March 2013, to allow determination of an appropriately licensed landfill for disposal. The waste producer must develop a sampling plan using Best Practice with reference to BS EN 14899 (and supporting technical guidance CEN/TR 15310) to ensure samples are representative of the waste being produced.
- 5.5 Materials Transport and Disposal
- 5.5.1 All waste disposal activities will be undertaken in accordance with the Waste (England and Wales) (Amendment) Regulations 2014 and consequently, the haulier will need to be a licensed waste carrier and evidence of registration will need to be obtained prior to any consignment.
- 5.5.2 All waste will only be sent to a class of disposal facility permitted to accept the materials identified.

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- 5.5.3 Laboratory results of the excavated material will need to be passed on to the haulier and the material will need to be transported and disposed of accordingly. All excavated contaminated waste materials are to be transported off-site in appropriately sheeted lorries.
- 5.6 De-Watering
- 5.6.1 No groundwater ingress was encountered within exploratory hole locations during TECs intrusive investigation to a maximum depth of 3.2mbgl and therefore, dewatering works are considered unlikely to be required during excavation and formation works up to this depth. However, in the event of excess perched water/groundwater being encountered during deeper excavations appropriate storage, treatment and disposal may be required.
- 5.6.2 To minimise the generation of water requiring management, surface run-off and collection should be reduced by ensuring that the scale of open excavation is restricted to that necessary for the immediate works.
- 5.7 Backfilling
- 5.7.1 Where excavation of contaminated materials occurs, the resultant excavation should be backfilled with general fill or imported clean material. Excavated contaminated materials should not be used for backfilling.
- 5.8 Site Maintenance
- 5.8.1 Site maintenance procedures and risk assessments should be documented and implemented to ensure that the capping layer and hard cover are appropriately maintained and future maintenance workers are protected during exposure to materials beneath the capping layer (if utilised) and hardstanding.
- 5.8.2 Due consideration should be given as to whether the depth of any clean cover system is sufficient for the planting proposed, e.g. planting of vegetation with a rooting zone in excess of the depth of clean cover may require deepened excavations or use of containers.
- 5.8.3 Should future excavation works be required within the site, the mitigation and reinstatement measures detailed within this Remediation Strategy should be adhered to.
- 5.9 General Site Safety
- 5.9.1 All aspects of health and safety during site works will be undertaken in accordance with the Construction (Design and Management) Regulations, 2015 (CDM), or superseding documentation. In addition, all remedial works will be undertaken in accordance with the Health and Safety Executive publication (HSG66) "Protection of workers and the general public during the development of contaminated land" (1991), CIRIA Report 132 "A guide for safe working on contaminated sites" (1996) and current best practice guidance, including CIRIA Report C765 "Asbestos in soil and made ground good practice site guide" (2017).

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- 6 VERIFICATION PLAN
- 6.1 Materials Importation and Verification Testing
- Material Importation
- 6.1.1 Appropriate chemical testing of imported materials will be required if the origin of the imported clean cover capping materials is other than one of the following:
- A “greenfield” site where an appropriate desk study has been undertaken in accordance with BS10175:2011+A1:2013 which shows that no sources of contamination are or have been present; or
 - A site where suitable site investigation and testing has been undertaken in accordance with BS10175:2011+A1:2013 which clearly demonstrates the chemical suitability of the imported material.
- 6.1.2 If the source of the capping materials does not comply with the above or is from a site that is known to be, or suspected of being, contaminated, sufficient testing should be undertaken to confirm the materials are suitable for use. Where separate subsoil and topsoil materials are used in the cover system, it will be necessary to confirm the chemical quality of both of these components.
- 6.1.3 In addition, all imported topsoil and subsoil materials should meet the requirements of BS3882:2015 and BS8601:2013. All imported topsoil and subsoil should be free from foreign objects discernible by the naked eye (e.g. glass, brick, concrete, wire, tarmac, plastic, ceramic, metal, treated wood) or potentially hazardous foreign matter which may represent a risk of traumatic injury or damage to health.
- 6.1.4 In all cases, a copy of the delivery ticket should be available to confirm the imported materials have been transferred directly from the approved source site.
- 6.1.5 Where capping materials (including manufactured soils) are sourced from a commercial provider, a copy of the supplier’s routine chemical test certificate(s) and delivery tickets to site should be included within the remediation Verification Report. All test certificates should be current and representative of the material actually being used on site. Should importation be undertaken over an extended period of type separate certification may be required. The amount of testing undertaken by the commercial provider should be linked to the former uses of the source site and the potential for contamination to be present. It is noted that the use of skip waste will not be accepted as capping materials without extensive testing to confirm it is suitability for use.
- 6.1.6 Quarried aggregate need not be subject to this testing regime where supported by appropriate certification.
- 6.1.7 Placement of fill materials associated with these remedial works should not be permitted unless this information has been received and approved in advance by the Client’s representative.
- 6.1.8 All samples will be submitted to an appropriate accredited laboratory (MCERTS/UKAS) for analysis.
- 6.1.9 All imported material used as part of a clean cover system will comply with the limits set out within Table 6.1. Given the proposed development includes areas of communal soft landscaping only, limits have been set on the basis of a ‘residential (without homegrown produce)’ site end use.

Table 6.1: Importation & Re-use Criteria

Contaminant	Maximum Import Concentration (mg/kg) ⁽¹⁾
Arsenic	40 ⁽²⁾
Boron	11000 ⁽⁴⁾
Cadmium	150 ⁽²⁾
Chromium (Total)	910 ⁽⁴⁾
Chromium (VI)	21 ⁽²⁾
Copper	7100 ⁽⁴⁾
Lead	310 ⁽²⁾
Mercury	170 ⁽³⁾
Nickel	130 ⁽³⁾
Selenium	350 ⁽³⁾
Zinc	40000 ⁽⁴⁾
Beryllium	1.7 ⁽⁴⁾
Barium	1300 ⁽⁵⁾
Vanadium	1200 ⁽⁴⁾
Cyanide	20 ⁽⁶⁾
Total Phenol	440 ⁽⁴⁾
Banded Petroleum Hydrocarbons ⁽⁷⁾	
TPH Aliphatic C5-C6	42 ⁽⁴⁾
TPH Aliphatic C6-C8	100 ⁽⁴⁾
TPH Aliphatic C8-C10	27 ⁽⁴⁾
TPH Aliphatic C10-C12	130 ⁽⁴⁾
TPH Aromatic C5-C7	370 ⁽⁴⁾
TPH Aromatic C8-C10	47 ⁽⁴⁾
TPH Aromatic C10-C12	250 ⁽⁴⁾
Other Petroleum Hydrocarbons ⁽⁷⁾	
Total Petroleum Hydrocarbons (TPH)	500
Naphthalene	2.3 ⁽⁴⁾
Benzo(a)anthracene	11 ⁽⁴⁾
Chrysene	30 ⁽⁴⁾
Benzo(b)fluoranthene	3.9 ⁽⁴⁾
Benzo(k)fluoranthene	110 ⁽⁴⁾
Benzo(a)pyrene	3.2 ⁽⁴⁾
Indeno(1,2,3-cd)pyrene	45 ⁽⁴⁾
Dibenzo(a,h)anthracene	0.31 ⁽⁴⁾
Benzo(g,h,i)perylene	360 ⁽⁴⁾
Benzene	0.38 ⁽⁴⁾
Ethylbenzene	83 ⁽⁴⁾
m & p-xylene	79 ⁽⁴⁾
o-xylene	88 ⁽⁴⁾
MTBE	73 ⁽⁴⁾
Other	
Asbestos Screen	Absent

Notes:

1. Importation criteria based on human health screening values for a 'residential end use without homegrown produce' site end use
2. DEFRA C4SL (2014)
3. Environment Agency Soil Guideline Values (2009)
4. CIEH/LQM S4ULs (2015)
5. EIC/AGS/CL:AIRE (2009)
6. Dutch Intervention Value for free cyanide (VROM 2000)
7. Speciated hydrocarbon contaminants with screening values >500mg/kg are not included as total TPH limit has been set at 500mg/kg.
8. Current COPC. Importation criteria set at half SSV where used within a simple cover system.

Verification Testing

- 6.1.10 Upon final placement of any cover system within the proposed soft landscaped areas, verification pits should be excavated to prove the depth, and where necessary, the chemical quality of the clean cover and the presence of an appropriate geotextile.
- 6.1.11 A written description and photographic record of each verification pit shall be obtained. Given the proposed development, it is suggested that where appropriate supporting current certification is not available an appropriate number of validation samples of the placed imported cover system will be taken and chemically analysed.
- 6.1.12 Where appropriate supporting current certification is not available in relation to the chemical quality of placed imported cover system material, verification samples will be taken and chemically analysed. The number of validation samples required will be confirmed with the regulatory authorities prior to undertaking the sampling but would be initially suggested as follows:
- One sample for every 100m³ of fill, if the material is imported from a known 'Greenfield' source.
 - One sample per 50m³ of fill if the material is derived from site or imported from an unknown source or off site source without appropriate documentation of non-contaminative history.
- 6.1.13 However, where different sources are utilised to provide the cover system, there may be the need for further testing to confirm the chemical composition of the imported materials.
- 6.2 Verification Reporting
- 6.2.1 In accordance with current guidance, upon completion of the final works a verification report shall be prepared in order to satisfy Condition 14 (verification report) of the approved planning application that demonstrates the effectiveness of the remediation carried out and identifying any requirements for longer-term monitoring of identified pollutant linkages, maintenance and arrangements for contingency action, if appropriate.
- 6.2.2 The final verification report will be prepared in accordance with the requirements of CLR 11 'Model Procedures for the Management of Land Contamination' (DEFRA & Environment Agency, 2004).

6.3 Communications Plan

6.3.1 Should, at any time, verification information show that remediation activities have not achieved the remediation criteria derived for the relevant pollutant linkages or additional assessment undertaken, the following action plan shall be implemented:

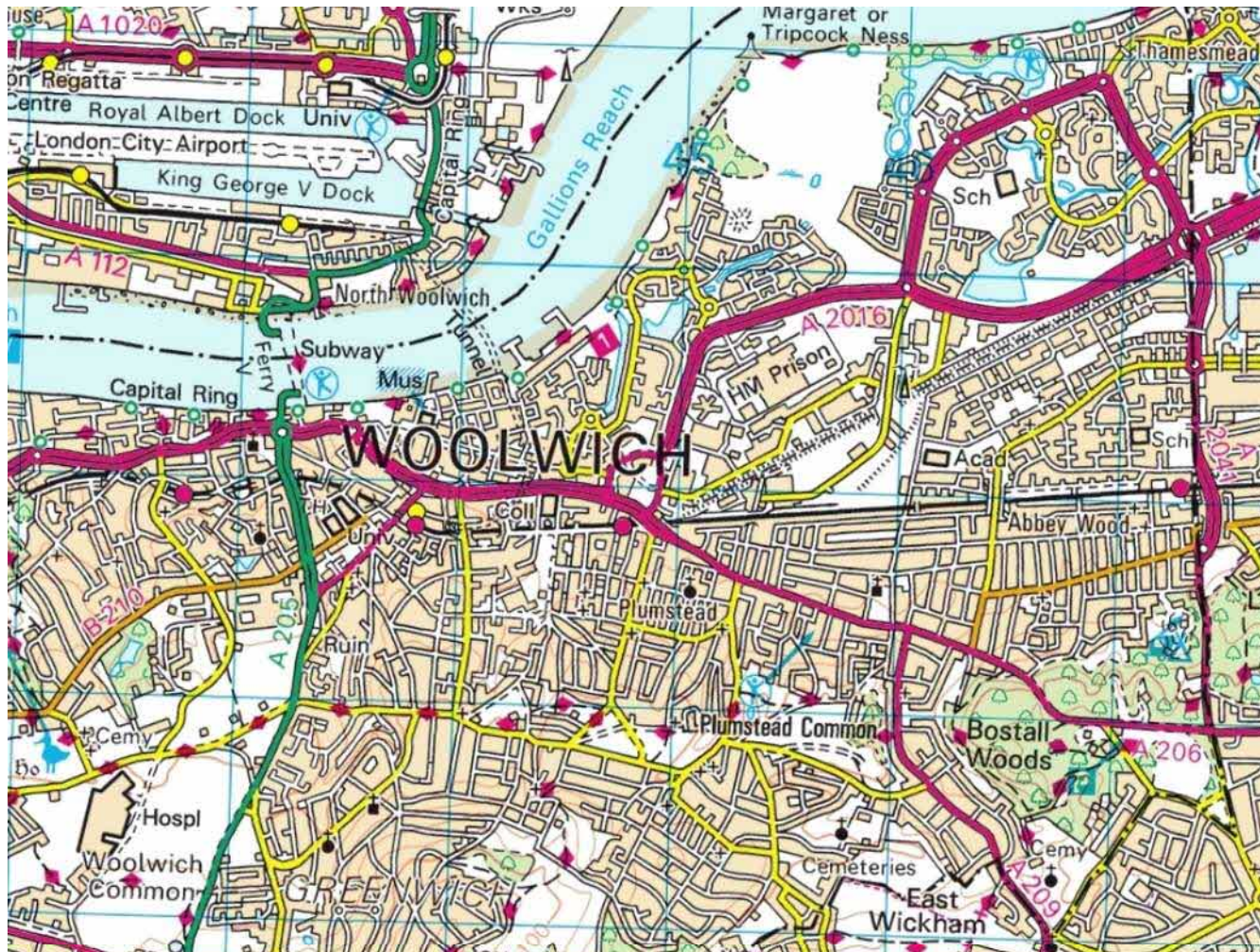
- The results shall be notified to the Local Planning Authority immediately and confirmed in writing;
- Any agreed remedial action will be undertaken within such reasonable time as required by the Local Planning Authority; and
- A report detailing any remedial works undertaken, the monitoring results and the effectiveness of the action plan shall be forwarded to the Local Planning Authority.

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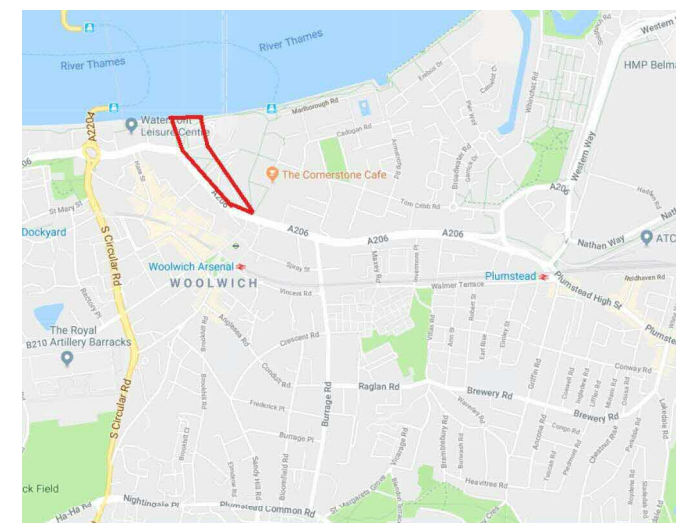
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FIGURES



Approximate Site Location: 



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The Old Chapel
35a Southover
Wells, Somerset
BA5 1UH
Tel: 01745 677760
Fax: 01749 679345
Email: info@tecon.co.uk
www.tecon.co.uk

Site Name:
Royal Arsenal Riverside - Linear Park

Drawing Name:
Site Location Plan

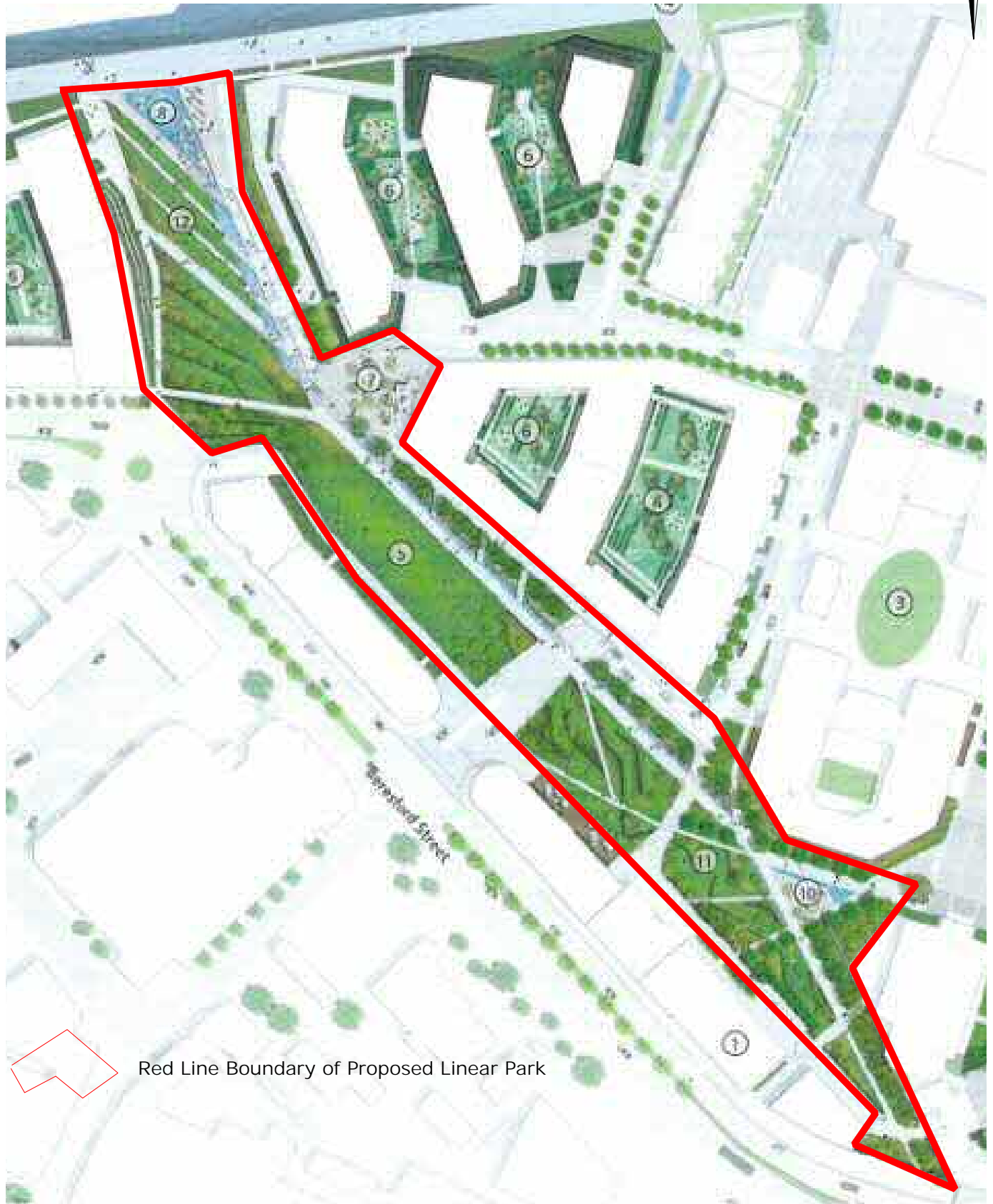
Client Name:
Berkeley Homes (East Thames) Limited

Project No:
1508005.016

Figure No:
1

Date:
March 2018

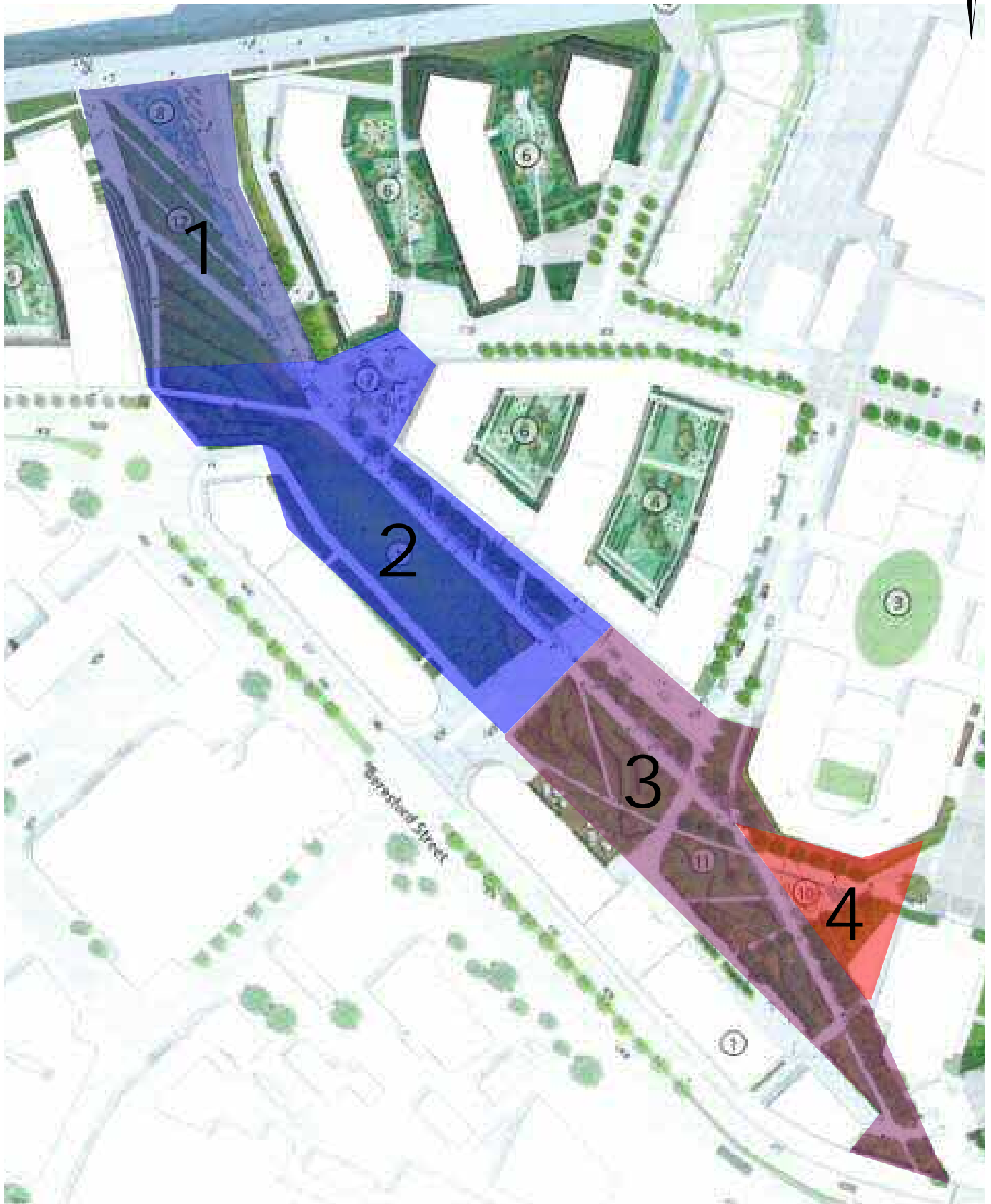
Scale:
NTS




Red Line Boundary of Proposed Linear Park

Extract of Illustrative Waterfront Masterplan - Proposed Waterfront Park Plan

	Tweedie Evans Consulting The Old Chapel 35a Southover Wells, Somerset BA5 1UH	Tel 01745 67776C Email: info@tecon.co.uk www.tecon.co.uk	Site Name: Royal Arsenal Riverside - Linear Park	Scale: NTS
Drawing Name: Proposed Development Plan	Client Name: Berkeley Homes (East Thames) Limited	Project No: 1508005.016	Date: March 2018	Figure No: 2



Extract of Illustrative Waterfront Masterplan - Proposed Waterfront Park Plan

 TWEEDIE EVANS CONSULTING	Tweedie Evans Consulting The Old Chapel 35a Southover Wells, Somerset BA5 1UH	Tel: 01749 577760 Fax: 01749 579345 Email: info@tecon.co.uk www.tecon.co.uk	Site Name: <p style="text-align: center;">Royal Arsenal Riverside - Linear Park</p>	Scale: <p style="text-align: center;">NTS</p>
Drawing Name: <p style="text-align: center;">Linear Park - TEC Zone Designator</p>	Client Name: <p style="text-align: center;">Berkeley Homes (East Thames) Limited</p>	Project No: <p style="text-align: center;">1508005.016</p>	Date: <p style="text-align: center;">March 2018</p>	Figure No: <p style="text-align: center;">3</p>