

1. **This document and its contents have been prepared and are intended solely for St James West London's information and use in relation to providing an addendum to the Remediation Strategy and Options Appraisal for their site located in Southall, London.**
 2. Atkins Limited (Atkins) has been appointed by St James West London Ltd (St James) to undertake a Detailed Quantitative Risk Assessment (DQRA) for controlled waters and human health which will be used to inform the remediation design for the former Southall Gasworks (herein referred to as 'the site'). A site location plan is presented as Figure 1.
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1. The site has the benefit of outline planning permission granted by the Greater London Authority (GLA) Planning Committee on 29th September 2010 on behalf of LB Ealing and LB Hillingdon (permission refs: and 54814/APP/2009/430).

In-situ Groundwater Quality Historical reporting (WYG, 2003) has confirmed the presence of groundwater contamination at the site. This included widespread contamination of total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH), ammonium, cyanide, benzene and phenols. Similar contaminants were reported in Arup's 2015 DQRA (Arup, 2015b) which identified metals, cyanides, ammoniacal nitrogen, sulphate, PAH, phenolic compounds, VOCs, TPH, BTEX (benzene, toluene, ethylbenzene and xylenes) and chlorinated solvents. These contaminants suggest release by former site operations and disposal of waste products on site. Further detail on groundwater contamination is provided later in this report. In-situ groundwater chemistry data collected between 17th November 2014 to 9th January 2015 were analysed. The result of the full monitoring are presented in Appendix F. The in-situ groundwater chemistry measurements provide a useful understanding of the natural attenuation processes within the Lynch Hill Gravel (which is considered the primary pathway for groundwater migration from site).

Receptors The site has been split into a number of development phases (A to I). All phases include residential properties and therefore the critical receptor in all phases is considered to be a female child aged between 0-6 years. This receptor is considered to be the most sensitive and therefore protective of all other receptors that may be present in each of these areas (e.g. adult workers and school children). Offsite receptors comprise local residents (the closest are approximately 10 m distant from the site boundary) and workers in nearby housing and commercial properties.

Pathways which remain are associated with migration of volatile contaminants:
Inhalation of outdoor vapours from potential contaminants within soils; Inhalation of outdoor vapours from potential contaminants within groundwater; and Migration of contaminants off-site within groundwater and inhalation of indoor and outdoor vapours.

Arup's 2015 DQRA report (Arup, 2015b), included an initial generic assessment for human health. Soils were screened against a set of Generic Assessment Criteria (GAC) for a residential landuse with consumption of home grown produce. Arup identified the following contaminants to be taken forward for DQRA: benzo(a)pyrene – surrogate marker for all genotoxic PAH compounds in line with the relevant Health Protection Agency (HPA) Contaminated Land Information Sheet; phenanthrene – surrogate marker for all threshold PAH compounds as it has the most stringent health criteria; free cyanide – number of exceedances present across the site and free cyanide can present an acute risk to health at high concentrations; arsenic and lead – widespread exceedances are present across the site; cadmium – relatively few exceedances but considered as different driving pathways to lead and arsenic; nickel and vanadium – few exceedances but are not co-located with other metal compounds; benzene – surrogate marker for all BTEX compounds as has the most

stringent health criteria value and is the most volatile; naphthalene – widespread exceedances and surrogate for other naphthalene related compounds;

1,2,4-trimethylbenzene – mainly in strata beneath Made Ground. Volatile aromatic hydrocarbon and not co-located with other volatile compounds; cresols – present across the site; xylenols & ethylphenols; and TPH aromatic fractions >C10-C12, >C12-C16, C16-21 and C21-35

7.2.3. Off Site Groundwater Vapours As noted in Section 6.2.2., the groundwater on site contains a number of volatile contaminants which could potentially present a risk to off-site receptors via migration in groundwater and vapour intrusion into buildings. Nearby residential properties are located to the north (some within 10 m) and south (some within 47 m) of the site and have been considered as the critical receptors.

Arup in their 2015 DQRA (Arup, 2015b), identified the following contaminants in groundwater as being of concern for the off-site vapour pathway from groundwater sources: naphthalene; TPH aromatic >C10-12 TPH aromatic >C12-16; 1,2,4-trimethylbenzene; benzene; and vinyl chloride.

1.3. Assumptions and Limitations The findings and opinions conveyed via this report are based on information obtained from a variety of third party sources. Atkins cannot and does not guarantee the authenticity or reliability of the information and no attempt has been made to verify independently any data collected.

Atkins DQRA presents one set of human health criteria (based on residential without consumption or home grown vegetables) for verification and reuse of site won and imported material to be used in the cover system above the marker layer.

there are no private gardens proposed cannot grow veg on the contaminated soil ever !

*Vapour Monitoring The Arup and Atkins' DQRA reports both identified the potential risk to off-site residential receptors from the migration of contaminants within groundwater and the subsequent inhalation of indoor and outdoor vapours. **The main receptors at risk were considered to be the residents within the houses close to (within 10 m) the north-east boundary of the site. The contaminants of concern were identified as naphthalene, TPH aromatic fraction >C8-10, C10-12 and C12-16, 1,2,4 trimethylbenzene, benzene and vinyl chloride. Vapour monitoring to provide background concentrations ahead of the main remediation works and monitoring during remediation to ensure investigation/action levels are not exceeded was recommended in Arup's Remediation Strategy. In Atkins' DQRA report it was recommended that additional soil vapour monitoring and further assessment of the site boundary be undertaken to clarify the potential risk. The background monitoring will include three rounds of monitoring by Atkins undertaken prior to the main remediation works. Thereafter monitoring will be undertaken at a minimum frequency of fortnightly during the course of the remediation works, unless otherwise agreed with the Local Authority. Vapour sampling will be undertaken from ten vapour monitoring wells installed during the Earthworks Remediation Pilot Trials. Sampling will be undertaken in general accordance with British Standard BS5876 (2013) and Health and Safety Executive MDHS 96 (2000). The soil vapour wells will be sampled using absorbent tubes (i.e. tenax) via a calibrated workhorse pump at an appropriate flow rate and sample duration to provide reasonable limits of detection at the laboratory. On completion of monitoring, adsorbent tubes will be submitted to a UKAS accredited laboratory for an appropriate suite of analysis for volatile organic compounds and chlorinated solvents. The data will be analysed and results reported after the initial background monitoring rounds have been undertaken. The report will outline the background concentrations, clarify the potential risk to off-site residents and outline a vapour monitoring strategy for the remediation phase of works, including recommended**

frequency of monitoring, contaminants of concern and provision of action levels and an initial intervention level. The information will be incorporated into the RMS and the RMS will detail a methodology / plan to be followed should a situation be detected where vapour levels are recorded at or above target levels and are continuing to rise towards the intervention levels. The RMS will also contain a methodology that will be followed should intervention levels be exceeded