

Appendix 11-4 TVP P&R Phase 1 Land Contamination Assessment

REPORT N° 70012699-013

THAMES VALLEY PARK AND RIDE, READING, BERKSHIRE

PHASE 1 LAND CONTAMINATION ASSESSMENT

CONFIDENTIAL

APRIL 2016

THAMES VALLEY PARK AND RIDE, READING, BERKSHIRE

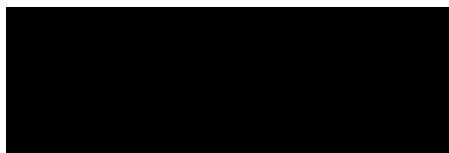
PHASE 1 LAND CONTAMINATION ASSESSMENT

Wokingham Borough Council

**Second Issue
Confidential**

Project no: 70012699-013
Date: April 2016

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EXECUTIVE SUMMARY

WSP UK Ltd. (WSP) was instructed by Wokingham Borough Council (WBC), to undertake a Phase 1 land contamination assessment of Thames Valley Park and Ride, Earley, Reading, Berkshire (the site). WSP understands that WBC proposes to develop the site to comprise a park and ride facility with 277 parking spaces, bus stop and shelter and limited areas of soft landscaping. An environmental assessment is required in order to support the planning application to assess potential environmental liabilities associated with ground contamination.

The site is an irregularly shaped parcel of land, located approximately 1.5 miles east of Reading town centre. It largely comprises areas of dense vegetation, with an area of hard standing and fly tipping in the eastern portion of the site. It was previously part of a wider area of gravel working and is likely to have been infilled, at least in part, with unknown materials. The site is located in a largely commercial setting and potential sources of contamination include a disused gasholder station to the south-west and a mainline railway embankment to the south. The River Thames is located within 20m north of the site, with a marina beyond. Historically, the south of the site was a seed testing facility for approximately 100 years and large factories were present to the east; these areas are now business parks.

The site is considered to be located in a highly sensitive environmental setting, being directly underlain by a Principal Chalk bedrock Aquifer with limited thicknesses of Secondary A superficial Aquifers potentially encroaching on the northern, eastern and southern boundaries of the site. The River Thames is located approximately 20m north of the site and shallow groundwater <5m bgl underlying the site is considered likely to be in hydraulic continuity with this feature. Given the anticipated shallow depth of groundwater, there is potential for lateral migration of contaminants both on and off-site.

The risks associated with contamination from the future development have not been considered, because it is assumed that suitable pollution control measures will be incorporated into the design of the park and ride facility.

Given that the nature of infilled materials and the quality of the shallow groundwater is unknown in the context of redevelopment for a park and ride facility, it is considered that a potential risk exists to human health and controlled waters (the River Thames and underlying aquifers). Using the current desk-based information, the risks to the health for future site users are considered likely to be low across the majority of the site, given the limited exposure durations and the risks to controlled waters are considered to be low to medium.

Surface sealing of the site could alter the current ground gas regime by reducing natural venting and changing migration pathways, thus potentially impacting surrounding premises. Using the current desk-based information, risks to surrounding properties are considered to be moderate.

Given the potential risks from the future development, it is considered likely that intrusive ground investigations across the site will be required by planning conditions/reserved matters to confirm the underlying ground conditions and to characterise the potential risks to human health and controlled waters. This information will also be required by the developer to understand contamination constraints with respect to materials management planning, re-use and disposal, the potential requirements for remediation and H&S requirements under CDM 2015.

1 INTRODUCTION

1.1 AUTHORISATION AND PURPOSE OF ASSESSMENT

WSP UK Ltd. (WSP) was instructed by Wokingham Borough Council (WBC), to undertake a Phase 1 land contamination assessment of Thames Valley Park and Ride, Earley, Reading, Berkshire (the site). The works were commissioned in response to WSP's proposal, reference 70007488, dated 20th February 2015.

WSP understands that the Client proposes to develop the site as a park and ride facility serving Reading town centre. The site is to comprise 277 car parking spaces, a bus stop and shelter and limited areas of soft landscaping. A Phase 1 land contamination assessment is required in order to support the planning application to assess potential environmental liabilities associated with ground contamination.

1.2 AIMS

The key aims of this assessment are to:

- Develop a preliminary conceptual site model for the site to identify potential ground contamination constraints associated with the potential redevelopment of the site for a car parking end use;
- Evaluate the potential liabilities associated with the significant exposure of the identified receptors in the context of the proposed end use; and,
- Provide recommendations on the measures that could be adopted to address the potential liabilities.

This assessment does not consider the potential environmental risks associated with the current land use.

1.3 SCOPE OF WORKS

In order to meet the aims stated in Section 1.2 the following scope of works was undertaken:

- A site walkover survey of accessible areas, to document the current land use and site setting;
- A review of available historical maps within an Envirocheck Report to identify former land uses and potential contaminative activities on and surrounding the site;
- A review of the WBC planning website and contact with the Contaminated Land Officer (CLO);
- A review of relevant publicly available information relating to hydrological features, hydrogeology, neighbouring land use, ecologically sensitive uses and geology in order to establish the environmental setting of the site;
- The development of a preliminary conceptual site model (CSM) following the source-pathway-receptor contaminant linkage approach; and

- An outline of the environmental risks with respect to ground, groundwater and ground gas conditions, which may potentially arise as liabilities or constraints associated with the development of the site.

This report has been prepared in general accordance with:

- Part 2A of The Environmental Protection Act 1990.
- Environment Agency (EA) '*Model Procedures for the Management of Land Contamination*', CLR11. 2004
- The National Planning Policy Framework.
- NHBC, EA and CIEH '*Guidance for the Safe Development of Housing on Land Affected by Contamination*' R&D66. 2008

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1.4 SOURCES OF INFORMATION

The following sources of information have been used in the production of the report:

- Landmark Envirocheck report ref. 68478072_1_1, dated 10 June 2015.
- EA '*What's In Your Backyard?*' website accessed on 28 August 2015.
- British Geological Society (BGS) 1:50,000 Series Geological Map Sheet 268 '*Reading*' (Solid& Drift ed.).
- BGS '*Geology of Britain*' online viewer accessed on 14 September 2014.
- Wokingham Borough Council planning search website accessed on 14 September 2015.

No third party reports pertaining to the site were available for review.

1.5 LIMITATIONS

This report is addressed to and may be relied upon by WBC. It may not be relied upon or transferred to any other parties without the express written agreement of WSP. The report should be read and used in full. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party. WSP cannot be held liable for third party information. Full details of the limitations are provided as **Appendix A**.

2

SUMMARY OF THE SITE AND SURROUNDING AREA

Site location and layout plans are provided as **Figures 1** and **2**. The Masterplan is presented as **Figure 3**.

It was not possible to undertake a full walkover survey of the site due to a number of health and safety issues including rough sleepers and the presence of sharps. However, a perimeter survey and walkover of accessible surrounding areas of the site was carried out by a representative of WSP on 2 September 2015 and a photographic record is provided as **Appendix B. Table 2-1** provides details of the site obtained from a review of online aerial photography, key regulatory information obtained from the Envirocheck® report (**Appendix C**) and key observations made during the walkover.

Table 2-1: Site Information

Details	Description
Name and Address of Site	Thames Valley Park and Ride, Earley, Reading, Berkshire, RG6 1AZ
Grid Reference	The site is centred on NGR 473390, 173890
Site Ownership/ Occupation	The site is currently unused parcels of land owned by: ■ Wokingham Borough Council – south-eastern portion. ■ The University of Reading – the majority of the towpath along the northern boundary, extending across the northern site boundary. ■ Wokingham Waterside Centre – boat house and land adjacent to the south. ■ The Oracle Corporation - remaining site areas. The site ownership plan is presented as Figure 4.
Site Description and Current Use	The site is currently unused and largely occupied by dense vegetation. It is a roughly triangular-shaped parcel of land, located approximately 1.5 miles east of Reading town centre in a predominantly commercial area. The main access point into the site is a car park leading off Thames Valley Park on the eastern boundary of the site. An area of hard standing is located on the eastern portion of the site adjacent to the roundabout on Thames Valley Park Drive which was anecdotally referred to as a previous storage area for construction materials. Extensive fly tipping was observed in this portion of the site, including wood, road signs, cones, glass, cans, a sleeping bag, building rubble, bricks, sand and paving stones. The remaining areas of the site were observed to be covered by dense vegetation.
Site Area and Topography	The site is approximately 1.7 ha in size. The site lies at approximately 40m AOD in a relatively flat area. Beyond the southern site boundary is a railway embankment and business park which are approximately 5-10m higher than the site level.
Surrounding Area	The site lies in a largely commercial area on the floodplain of the River Thames. The following land uses were observed adjacent to the site: North: largely dense vegetation with the River Thames approximately 20m to the north, flowing from south-west to north-east. In the centre of the northern boundary is The Dreadnought, a former pub now occupied by Reading University Boat Club. A bunded tank, of unknown contents and observed to be in good condition was present at this location (approximate dimensions 1m x 0.5m x 0.5m). North-east: bounded by the Wokingham Waterside Centre and car park and an area of waste storage adjacent to the east of the Centre. Adjacent to the west of this building is a retaining wall and area of foundations, where it is understood a former boathouse

stood. Adjacent to the south of Wokingham Waterside Centre building was a wooden building of unknown purpose, possibly a workshop.

East: a roundabout bounds the site, with Thames Valley Park and commercial facilities beyond.

South: a railway line running east to west on an embankment forms the perimeter of the site. Beyond this are Suttons Business Park and two disused gas holders to the south-west.

West: dense grass and scrub vegetation bounds the site. Three areas of rough sleepers were observed in this area during the site walkover.

3 ENVIRONMENTAL SETTING

3.1 GEOLOGY

The 1:50,000 BGS Map, BGS online geology viewer and select BGS borehole records for locations in the vicinity of the site (logs provided in **Appendix C**) were reviewed in order to gain an understanding of the underlying geology. The majority of the site is directly underlain by the Seaford and Newhaven Chalk Formation bedrocks which extend to >100m thick. Alluvial drift deposits comprising '*clay, silt, sand and gravel*' may extend onto the northern boundary along the River Thames and sands and gravels of the Kempton Park Gravel Formation underlain by the Taplow Gravel Formation may extend onto the eastern and southern boundaries. The thickness of the superficial deposits has been determined from adjacent BGS boreholes to be <5m and the Chalk appears to have been water bearing at shallow depths (generally <5m bgl).

3.2 HYDROGEOLOGY AND HYDROLOGY

The Kempton Park Gravel Formation, Taplow Gravel Formation and Alluvium are all designated Secondary A Aquifers as designated by the Environment Agency (EA). The underlying Chalk bedrock is designated as a Principal Aquifer by the EA. The available borehole logs at adjacent locations indicate that groundwater is present in both superficial and bedrock deposits, between 2.6 – 8.3m bgl at the time of measurement.

The site is located within the Water Framework Directive (WFD) Thame and South Chilterns management catchment of the Thames River Basin District and the land adjacent to the west of the site is located within a Zone 3 (total catchment area) groundwater Source Protection Zone (SPZ) for public water supply. The site is within a surface water safeguard zone with respect to Drinking Water as defined by the EA.

The nearest named surface water feature is the River Thames within 20m of the northern boundary, which is reported by the EA to be heavily modified in this location. The EA has assessed its current ecological and chemical status in the vicinity of the site to be Moderate Potential and Good respectively, and predicts that its status will be unchanged in 2015, although the EA evaluates that there is a risk that this may not be achieved. Adjacent to the north of the River Thames is a marina, of which the ecological and chemical status has not been classified by the EA. The marinas were former gravel extraction pits, which during extraction filled with water to create the water features. The pits were connected to the River Thames in the mid-1990s approximately 400m north of the site. A surface water channel was observed between the River Thames and the marina approximately 40m north of the site at the time of the walkover.

One outfall is present adjacent to the centre of the northern boundary flowing into the River Thames on the 2006 Envirocheck historical map. This was not determined to be present during the site walkover.

Ten current licensed groundwater abstractions are recorded within a 1km radius of the site. Four of these are at the site, one issued to the University of Reading research site and the other three issued to Wokingham Waterside Centre Ltd for the purpose of maintaining sports grounds/ facilities. The other six abstractions are located between 420 – 660m of the site, four of which are to Thames Valley Park Manco Ltd for business parks: spray irrigation/ top up water, one to M J Gleeson Group Plc for pollution remediation at a former gasworks and one to the Environment Agency for staff welfare, boiler feed. The last of these is from the chalk aquifer, the aquifers for other abstractions are unknown. No surface water abstractions are recorded within 1km of the site.

The northern boundary of the site is within a Flood Warning Area as defined by the EA, although this report does not purport to be a flood risk assessment.

3.3 DESIGNATED ECOLOGICAL SITES AND OTHER SENSITIVE LAND USES

There are no designated ecological sites or other sensitive land uses within 1km of the site.

3.4 PRELIMINARY HYDROGEOLOGICAL MODEL

Based on the borehole information reviewed, it is anticipated that shallow groundwater is present within underlying superficial deposits and Chalk bedrock beneath the site and furthermore, that groundwater within these aquifers is in vertical hydraulic continuity. The dominant surface water feature in the vicinity of the site is the River Thames, flowing in a westerly direction at this location. Given the presence of shallow groundwater it is considered probable that this water is in hydraulic continuity with the river, and as such it is considered likely that groundwater is flowing towards the north/west as a continuum of the river. In periods of high water the River Thames could recharge the groundwater beneath the site. Further effects could influence groundwater flow direction including the variable nature of superficial deposits and the Thames being highly modified at this location.

An outfall is identified on historical maps to the north of the site, which could act as a direct pathway for water to the River Thames from the site.

3.5 RADON

The Envirocheck® report indicates that the site is located in a lower probability radon area, as less than 1% of the homes are above the action level.

4

POTENTIALLY CONTAMINATIVE LAND USES

4.1

SITE USE

Table 4-1 provides information relevant to identifying current potential contaminative land uses, activities and incidents relating to the site. The information was obtained from a review of OS mapping, online aerial photography, key regulatory information obtained from the Envirocheck report, the EA 'What's In Your Backyard?' website and key observations made during the walkover. The walkover was not undertaken within the site boundary.

Table 4-1: Current Potential On-Site Contaminative Land Uses, Activities and Incidents

Activity / Incident	Description	Regulatory Information
Operations and Processes	New Town Gravel Pit, an opencast sand and gravel pit was located at the site. Extraction has ceased and operation dates are unknown.	Envirocheck Report
Bulk Storage of Chemicals/ Fuels	No chemical/ fuel storage tanks were observed at the site and no records of licences or permits exist.	Site walkover
Waste Storage	Extensive fly tipping was observed on hard standing on the eastern boundary of the site including wood, road signs, cones, glass, cans, a sleeping bag, building rubble, bricks, sand and paving stones. No potential asbestos containing materials were observed. No records of licences or permits exist.	Site walkover
Drainage / Services	No drainage survey or drainage plans were available for review and no inspection covers were lifted. Two overhead pylons were observed running south-west to north-east across the site. One pollution incident to controlled waters was recorded at the site, in March 1989 of unknown oils. Classified as category 3, minor incident. The impacted water body is unknown.	Site walkover Envirocheck Report
Observations of Impact	During the site walkover, no external hydrocarbon or other staining of the ground was observed. Furthermore, no evidence of vegetation stress was noted. It is understood that sharps have been fly tipped across the site, the location of which are unknown.	Site walkover Anecdotal information

4.2 LAND USES IN THE SURROUNDING AREA

Following a review of relevant information obtained from the Envirocheck® Report the relevant regulators, and observations made during the site visit, a summary of sites, activities and incidents determined by WSP to be of note within 250m of the site are provided in **Table 4-2**.

Table 4-2: Summary of Potential Land Uses, Activities and Incidents in the Immediate Surrounding Area

Land Use	Distance (m) / Direction	Source(s) of Information
One active discharge consent, issued to Thames Water Utilities Ltd. Issued September 2010 for sewage discharges.	100m E	Envirocheck Report
Three pollution incidents to controlled waters, dated May 1991, November 1994 and July 1997. Two of which were classified as category 3 – minor incidents due to unknown oils and one was classified as category 2 – significant incident of an unknown pollutant.	210 – 220m W	Envirocheck Report
One historical landfill site at Deans Farm (a licensed waste management facility, issued June 1992). Landfill taking construction, demolition and dredging waste.	130m NW	Envirocheck Report/ EA 'What's in your backyard'
Napier Road landfill, operation dates unknown. Landfill taking inert and industrial wastes.	290m W	
Thames Valley Park landfill, operational between 1987 and 1989, for the deposition of pulverised fuel ash and asbestos.	320m E	
Gasholders operated by Transco Plc.	90m SW	Envirocheck Report COMAH records
Two ceased opencast gravel pits referred to as 'New Town Gravel Pit' for the extraction of sand and gravel.	80m E/ 210m SW	Envirocheck Report
Six active contemporary trade directory entries issued to pest and vermin control, computer manufacturers, distribution services, damp and dry rot control, garage equipment and domestic appliance repairs.	120 to 240m SE and SW	Envirocheck Report
Four 7kg butane cylinders were observed adjacent to a wooden building as part of Wokingham Waterside Centre along the northern boundary of the site.	Adjacent N	Site walkover

4.3 SITE HISTORY

Historical maps were obtained as part of the Envirocheck® report and were reviewed to identify any potentially former land uses upon the site and within a 250m radius of the site boundary.

The earliest historical map of 1879 presents the site in a semi-rural setting, within an area of gravel pitting and farm land. The majority of the site itself, particularly the western half, was part of wider worked and previously worked gravel pits which were all disused by the end of the 19th century. The area appears from the historical maps to have been infilled in the 1960s/1970s although no records of historical landfilling were identified in WSP's data search. No evidence of ground depressions or raised land was observed on the site walkover.

Between 1932 and 1934 allotment gardens were present in the south-eastern portion. No further change was observed at the site to the present day, although the allotments were no longer present during the site walkover.

Sutton's Seeds had a large facility for testing seeds to the south of the railway embankment which extended >500m beyond the south-eastern boundary of the subject site. Information on Sutton's Seeds history obtained from www.suttons.co.uk indicates that this may have been present from the 1840s until its closure in 1976. The historical maps show that the testing ground comprised large areas of open ground, presumably used for planting, with a tank 100m to the south of the subject site. This is considered likely to have contained water given its proximity to a wind pump. Between 100 and 200m, an area of glasshouses was constructed with associated tanks, 100 m to the south of the subject site. The Sutton's Seeds trial ground was redeveloped in the late 1970s as a business park.

A significant area of gravel workings occurred to the north of the site between 100 and >1km. At its closest point, it was 100 m from the subject site boundary in 1979. The pit is now water filled and is a marina and nature reserve.

Table 4-3 provides a summary of other relevant information for potential historical off-site sources noted on the available mapping

Table 4-3: Summary of Off-Site Pertinent History of Areas Surrounding The Site

Historical Off-Site Land Use	Distance from Site Boundary	Direction from Site Boundary	Dates of maps
Dreadnought (public house/ boat house)	Adjacent	N	pre 1879 – present
Railway embankment	Adjacent	S	pre 1879 – present
Gravel pit	200m	S	1899 – 1901
Wokingham Waterside Centre/ Boat house	Adjacent	NW	1912 – present
Gas works	350 – >500m	SW	1900 – present
Gas holder station (originally associated with gasworks and comprising one gas holder)	100m	SW	1933 – present
Second gas holder	100m	SW	1957 – present
Brick works (disused from 1900), becomes Kiln Farm with wind pump in 1913.	600m	E	1883 – 1938
Factory and old works (1961), factories and old works (1973), power station (800m E). Correspondence with the Contaminated Land Officer (CLO) indicates that a metal galvanising factory and metal casement factory were located 110m and 240m east respectively.	100m – >1km	E	1961 – 1991
A wetland nature reserve was created at the location of Earley Power Station Landfill and residual material that was excavated from this location and not removed off-site was buried on-site as a landfill known as Thames Valley Park between 1987 and 1989. Deposited material included pulverised fuel ash and asbestos. These landfills are located beyond 300m E of the site.			
Thames Valley Park constructed at this site in the mid-1990s.			

4.4 REGULATORY CONSULTATION

The Contaminated Land Officer (CLO) at Wokingham Borough Council was contacted requesting any pertinent information relating to the site. Their response is presented within **Appendix C**. Pertinent information not already included above and within 250m of the site includes:

- The presence of an 'Old Gravel Pit' between approximately 1899 and 1936. In the 1950s the gravel pit is no longer denoted but there is evidence of excavations and uneven ground on the site. In the 1970s the ground surface at the site appears level, suggesting the excavations have been filled;
- There are no records of any known contamination or pollution issues associated with the site itself or any adjacent sites; and
- There are no records of any known contamination or pollution issues associated with the site itself or any adjacent sites.

The Environment Agency, South East Area, was contacted on 14th September 2015 for information on watercourses, water abstractions, discharges and radioactive substances within the vicinity of the site. Pertinent information reported comprised:

- There are no environmental permits for industrial installations, waste operations or radioactive substances within 1km of the site.
- There are 14 active and inactive Environmental Permits for water discharge within 1km of the site. There is one active discharge within 250m of the site issued to Thames Water Utilities Ltd for a pumping station located 200m from the site (directions unknown).

4.5 PLANNING APPLICATIONS

A search was conducted for planning applications on the Wokingham Borough Council planning website for the vicinity of the site. Pertinent information includes:

- Thames Valley Park, applications dated from 1996. None of the planning applications viewed relate to potential ground contamination or remediation.
- A search for Wokingham Waterside Centre indicates the presence of an unknown tank at the southern portion of their land. It is considered possible that this tank is present within the observed wooden building during the site walkover.
- Application No. DEM/2014/0790, for the Gas Works Kennet Side Reading. Application for demolition of gas holders and buildings and pipework operation. Approved 14/05/2014. This application was for the gas holders approximately 500m south-west of the site. No planning applications were found relating to the gas holders approximately 100m south-west of the site.

5

PRELIMINARY CONCEPTUAL MODEL

5.1 INTRODUCTION

This section of the report presents the characteristics of the site and provides a systematic evaluation of the risks to enable uncertainties and further assessment needs or other actions to be identified. It draws on the information presented in earlier sections of the report to identify plausible contaminant-pathway-receptor contaminant linkages in the context of the proposed future land use.

5.2 POTENTIAL CONTAMINANT SOURCES

Table 5-1 provides a summary of the potential sources of contamination and the likely nature of such sources both on Site and in the immediate surrounds.

Table 5-1: Potential Plausible Sources of Contamination

Potential Source	Potential Contaminants of Concern	Likely/Anticipated Distribution
On-Site		
Former gravel working and probably infilling	Soil gases (methane and carbon dioxide). Nature and origin of fill material unknown and could contain a wide range of potential contaminants including: Petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), asbestos, metals, volatile and semi volatile organic compounds (VOCs/ SVOCs).	Particularly the western and northern portions of the site which coincides with the extent of working from historical maps.
Fly tipping	A wide range of potential contaminants including: Petroleum hydrocarbons, PAHs, asbestos, metals, VOCs, SVOCs.	Fly tipping in the eastern portion of the site. Likely limited to localised sources.
Off-Site		
Adjacent railway line and embankment	Leaching from the embankment which is constructed of unknown materials, plus railway operations, likely to include: heavy metals, petroleum hydrocarbons, PAHs, herbicides and pesticides.	Migration onto the southern boundary of the site.
Gravel workings and landfills in the vicinity of the site	Soil gases (methane and carbon dioxide).	Migration onto site as gases via the unsaturated zone.
Gas generation from Alluvial deposits	Nature of fill material unknown and could contain a wide range of potential contaminants including: Petroleum hydrocarbons, PAHs), asbestos, metals, VOCs, SVOCs.	Migration onto site of leachates within groundwater.
Tank observed at the Dreadnought and reported to be present at Wokingham Waterside Centre	A wide range of potential contaminants including: petroleum hydrocarbons, VOCs, SVOCs.	Migration onto northern portion of the site.
Suttons Seeds testing ground	A wide range of contaminants including: metals, pesticides, herbicides, fuels.	Redeveloped in 1970s and consequently remediation may have followed previous

Potential Source	Potential Contaminants of Concern	Likely/Anticipated Distribution
		standards. Given the 5-10 m drop between this site and the subject site, the unsaturated zone is likely to be thicker which will allow attenuation of contaminants prior to entering the groundwater.
Gas holder station	A wide range of potential contaminants including: heavy metals, petroleum hydrocarbons, VOCs, SVOCs, PAHs, solvents, sulphates, sulphides, carbonates, phosphates, cyanides, ammoniacal nitrogen, oxides, phenols.	Migration onto south-western boundary of the site. Given the 5-10 m drop between this site and the subject site, the unsaturated zone is likely to be thicker which will allow attenuation of contaminants prior to entering the groundwater.

The former gas works beyond 350m south west have been discounted as they are understood to have been remediated due to the prior issued abstraction license contained within the Envirocheck report and planning application DEM/2014/0790. The business park to the south of the site has not been included in the above table, as no potentially contaminative sources were identified.

The former power station and subsequent landfilling has been discounted as the area has been redeveloped as Thames Valley Park, is down inferred hydraulic gradient and is beyond 300m east of the site.

The presence of sharps identified on site was not considered a ground contamination issue, but should instead be considered in terms of health and safety during future works at the site.

Future sources of contamination associated with car parking (e.g. fuel spillages) have been discounted as a potential contaminant source because it is assumed that the design of the Park and Ride site will include suitable pollution control measures such as oil interceptors.

5.3 POTENTIAL RECEPTORS

In the context of the proposed future land uses, the following potential receptors of soil and/or groundwater impact were identified:

HUMAN HEALTH

- Future site users (workers at and users of park and ride facility); and
- Neighbouring commercial/ public land users.

WATER ENVIRONMENT

- River Thames within 20m north of the site; and
- Underlying and adjacent Principal and Secondary A Aquifers (including local groundwater abstractions).

OTHER

- Below ground building structures and services; and
- Structures on-site.

5.4 PLAUSIBLE CONTAMINANT LINKAGES

Table 5-2 provides an evaluation of the potential contaminant linkages that were considered to be plausible on the basis of the current master plan and information currently available for the site.

Table 5-2: Plausible Contaminant Linkages

Potential Contaminants	Potential Pathways	Potential Receptors	Comments
All on and off-site contaminants in soils and groundwater	Dermal contact, ingestion and inhalation of impacted soil particles and asbestos fibres in areas of soft landscaping.	→ Future site users → Future maintenance workers	Limited exposure durations expected. Extensive hardstanding will further restrict exposure. No visual or olfactory evidence of contamination observed during site walkover.
	Vertical leaching from impacted soil and lateral migration of impacted groundwater derived from on-site sources.	→ River Thames → Underlying Principal Chalk Aquifer → Superficial Secondary A aquifers	Ten licensed groundwater abstractions recorded within a 1km radius of the site. Four of these are at the site, one of which is issued to the University of Reading for research and the other three are issued to Wokingham Waterside Centre Ltd for maintaining sports grounds/ facilities.
	Surface run-off/ outfall to the River Thames		
Ground gas generation from possible infilled gravel pit on-site, off-site former gravel workings and alluvial deposits	Migration and inhalation of gases derived from the degradation of landfill and organic materials. Ingress into buildings via service penetrations, floor construction and cracks, wall cavities, etc.	→ Future site users → Adjacent land users	Accumulation of hazardous gases in confined spaces, may increase the risk of explosion of methane and asphyxiation by carbon dioxide under extreme weather conditions such as low and falling atmospheric pressure. Anticipated low risk on-site due to limited buildings/structures that will be occupied. Potential for gas migration and venting from site and within surrounding area to be altered due to surface sealing of the site.
Volatile compounds	Inhalation of vapours derived from on-site soil and groundwater, and off-site groundwater e.g. gasholder station.	→ Future site users → Adjacent land users	Limited exposure durations expected for site users.
Aggressive compounds	Direct contact with impacted soils and groundwater (derived from on- and off-site e.g. gasholder station)	→ Below ground construction materials including concrete and drainage pipes	

It is assumed that construction practices will minimise exposure of adjacent neighbours and construction workers, and these have been discounted from this assessment. Furthermore, it is assumed the construction of the car park will include suitable pollution control measures associated with car parking (e.g. interceptors to protect controlled waters).

6

CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

The site is located in a largely commercial setting with a history of widespread gravel extraction at and in the vicinity of the site. Based on the findings of the site walkover and desk-based assessment, it is considered that the site is set in a location of high environmental sensitivity and vulnerability. The site is underlain by the Seaford and Newhaven Chalk Formation a Principal bedrock Aquifer, which is a major source of public water supply in the south of England, although not within 1km of the site. There are however, ten groundwater abstractions for commercial and irrigation purposes within 1km of the site which may be abstracted from the Chalk and/or the overlying superficial Secondary A aquifers. Groundwater data from the BGS suggests that the Chalk bedrock is almost fully saturated beneath the site. Where the superficial deposits may overlie the Chalk aquifer, on the northern, eastern and southern boundaries of the site, it is anticipated that these are <5 m thick and in vertical hydraulic connectivity with the Chalk, thus affording little protection or attenuation of contaminants that may be leaching from near-surface. In addition, the River Thames is located 20m to the north of the site and it is highly probable that this is in hydraulic continuity with the shallow groundwater beneath the site.

In the context of redevelopment for a park and ride facility, a potential risk exists to human health and controlled waters (the River Thames and underlying aquifers). The risks to human health are considered likely to be low across the majority of the site, but localised higher risks may exist, and the risks to controlled waters are considered to be low to moderate. The impact from soil gas is considered to be moderate, particularly for surrounding properties. Of principal concern is the nature of possible infilled materials and the presence of superficial alluvial deposits which may result in gassing from the site and the surroundings. Future surface sealing of the site as a car park may result in alteration of the current gas flow regime by reducing natural venting and changing current migration pathways, thus potentially impacting surrounding premises. Furthermore, given the nature of the underlying geology and historical and current on-site and surrounding land uses (including gravel working, factories, seed testing, railway land and a gasholder station), there is potential for lateral migration of soil contaminants and gases both onto and off the site.

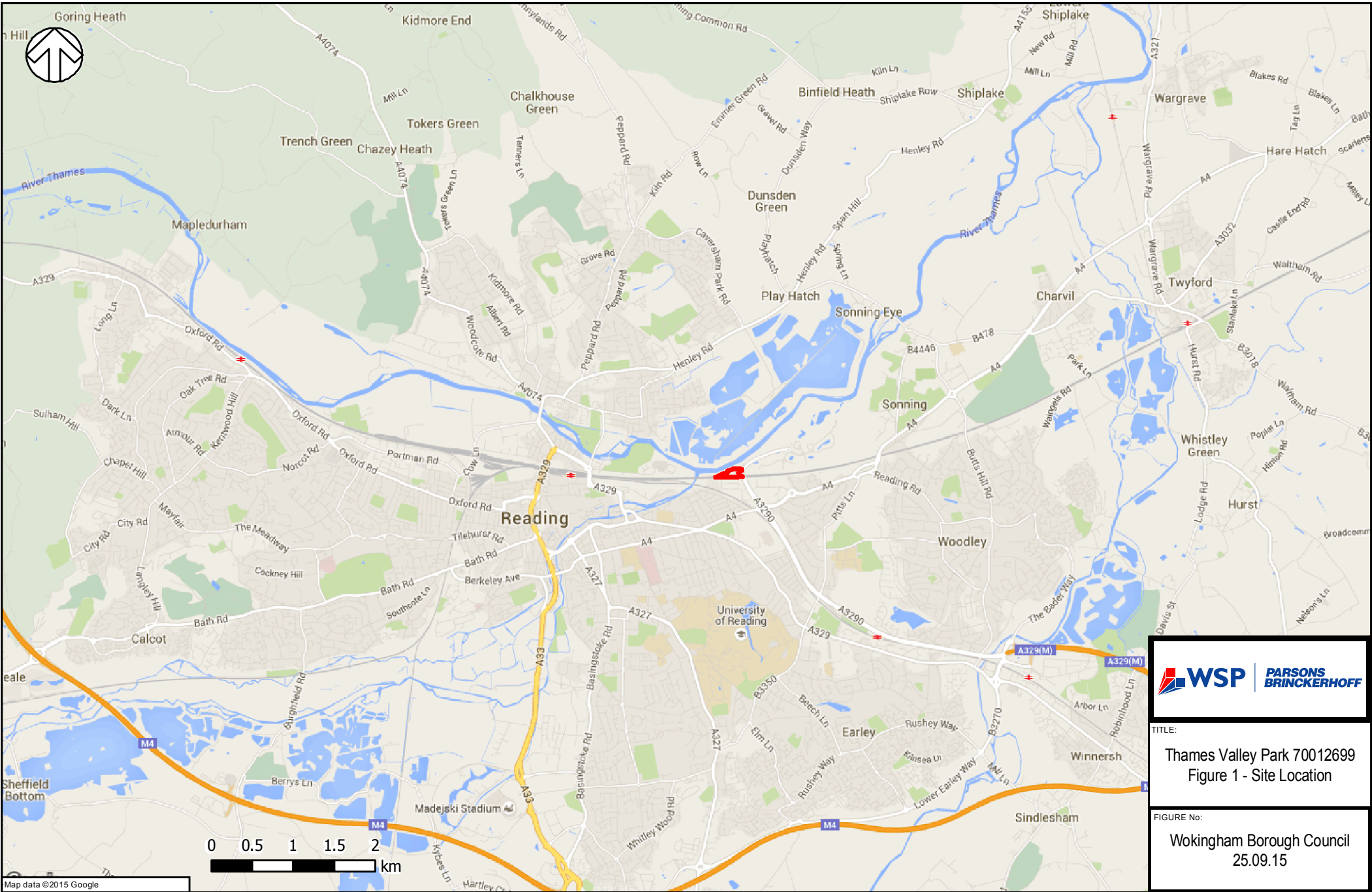
6.2 RECOMMENDATIONS

It is considered likely that intrusive ground investigations across the site will be required by planning conditions/reserved matters to confirm the underlying ground conditions and to characterise the potential risks to human health and controlled waters, in particular from ground gases. This information will also be required by the developer to understand contamination constraints with respect to materials management planning, re-use and disposal, the potential requirements for remediation, and H&S requirements under CDM 2015.

Figures

APPENDIX A-1

FIGURE 1 – SITE LOCATION PLAN

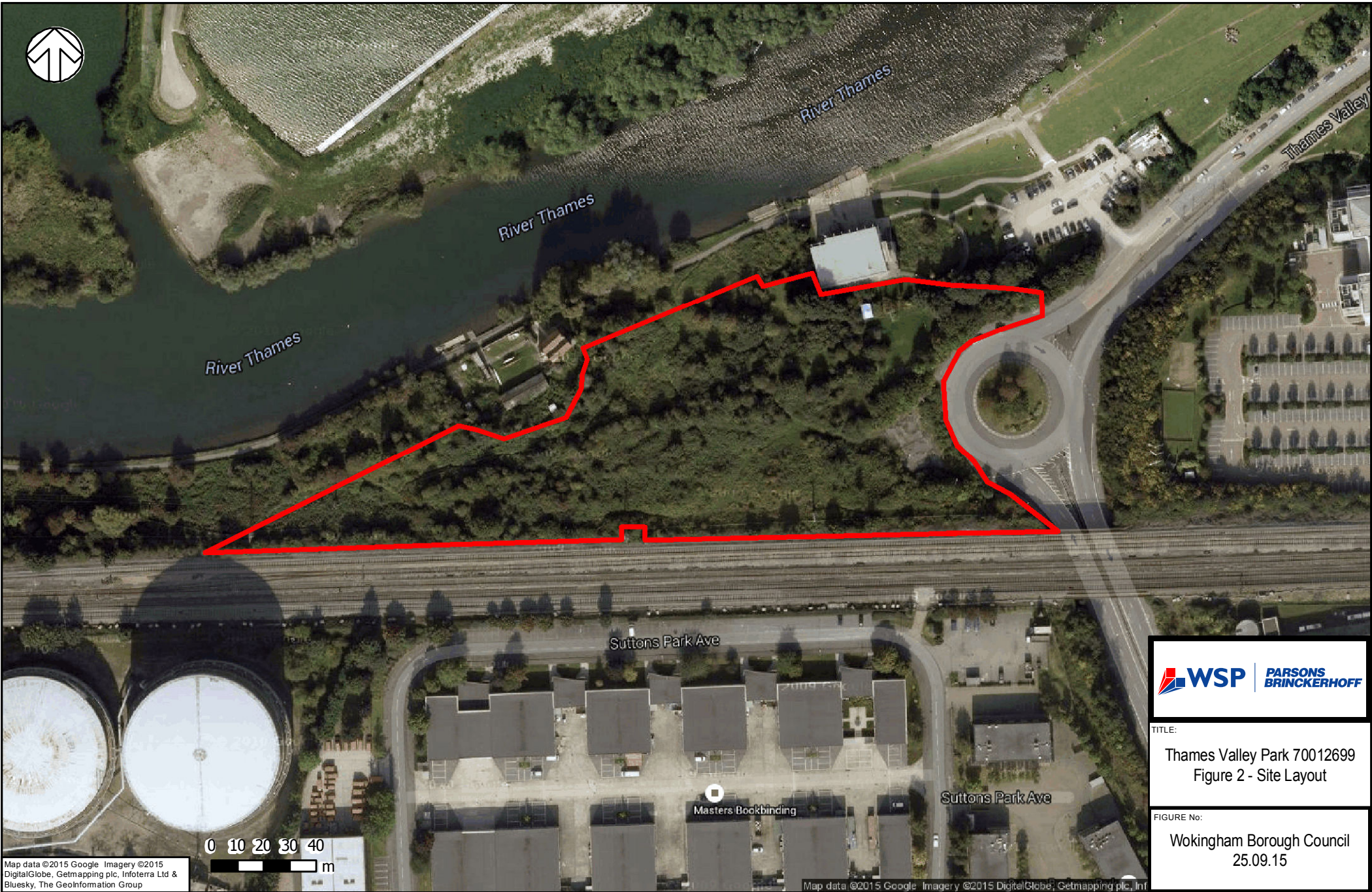


TITLE:
Thames Valley Park 70012699
Figure 1 - Site Location

FIGURE No:
Wokingham Borough Council
25.09.15

APPENDIX A-2

FIGURE 2 – SITE LAYOUT PLAN



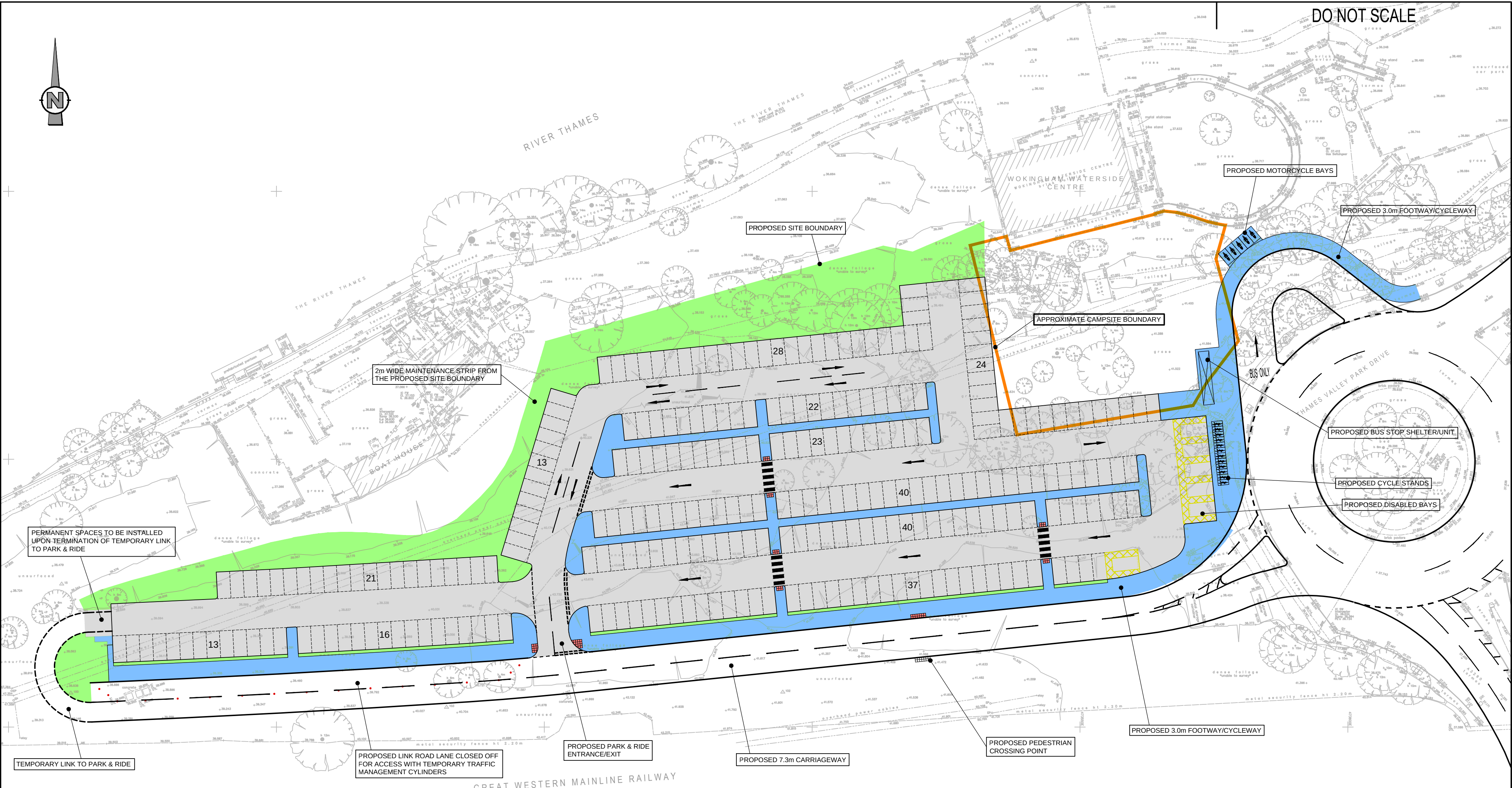
TITLE:
Thames Valley Park 70012699
Figure 2 - Site Layout

FIGURE No:
Wokingham Borough Council
25.09.15

APPENDIX A-3

FIGURE 3 – REDEVELOPMENT MASTERPLAN

G:\WOKINGHAM HIGHWAY ALLIANCE\TRAFFIC MANAGEMENT\201516 PROGRAMME\FEASIBILITY SCHEMES\THAMES VALLEY PARK\DRAWINGS\AUTOCAD\5049_TVP_SK_006.DWG 19/05/2016 07:49:45 Tim Allen



REV	DATE	BY	DESCRIPTION	CHK	APD
C	18/05/16	TRA	ROUNDABOUT/ENTRY ARM AMENDED	TRA	TB
B	03/02/16	TRA	BUS STOPS AND TOILET BLOCK REMOVED	TRA	TB
A	19/11/15	TRA	FIRST ISSUE	TRA	TB

DRAWING STATUS: FOR INFORMATION ONLY



**WOKINGHAM
BOROUGH COUNCIL**

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CLIENT:	WOKINGHAM BOROUGH COUNCIL
ARCHITECT:	

PROJECT:	THAMES VALLEY PARK PARK & RIDE
TITLE:	PRELIMINARY LAYOUT - OPTION 6 EXCLUDING CAMPSITE AREA & EXTRA SPACES 277 SPACES (INCLUDES 6 DISABLED SPACES)

SCALE @ A2:	1:500	CHECKED:	TB	APPROVED:	SR
CAD FILE:	5049_TVP_SK_006	DESIGN-DRAWN:	TRA	DATE:	November 2015
PROJECT No:	5049	DRAWING No:	TVP/SK/006	REV:	C

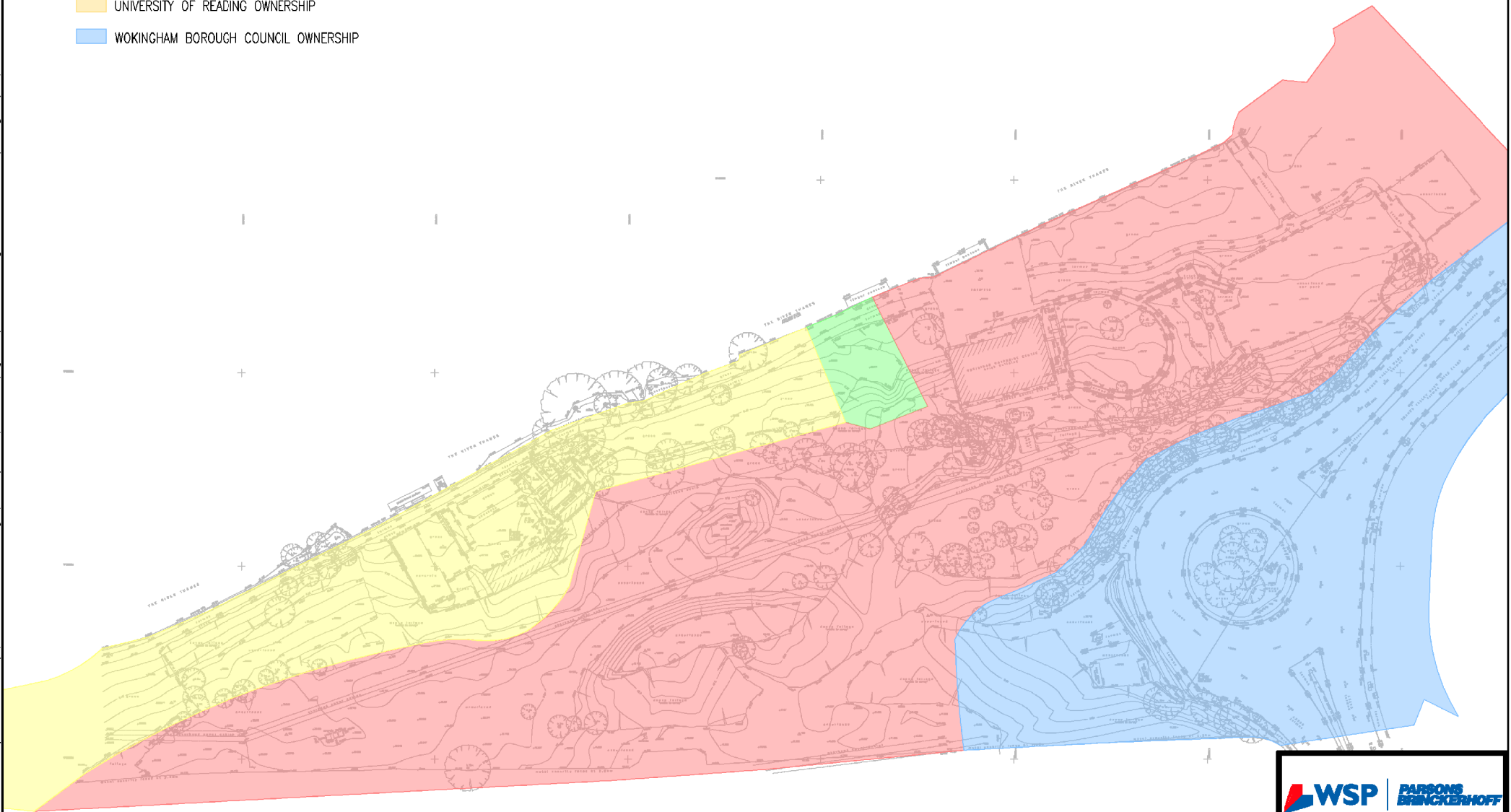
APPENDIX A-4

FIGURE 4 – SITE OWNERSHIP PLAN



KEY:

- ORACLE CORPORATION OWNERSHIP
- WOKINGHAM WATERSIDE CENTRE OWNERSHIP
- UNIVERSITY OF READING OWNERSHIP
- WOKINGHAM BOROUGH COUNCIL OWNERSHIP



TITLE:

LAND OWNERSHIPS

FIGURE No.

4

Appendix A

LIMITATIONS

LIMITATIONS FOR GROUND RISK AND REMEDIATION DIVISION

General

WSP has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report. Unless explicitly agreed otherwise, in writing, this report has been prepared under WSP Standard Terms and Conditions, as included within our proposal to the Client.

Project specific appointment documents may be agreed on a project by project basis, at our discretion. A charge may be levied for both the time to review and finalise appointments documents and also for associated changes to the appointment terms. WSP reserve the right to amend the fee should any changes to the appointment terms create an increase risk to WSP.

The report needs to be considered in the light of the WSP proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report. The report is only valid for its originally intended purpose as set out in either our report or the proposal.

Phase 1 Geo Environmental Preliminary Risk Assessments

The works undertaken to prepare this report comprise a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. It is not standard, due to the timescales, to visit archives and local libraries as part of these works. WSP cannot be held responsible for any disclosures that are provided post production of our report and will not automatically update our report.

The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, WSP reserves the right to review such information and, if warranted, to modify the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed. Actual risks can only be assessed following intrusive investigations of the Site.

WSP does not warrant work / data undertaken / provided by others.

This section covers reports with the following titles or combination of titles: Phase 1; Desk Top Study; Geo-Environmental Assessment; Development Appraisal; Preliminary Environmental Risk Assessment; Constraints Report; Due Diligence Report; Geotechnical Development Review; Environmental Statement; Environmental Chapter; Geotechnical Development Risk Register or Baseline Environmental Assessment. These limitations associated with preliminary works also apply when they are reported within an intrusive investigation report.

Appendix B

LIMITATIONS

APPENDIX B

PHOTOGRAPHIC RECORD



Plate 1: Evidence of waste storage at Wokingham Waterside Centre.



Plate 2: Looking west along the River Thames and towards Wokingham Waterside Centre.

Photographic Record



Plate 3: Possible workshop at Wokingham Waterside Centre with gas canister storage.



Plate 4: Retaining wall adjacent to the west of Wokingham Waterside Centre.

Photographic Record



Plate 5: Flammables storage at The Dreadnought.



Plate 6: Rough sleeper adjacent to the western site boundary with railway and gas holder beyond.