

Shinfield Park
Shinfield Road
Reading
RG2 9FW

Flood Risk Assessment

for

Wrenbridge (FRELD Reading) LLP

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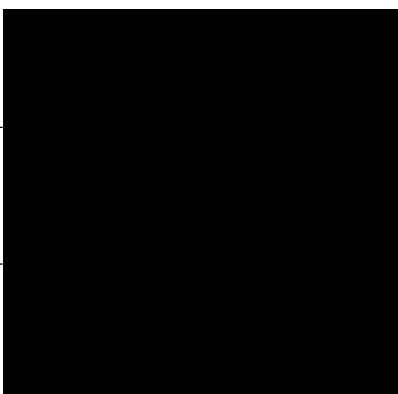
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1.0 EXECUTIVE SUMMARY

This Flood Risk Assessment & Drainage Strategy report has been prepared to support a planning application for the demolition of existing buildings and redevelopment of site for flexible employment use (Use Class E(g)(ii)-(iii)/B2/B8) together with associated servicing areas, parking, landscaping and other associated works at Shinfield Park, Shinfield Road, Reading, RG2 9FW.

In accordance with the National Planning Policy Framework (NPPF), Wokingham Borough Council (WBC) Strategic Flood Risk Assessment (SFRA), Local Flood Risk Management Document and the Sustainable Drainage Systems Strategy Guidance for Development, this report has studied and assessed the flood risk to the site by all sources.

A review of the EA Flood Maps indicates that the red line boundary is located within Low-Risk Flood Zone 1, i.e. land defined as having less than a 1 in 1000 annual probability of flooding from of river or sea water in any year. The site is defined as 'less vulnerable' such that the development can be considered 'appropriate' in accordance with NPPF guidelines. As the site is located within Flood Zone 1, the sequential and exception tests are not required by the local authority.

Further to this, the site is considered to be at very low risk from all other sources of flooding; tidal, surface water, sewer, groundwater and artificial sources.

A review of the site topographical, GPR and CCTV surveys would indicate that the current development buildings and parking areas are served by two below ground surface water drainage networks. One outfalls unrestricted to a pond beyond the B3270 to the southeast and the other to a small watercourse to the southwest. The foul drainage serving the current buildings is also made up of two distinct networks that outfall ultimately to the Thames Water sewer networks to both the north and south of the site.

The surface water drainage strategy as outlined below is to restrict the proposed flow rate to satisfy WBC Policies for brownfield developments, and to ensure that the flood risk to the site and surrounding catchment is not increased by the development. The Sustainable Drainage Systems (SuDS) hierarchy has been considered in the drainage strategy discussed in Section 5. The surface water runoff will be collected from the new impermeable areas and directed via a below ground network that leads through a number of geocellular attenuation tanks located beneath the service yards, before outfalling to the adjacent parkland beyond the B3270 to the east and that encompasses the retained pond via an existing connection. The peak rate of runoff will be restricted to the respective 1 in 1 year and 1 in 100-year greenfield rates, in line with WBC policy. The existing site is largely impermeable and discharges at an unrestricted rate. As such the proposed strategy provides a significant reduction in these pre-development discharge rates. The post development impermeable areas will also decrease, thus reducing the overall post development runoff volumes.

A detailed Drainage layout with hydraulic calculations incorporating a climate change allowance of 40% have been prepared to support this approach and can be found in the Appendices. SuDS in the form of permeable paving and small bio retention areas adjacent the new highways will also be incorporated into the layout.

There is no residual flood risk from the development site to the surrounding district due to the reduction in storm water flow rates. The development does not therefore increase the risk of flooding to other adjacent neighbourhoods. Out of chamber or gully flooding for the extreme 100 year plus climate change event may occur within the development site and is classed as exceedance flows. Flood water from this event will be contained within the lower lying yard areas of the development site and directed away from the proposed units.

Foul flows will be collected by a new below ground gravity network and discharge to the existing Thames Water foul water sewer beyond the southwestern boundary via an existing connection.

2.0 DEVELOPMENT DETAILS

2.1 CONTEXT

This Flood Risk Assessment & Drainage Strategy report has been prepared by Burrows Graham Ltd. on behalf of Wrenbridge (FRELD Reading) LLP ("the Applicant") in support of a planning application submitted to Wokingham Borough Council ("WBC") for the demolition of existing buildings and redevelopment of site for flexible employment use (Use Class E(g)(ii)-(iii)/B2/B8) together with associated servicing areas, parking, landscaping and other associated works at Shinfield Park, Shinfield Road, Reading, RG2 9FW ("the Site").

2.2 LOCATION

Site Name: Shinfield Park, Shinfield Road, Reading, RG2 9FW.

Grid Reference: 472807, 169080

Site Area: 5.5 Ha

Site Description: The irregular plan shapes of the site boundaries are located within Wokingham Borough Council district and comprises an existing office building in the centre with a number of small buildings around the periphery. Two large car parks are located to the north.

The development area is bound on most sides by a number of small internal access roads. The north, west and southern boundaries encompass substantial hedging and mature trees around the periphery. The M4 motorway passes along the southern development boundary. The site can be accessed from the B3270 to the south east.

The development boundary is located approximately 4km to the south of Reading Town Centre and some 7km to the west of Wokingham Town Centre.

A review of the topographical survey would indicate there to be a reasonable fall across the current site from circa 79.60m AOD at the north down to circa 73.50m AOD to the south. This difference in levels is made up of grades to the roads and car parks plus step changes and retaining walls within the existing office building.



Figure 1: Site Location

3.0 PLANNING POLICY

3.1 NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

Local planning authorities are advised by the National Planning Policy Framework (NPPF) 2024 to consult the Environment Agency (EA) and Lead Local Flood Authorities (LLFA) on all developments of an area greater than 1Ha and those that are at an increased risk of flooding.

This report has been prepared to assess the requirements of the NPPF in accordance with the current EA and LLFA policies and will primarily assess the following.

- Determining whether the site is likely to be affected by flooding and whether it would increase flood risk elsewhere.
- Assessing whether the proposed development is appropriate in the suggested location.
- Detailing any measures necessary to mitigate any flood risk identified, to ensure that the proposed development and occupants would be safe, and that flood risk would not be increased elsewhere.
- Determine the current surface water drainage regime and assess any potential increase in surface water runoff as a result of the proposed development.
- Discuss Sustainable Drainage Systems (SuDS) as an option for reducing surface water flood risk.
- Devise an appropriate surface water drainage strategy (including calculation where appropriate) to deal with any potential increase in surface water runoff and include for climate change.
- Include the appropriate climate change allowances for both fluvial and surface water runoff.
- Consider the recommendations of the WBC Strategic Flood Risk Assessment (SFRA) and other local policies.

A review of the EA Flood Maps indicates that the red line boundary is located within Low-Risk Flood Zone 1, i.e. land defined as having less than a 1 in 1000 annual probability of flooding from of river or sea water in any year. The site is defined as 'less vulnerable' such that the development can be considered 'appropriate' in accordance with NPPF guidelines. As the site is within Flood Zone 1, the sequential and exception tests are not required by the local authority.

3.2 STRATEGIC FLOOD RISK ASSESSMENT

The aim of a Strategic Flood Risk Assessment (SFRA) is to assess the risks in a particular area with regard to all types of flooding and to determine how much development is permitted in that area. It can assess this by looking at how drainage systems in the area should function and how risks in vulnerable areas can be reduced and/or mitigated. The NPPF states that regional planning bodies (RPB's) or local planning authorities should prepare SFRA's in consultation with the EA.

The SFRA provides a detailed understanding of flood risk across all areas and from all sources. It states that the sequential and exception tests must be provided where applicable and climate change must be taken into consideration over the lifespan of the development.

Wokingham Borough Council in partnership with Consultants JBA have produced the Wokingham Borough Council Level 2 Strategic Flood Risk Assessment (2023) to demonstrate and define its understanding and role in managing flood risk in the borough. A fundamental aim of the strategy is that WBC embraces and supports its role as Lead Local Flood Authority, and this means taking the lead in helping with infrastructure development and re-development and working with other bodies in dealing with flood risk. The Council wants to encourage and wherever possible enforce current thinking and guidance and be able to provide improvements through working better together. The Strategy is aimed at providing an overview and assessment of local flood risk, setting out objectives and measures for how WBC will manage and reduce local flood risk. This Strategy builds on existing and developing approaches to flood risk management and promotes the use of a wide range of measures to manage flood risk. Risk should be managed in a co-ordinated way within catchments and balance the needs of communities, the economy and the environment.

The full report can be obtained from WBC website with the main objectives below:

- To better understand local flood risk and make best use of available information in order to better manage flood risk to people, businesses, property, infrastructure and the natural environment.
- To reduce the potential impact and costs of flooding in the Borough.
- To ensure resilience of local water bodies and drainage assets.
- To ensure appropriate development in areas of flood risk.
- To develop a collaborative partnership approach to flood risk management, and cooperate with other Risk Management Authorities (RMAs) and key stakeholders working across catchments.
- To assist communities in understanding information on flood risk and supporting themselves.
- To encourage, support and provide flood risk management which seeks to enhance and protect the environment.
- Determine the variations in risk from all sources of flooding across the Borough.
- Prepare broad policies for the management of flood risk.
- Steer development towards areas of lowest flood risk, through application of the Sequential Test and, where necessary, the Exception Test.
- Consider opportunities to reduce flood risk to existing communities through better management of surface water, provision for conveyance and storage for flood water; and
- Identify the level of detail required for site-specific Flood Risk Assessments.

3.3 LOCAL FLOOD RISK MANAGEMENT STRATEGY

The aim of this document is to set out the council's approach to managing flood risk in the short and long term. The WBC Local Flood Risk Management Strategy was published in 2015. The primary aim of the document is to improve the understanding of flood risks within Borough and provide a source of information which can be utilised to identify ways of managing flood risk. The second objective is to reduce the risk of flooding for people and businesses, and put forward key actions to ensure this can be achieved.

3.4 WOKINGHAM BOROUGH COUNCIL SUSTAINABLE DRAINAGE

WBC acting as Lead Local Flood Authority (LLFA) have prepared the Wokingham SuDS Strategy (2017) Guidance on the use of sustainable drainage systems with the aim of how SuDS can be integrated into the fabric of development starting at the planning stage and leading through the concept, outline and detailed design stages.

The main principles of the report and what should be submitted at planning stage are summarised below:

- Details of how runoff is collected from roofs, roads and other hard surfaces to keep water at or near the surface.
- Site control features shown with approximate volumes, flow control locations and details.
- Flow routes including low flow, overflow and exceeding routes.
- Confirmation of sub-catchments with location of flow controls.
- Confirm the destination of the "controlled flow of clean water" from the site – the ground by infiltration, a watercourse or the surface water sewer.
- Existing brownfield sites to discharge at respective Greenfield rates unless can confirm this is not achievable.
- Existing Greenfield sites can discharge at respective Greenfield rates.
- Climate change for commercial development to align with the appropriate EA published climate change allowances. With the design life of no more than 70 years, this would be the 2070's central allowance (25%).
- Detailed SuDS management train approach to be incorporated throughout the scheme with appropriate measures from prevention, source control through to site control.
- Exceedance flows beyond the 30-year event and for events beyond those quantified can be incorporated as long as the water is managed and does not flow off site or cause flood risk to the development building.
- Detailed plans and hydraulic calculations to be provided at planning stage.
- That SuDS are used in major developments.
- That SuDS provide wider benefits which include biodiversity, water quality, amenity and attenuation.
- That the minimum standards of operation proposed by the applicant are appropriate.
- Through the use of planning conditions or planning obligations that there are clear arrangements in place for ongoing maintenance of the SuDS scheme over the lifetime of the development.

The drainage strategy for this development will look to integrate these policies within the design.

3.5 WOKINGHAM BOROUGH COUNCIL POLICIES

Wokingham Borough Council (WBC) Core Strategy (until 2026). Core Policy CP1 - Sustainable Development has several aspects that link directly to the use of SuDS. It states that planning permission will be granted to developments that provide a range of things including; limiting any adverse effects on water quality, provision of adequate drainage, incorporation of facilities for recycling of water and management of flood risk from all sources

Core Strategy Policy C3 – General Principles for Development states that planning permission will be granted to developments that have no detrimental impact upon the landscape, geological features or watercourses.

The Managing Development Delivery Local Plan also forms part of the Wokingham Borough Development Plan and therefore planning applications must be determined in accordance with it. Policy CC10 – Sustainable Drainage gives specific requirements for provision of drainage in new development. The requirements of policy CC10 are set out below.

Policy CC10: Sustainable Drainage

1. All development proposals must ensure surface water arising from the proposed development including taking into account climate change is managed in a sustainable manner. This must be demonstrated through
 - a) A Flood Risk Assessment, or
 - b) Through a Surface Water Drainage Strategy.
2. All development proposals must
 - a) Reproduce greenfield runoff characteristics and return run-off rates and volumes back to the original greenfield levels, for greenfield sites and for brownfield sites both run-off rates and volumes be reduced to as near greenfield as practicably possible.
 - b) Incorporate Sustainable Drainage Systems (SuDS), where practicable, which must be of an appropriate design to meet the long term needs of the development and which achieve wider social and environmental benefits
 - c) Provide clear details of proposed SuDS including the adoption arrangements and how they will be maintained to the satisfaction of the Council [as the Lead Local Flood Authority (LLFA)]
 - d) Not cause adverse impacts to the public sewerage network serving the development where discharging surface water to a public sewer.

The Wokingham Borough Sustainable Design and Construction (2010) SPD provides further information on SuDS. To ensure SuDS are integrated holistically into a development the SPD lists a number of stages that need to occur before development commences. It also states that all development is expected to produce a Surface Water Drainage Strategy in compliance with the most recent guidance, and should involve the introduction of SuDS techniques and take into account climate change.

These sections of both the Core Strategy and SPD have been assessed for this scheme as part of this FRA and all the main elements such as reducing flood risk and incorporating SuDS methods have all been incorporated.

4.0 FLOOD RISK REVIEW

The NPPF guidelines require the developer to assess the impact of the proposed development runoff on the downstream catchment in conjunction with assessing the risk of runoff from the surrounding area on the proposed development layout.

In the following sections the flood risk to the site from all sources will be assessed.

4.1 FLUVIAL & TIDAL FLOODING

The site is not located near the sea or a tidally influenced watercourse, therefore the risk of tidal flooding is deemed to be very low.

A number of small unnamed watercourse have been identified to the south of the site. However, the closest main river is the River Loddon, located some 2.5km to the southeast of the site.

The National Planning Policy Framework (NPPF) categorises fluvial and tidal flood risk as follows:

- Zone 1 (low probability) – Land assessed as having less than a 1 in 1,000 annual probability of river or sea flooding (<0.1%).
- Zone 2 (medium probability) – Land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year; and
- Zone 3a (high probability) – Land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
- Zone 3b The Functional Floodplain – This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the EA. (Not separately distinguished from Zone 3a on the Flood Map).

Figure 2 below locates the site on the Environment Agency's (EA) indicative fluvial flood map for planning. This indicates that the site is located wholly within low-risk Flood Zone 1, i.e. probability of annual fluvial flooding significantly less than 1 in 1000 in any one year (<0.1%).

The risk from fluvial flood water is therefore reduced to acceptable levels and no further assessment is required.



Figure 2: Extract from EA Fluvial Flood Risk Map for Planning

4.2 SURFACE WATER FLOODING

The EA descriptions for the High, Medium and Low risk scenarios for surface water flooding are as follows:

- High risk means that each year this area has a chance of flooding of greater than 3.3%.
- Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%.
- Low risk means that each year this area has a chance of flooding of between 0.1% and 1%.
- Very Low risk means that each year this area has a chance of flooding of less than 0.1%.

A review of the EA surface water flood maps (Figure 3 below) indicates that the site area is predominantly classed as at 'very low chance' of surface water flooding. Some small, isolated areas of Medium and High Chance are identified within the lower lying car parking areas. This is due to a low point in the existing topography where any surplus rainwater water has the potential to be retained on the surface.

It is noted these EA maps do not consider the existing drainage infrastructure serving these areas that is identified on the topographical and GPR surveys that will collect this rainwater and direct into the underlying drainage network such that in reality the extent of any such surface water flooding would be significantly reduced. Furthermore, the redevelopment of the site will mitigate against this risk by removing the existing buildings, yards and parking areas, and replacing with new buildings and external areas to suit the development intent. The new impermeable areas will be directed into a new underground drainage network designed in line with local and national guidance.

In light of this the site can be considered at low risk from surface water flooding.

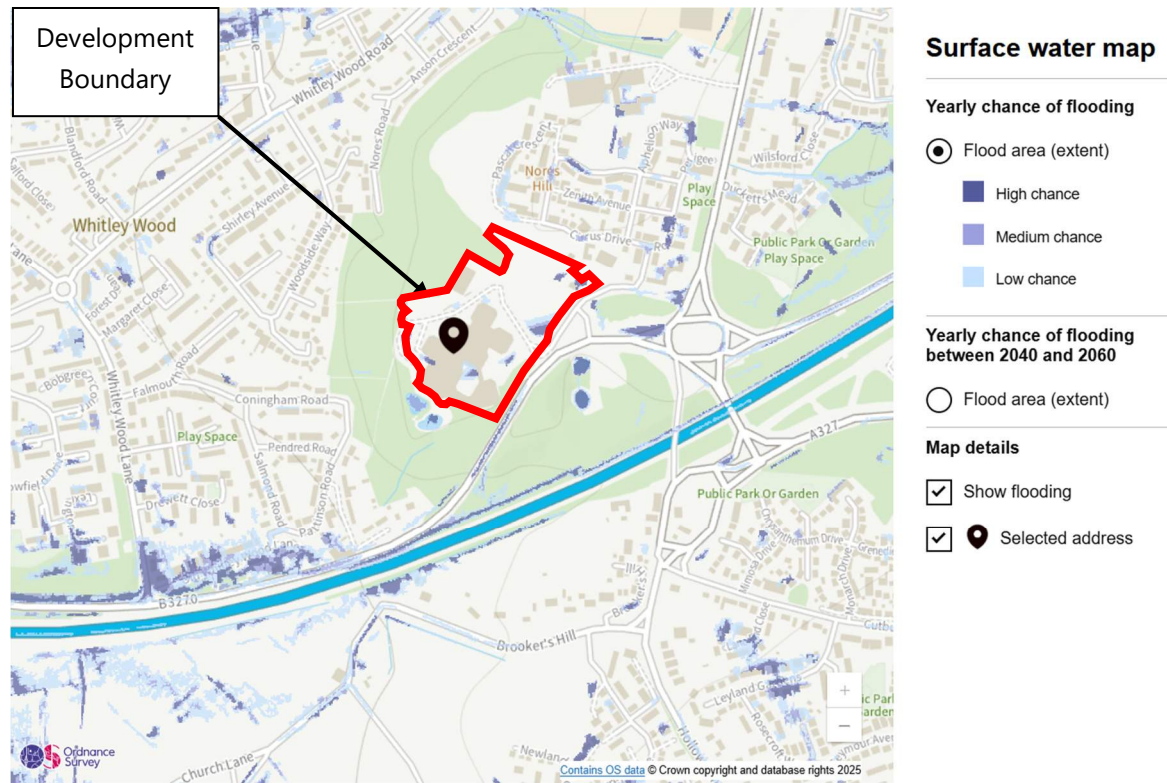


Figure 3: Extract from EA Surface Water Flood Risk Map

4.3 GROUNDWATER FLOODING

Groundwater flooding occurs when the water table, the level of water below the ground, rises above the ground surface or into cellars and basements. Groundwater flooding is most likely to occur in low lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks.

A detailed Phase 2 site investigation has been completed. This has identified that the ground condition comprises a varying depth of Made Ground to a maximum depth of 2.2m overlain by the London Clay formation to depth. Ground water monitoring identified water levels at circa 2m below ground level.

A review of the SFRA susceptibility to Ground water flooding map has indicated the site to have the low potential for groundwater flooding to occur at surface. It is noted however that the mapping is broadscale.

The proposed development does not include any below ground basement areas and floor levels will be raised above the external levels. Based on this, the risk of groundwater flooding to the site is considered low.

4.4 SEWER FLOODING

The Thames Water (TW) sewer records have been reviewed and indicate there to be a 225mm diameter surface water sewer that flows south beneath the footpath of the B3270. A 150mm diameter foul water sewer is identified within the northern boundary of the site flowing in a northwesterly direction.

A review of the site topographical, GPR and CCTV surveys would indicate that the current development buildings and parking areas are served by two below ground surface water drainage networks that outfall unrestricted to both a pond beyond the B3270 to the southeast and a small watercourse to the southwest. The foul drainage serving the current buildings is also made up of two distinct networks that outfall to both the north and south of the site.

The extensive drainage network serving the surrounding urban district ensures that the development footprint is protected from the impact of both upstream and downstream runoff. It is speculated that complete protection may well exist beyond a storm event equivalent to the 30-year statistical event. Beyond this projection, there may be a small degree of peripheral 'Exceedance' flooding within the areas above the sewers. However, this is expected to be localised and restricted to the location of specific manhole covers located outside the development footprint.

Thus, flood risk to the site from sewers is diminished to acceptable levels and considered to be low.

4.5 RESERVOIR FLOODING

Reservoir flooding is extremely unlikely to happen and there has been no loss of life in the UK from reservoir flooding since 1925. The Environment Agency is the enforcement authority and ensures that reservoirs are inspected regularly, and essential safety work is carried out.

The SFRA Reservoirs Flood Extents map shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. It can be seen from this map that the site is at very low risk. Ensuring that the reservoirs are adequately maintained the risk of reservoir flooding can be considered as low.

4.6 SUMMARY

Below is a table summary of the flood risks associated with the development site.

Source	Probability of Flood Risk	Impacts	Remarks
Tidal	Low	Low	The development building is not influenced by Tidal flood risk.
Fluvial (Watercourse)	Low	Low	The development is located in low flood risk zone 1.
Surface Water (Overland Flood Flow)	Low	Low	The development is located within a predominantly very low risk zone. The redeveloped site will include reprofiling of the site and new drainage infrastructure such that the post development risk is reduced from the pre development scenario.
Sewers & New Drainage	Low	Low	Adopted sewers located both inside and outside of the development boundary and easements maintained. New private drainage will serve the buildings and external yard area, designed to current guidance with any exceedance flooding located away from the buildings.
Groundwater	Low	Low	Development does not include basements. Building elevated above existing ground levels.
Artificial Sources	Low	Low	Low risk from other sources.

Table 1: Flood Risk Summary Table

5.0 DRAINAGE STRATEGY

5.1 CONSULTATION

Thames Water

Thames Water have been consulted via a pre development enquiry. Their considered response is yet to be received. Based on experience of similar schemes, it would be expected that a response would be that foul drainage can discharge unrestricted to the foul water network. Surface water should follow the SuDS hierarchy.

5.1 EXISTING DRAINAGE

The Thames Water (TW) sewer records have been reviewed and indicate there to be a 225mm diameter surface water sewer that flows south beneath the footpath of the B3270. A 150mm diameter foul water sewer is identified within the northern boundary of the site flowing in a northwesterly direction.

A review of the site topographical, GPR and CCTV surveys would indicate that the current development buildings and parking areas are served by two below ground surface water drainage networks that outfall unrestricted to both a pond beyond the B3270 to the southeast and a small watercourse to the southwest. The foul drainage serving the current buildings is also made up of two distinct networks that outfall to both the north and south of the site.

The site is therefore considered to be brownfield for drainage purposes. Refer to Appendix B for the GPR and CCTV surveys, plus Appendix F for a copy of the TW sewer records.

5.2 RUNOFF RATES

The existing brownfield flow rates from the site have been defined in Table 2 below based on the modified rational method for the various storm events of the approximate existing site area currently draining from the site via the two existing outfalls via the existing connections. These are considered to be on the high side and very much dictated by the size of the existing piped network.

Impermeable Area (ha)	1 year (30mm/hr)	30 year (65mm/hr)	100 year (95mm/hr)
3.50 (approx.)	292 l/s	632 l/s	924 l/s

Table 2: Existing Brownfield Runoff Rates

To satisfy WBC guidance & policy, the existing Greenfield rates have also been defined in Table 3 below. Refer to Appendix D for full details.

Area (ha)	1 year (l/s)	Qbar (l/s)	30 year (l/s)	100 year (l/s)
4.92	18.30	21.50	49.40	68.50

Table 3: Existing Greenfield Runoff Rates

5.3 GEOLOGY

A detailed Phase 2 Site Investigation has been carried out at the site. This has identified that the ground conditions comprise Made Ground to a maximum depth of 2.2m overlain by stiff clay of the London Clay formation.

Given the cohesive nature of the geology to depth, the Geo-Environmental specialist has confirmed that infiltration is not considered a viable SuDS technique for the site.

5.4 SUSTAINABLE DRAINAGE ASSESSMENT

Sustainable Drainage Systems (SuDS) are utilised in line with the CIRIA 753 guidance and Wokingham Borough Council SuDS Policy, with the aim to minimise the development's impact on the runoff quantity and quality and maximise amenity and biodiversity opportunities.

The CIRIA 753 Management train approach is a fundamental principle of SuDS systems, it aims to primarily reduce pollution, flow rates and volume of runoff from the site. The main objective is to treat the runoff as close to the source as possible and it is imperative that at least two of the following should be included within the drainage strategy.

- **Prevention** – The use of good site design and rainwater re-use measures to prevent runoff.
- **Source Control** – Controlling the runoff as close to source as possible by using green roofs, porous pavements and soakaways.
- **Site Control** – Use of water management techniques within local area, i.e. detention basins and geocellular storage.
- **Regional Control** – Management of water from a number of sites in a specific location, i.e. balancing ponds and wetlands.

Table 4 below provides an assessment of various above and below ground SuDS methods that can provide water quality treatment and management of flows to reduce runoff rates & volumes, and whether they can be suitably incorporated at this development site. The purpose of this assessment is to set out options to be considered at the planning stage with consideration to time constraints, viability and lifetime maintenance of the industrial led development.

Method	Comment	Suitability	Suitability for Development
Green Roofs	Can be used on suitable low-rise buildings to provide retention, attenuation and treatment of rainwater, and promotes evaporation and local biodiversity.	<i>Not Suitable:</i>	- Green roofs are better suited to be installed on flat roof areas. Given the building roofs are predominantly pitched this will reduce the effectiveness of the system retaining water runoff. - Additional loading from a green roof on a large span structure will significantly increase structural and foundation design, which is not considered a sustainable approach particularly when considering reducing carbon footprint. - Roof is also potentially being installed with PVs so there will be limited room to incorporate significant areas of green roofs that will provide any additional sustainability benefits. - The standard main roof has a 25-year envelope warranty, which will be compromised by having a green roof.
Rainwater Harvesting	Rainwater harvesting reduces the total runoff volume from the developed site and reduces treated water consumption.	<i>Not Suitable:</i>	- The ability to restrict peak flow rates and short-term peak volumes is non-existent where a critical storm event occurs. - Limited end use with small office area. - There is evidence that occupiers disconnect the system as the running and maintenance costs outweighs the benefits of reducing water demand.
Infiltration Options	Reduces total run off volume from the development.	<i>Not Suitable:</i>	Investigations would indicate that the underlying ground is unsuitable for infiltration due to cohesive geology.

Method	Comment	Suitability	Suitability for Development
Permeable Surfacing (Infiltration)	- Reduces total run off volume from the development. - Can be used to enhance water quality.	<i>Not Suitable:</i>	Investigations would indicate that the underlying ground is unsuitable for infiltration due to cohesive geology.
Permeable Surfacing (Standard)	- Can be used to enhance quality of runoff water. - Sub-base provides 'source' storage and reduces the volume of storage downstream. - The storage can be created with selection of the stone fill or use of plastic box stems.	<i>Suitable:</i>	The car parking bays are to be constructed using permeable surfacing.
Swales, basins and ponds	- Provide areas for above ground runoff storage. - Allow filtering of particulate matter, improving water quality	<i>Not suitable:</i>	Space constraints on site would not fit any above ground SuDS features for surface water storage.
Bio-Retention	Collect and retain run-off to help improve water quality, prior to discharge in piped system on infiltration.	<i>Suitable:</i>	Small areas of bio-retention will be incorporated adjacent the new highways.
Geocellular Storage	- Suitable for sites with insufficient space for basins etc. - Suitable for sites where topography prevents the use of open basins etc. - Can be very effective infiltration devices subject to ground conditions.	<i>Suitable:</i>	Incorporated into the main design to act as the means of attenuation.

Table 4: SuDS Viability & Assessment

5.5 CLIMATE CHANGE

In May 2022, the Environment Agency released updated climate change allowances for peak rainfall intensities which should be applied to new developments. Rather than nationwide allowances, each area will have its own peak rainfall allowances. In the case of the Wokingham area, this is the Kennet and tributaries Management Catchment peak rainfall allowances.

Based on the nature of the development, a lifespan of no more 70 years is anticipated. Therefore, the potential climate change allowance for the 2070's ranges between 25% for the central allowance and 40% for the upper end allowance. In line with the EA Guidance for this design life of a commercial building, the Central allowance of 25% for climate change on peak rainfall intensity would be applicable. However, to suit WBC policy the 40% climate change event has also been simulated to inform on the extent of the exceedance flooding.

5.6 SURFACE WATER STRATEGY

Based on the SuDS review, plus an assessment of the local site conditions, the SuDS hierarchal approach for discharge of surface water at the development site is considered in greater detail in Table 5 below:

Method	Suitability	Suitability for Development
Infiltration to Ground	No	The deep cohesive underlying geology would negate infiltration as a means of draining the site.
Connection to Watercourse	Yes	Reuse existing connection to the east of the site that ultimately outfalls to an existing wildlife pond and the local watercourse networks flowing south and then west.
Connection to Surface Water Sewer	No	Other more viable options which would take precedent.
Connection to a Combined Sewer	No	Other more viable options which would take precedent.

Table 5: SuDS Hierarchal Approach

Surface water generated from the roof of the new buildings will merge with the runoff from the yard and parking areas and be directed into a number of below ground drainage networks that pass through a number of geocellular attenuation tanks and full retention petrol separators. These will then flow to the existing manhole located in the central east of the site, prior to outfalling to a small wildlife pond and the downstream local watercourse network. Respective greenfield runoff rates up to the extreme 1 in 100 year plus 40% allowance for climate change event will be applied to the final manhole. This rate is in line with WBC Sustainable Drainage policy as discussed in Section 3.4.

The car parking bays will be constructed using permeable surfacing which will provide additional SuDS quality treatment prior to outfall. Plus some small areas of Bio retention will be construction adjacent the new highways to allow the water to pass into. Due to the limited external areas, other green SuDS options are not possible to be included within the development boundary.

Table 6 below defines the post development flows rates based on the local policy. As shown in the table, these rates incorporate a minimum **92%** reduction in the existing predevelopment discharge rates.

Full details of this strategy can be found on the BGL drawing in Appendix C and the hydraulic calculations in Appendix D.

	1 year	30 year	100 year + 40% CC
Existing Brownfield Runoff Rates (Estimated based on the existing impermeable area, and unrestricted flows)	292 l/s	632 l/s	924 l/s (100yr)
Greenfield Rates	18.3 l/s	49.4 l/s	68.5 l/s
Combined Post Development Peak Flow Rates (from BGL Hydraulic Models)	18.2 l/s	49.3 l/s	68.3 l/s
Minimum Percentage Reduction in Post Development Runoff Rates	94%	92%	93%

Table 5: Pre and Post Development Runoff Rates Combined for Both Parcels

The proposed private drainage layout for the new development site will be designed in accordance with BS EN 752: 2008 and Building Regulations part H guidance, i.e. to show no flooding to the 30-year storm return period criterion.

Events exceeding this up to and including the 100 year plus climate change allowance have been assessed. Flooding from these events is classed as exceedance flooding. The hydraulic model has determined that a small volume of exceedance flooding will be retained in the low-lying yard areas. These are set down from the finished floor level of the building and will not flow off site.

With the post development impermeable areas decreasing from the current office building and parking, the peak runoff volume will also reduce. Thus satisfying with WBC policy.

5.7 WATER QUALITY, QUANTITY, AMENITY & BIODIVERSITY

Water quality has been considered and the following measures have been included within the surface water drainage proposals:

- Runoff from roofs is considered to be clean and will be discharged directly into the surface water network.
- All runoff from the car parking bays has a medium risk and will pass through permeable paving.
- In addition, all runoff from heavier duty hardstanding areas will also pass through Class 1 full retention separators.
- As detailed under Section 5.6 - Surface Water Strategy, the mimicking of water quantity has been considered by reducing the offsite peak discharge rates and providing attenuation to control the runoff rates and peak volumes to the downstream network.

- In terms of Amenity and Biodiversity, as discussed and justified in the Section 5.4 - Sustainable Drainage, there are limited areas on this fully developed site to form green SuDS infrastructure to provide amenity and biodiversity areas linked to the drainage strategy. Notwithstanding, reference should be made to the landscape drawings and the Ecology & Biodiversity report which details improvements being made in relation to this provision.

5.8 MANAGEMENT & MAINTENANCE

The long-term maintenance of the new drainage infrastructure will be with the owner / occupier of the proposed industrial units in line with best practice guidance. Refer to Appendix E for full details.

5.9 FOUL WATER STRATEGY

Foul flows generated by the new development will discharge to the existing Thames Water adopted foul water sewer to the southwest of the site via the existing connection. The site will drain by a new private gravity network to this drain and be designed in line with Building Regulations Guidance.

Refer to Appendix C for the outline foul water drainage plan.

6.0 MANAGEMENT, MAINTENANCE AND RISK

A private management company will maintain the drainage infrastructure as part of the site wide management and maintenance strategy, detailed in Appendix E.

Should exceedance flooding occur, access and egress to the development shall be onto the B3270 highway to the east of the site.

The use of SuDS in the form of Source Control and Site Control measures will help to minimise the flood risk impact to the surrounding drainage network.

Up to and including the 100-year plus increase in rainfall allowance due to climate change (CC) event, the report has justified that there is no risk of flooding to the new hard standing area or occupiers.

Flood risk to people and property can be managed but it can never be completely removed; a residual risk remains after flood management or mitigation measures have been put in place. This relates to a rainfall event beyond what can be fully quantified.

7.0 CONCLUSION

In conclusion, this report has studied and assessed the flood risk to the site by all sources with the proposals complying with national, regional and local planning policy & guidance. A review of the EA Flood Maps shows that the site is located within Flood Zone 1, i.e. land defined as having less than a 1 in 1000 annual probability of flooding from of river or sea water. Further to this, the report has found the site to be at 'low risk' from all sources of flooding; tidal, fluvial, pluvial, sewer, groundwater and artificial sources.

The surface water drainage strategy is to reduce the peak post development flow rates passing off the roof and new hardstanding area to the respective greenfield rates, not exceeding 68.3l/s, including a 40% allowance for climate change. This satisfies WBC SuDS policy. The SuDS hierarchy has been considered in the drainage strategy. Due to the deeper cohesive underlying strata, the surface water runoff collected from the impermeable areas will be directed via permeable surfacing and underground networks to a number of geocellular tanks located beneath the service yards prior to connecting into the adjacent wildlife pond and downstream watercourse network via an existing connection.

The existing site is fully impermeable and currently discharges unrestricted, thus the proposed strategy provides a significant reduction in pre-development discharge rates.

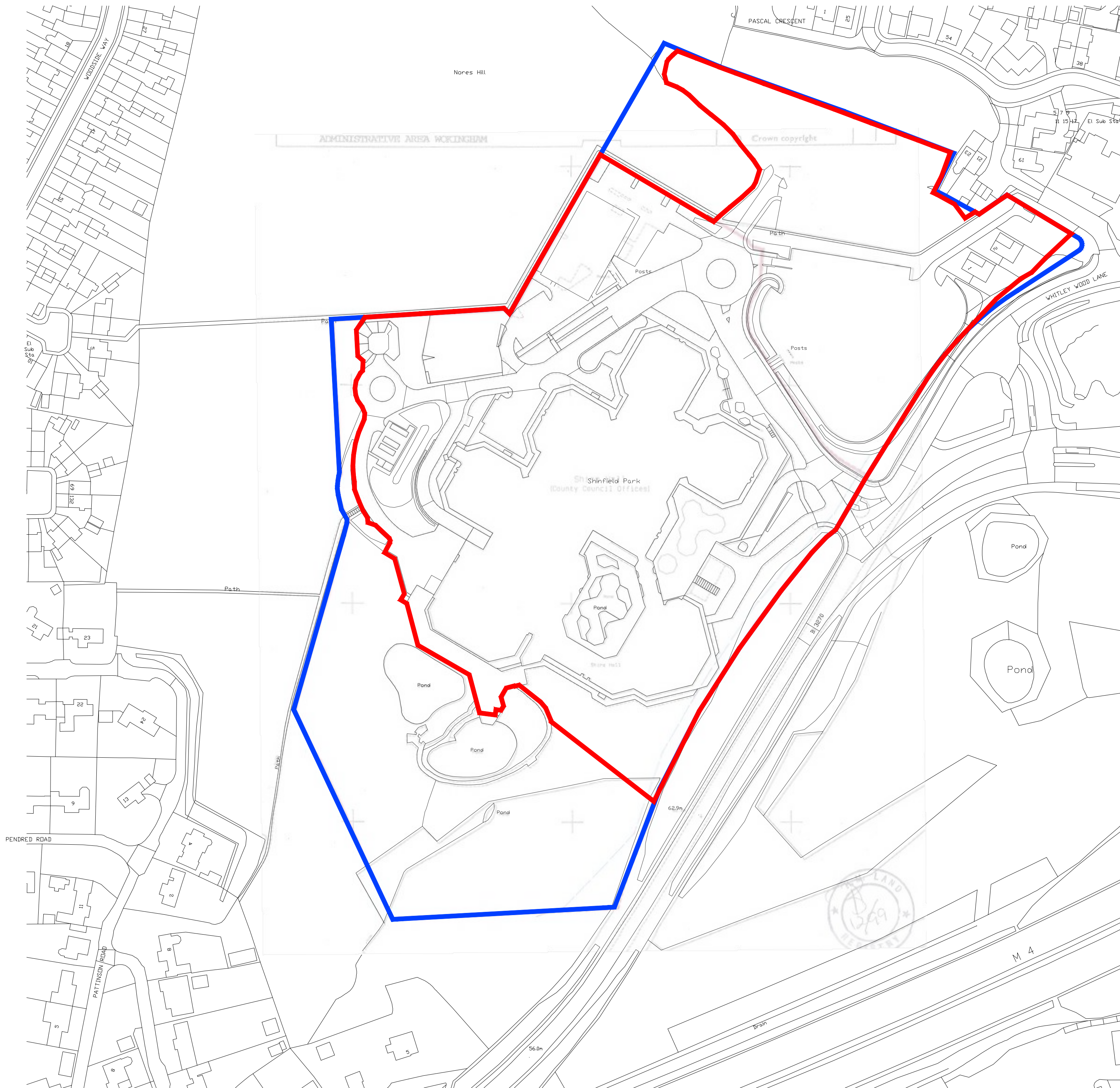
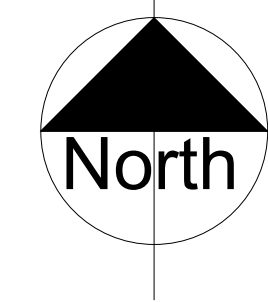
There is no residual flood risk from the development site to the surrounding district due to the reduction in storm water flow rates. The development does not therefore increase the risk of flooding to other adjacent neighbourhoods.

The relevant sections of the WBC Local Plan have been assessed for the scheme as part of this FRA and all the main elements such as reducing flood risk and incorporating SuDS methods have all been incorporated.

Foul flows will discharge unrestricted to the TW foul water sewer network passing beneath Pattinson Road to the south west via a an existing foul sewer running through the woodland to the south of the site.

APPENDIX A – SITE MASTERPLAN

NOTES:
Copyright Chetwoods (Birmingham) Limited. No implied licence exists.
Contractors must verify all dimensions on site before commencing any work or shop drawings. This drawing is not to be scaled. Use figured dimensions only.
Subject to statutory approvals and survey.
Building areas are liable to adjustment over the course of the design process due to the ongoing construction detailing developments.
Please note the information contained within this drawing is solely for the benefit of the employer and should not be relied upon by third parties.
The CDM hazard management procedures for the Chetwoods aspects of the design of this project are to be found on the "Chetwoods - Hazard Analysis and Design Risk Assessment" and/or drawings. The full project design teams comprehensive set of hazard management procedures are available from the Principle Designer appointed for the project.



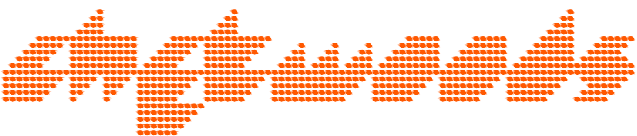
P1 PLANNING ISSUE 18/12/24 SKT

Rev	Revision Description	Date	Author/Reviewer
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PLANNING

32 Frederick Street,
Birmingham, B1 3HH

+44 (0)121 234 7500
www.chetwoods.com



Project

SHINFIELD PARK
READING

Client

WRENBRIDGE

Drawing Title

SITE LOCATION PLAN

Scale	Size	Drawn	Checked	Date
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1:1250	A1	SKT	TM	18/12/24
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Project	Originator	Zone	Level	Type	Rate	Number	Rev
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ACCOMMODATION SCHEDULE

	%	GIA sqm	GIA sqft	GEA sqm	GEA sqft
Unit 1 Warehouse	85.5%	6,862	73,863	7,238	77,910
GF Entrance & Core	2.3%	188	2,024		
FF Office	12.2%	980	10,549	1,120	12,056
Total	100.0%	8,030	86,435	8,358	89,966

	%	GIA sqm	GIA sqft	GEA sqm	GEA sqft
Unit 2 Warehouse	76.8%	2,917	31,399	3,192	34,359
GF Entrance & Core	4.2%	158	1,701		
FF Office	19.1%	724	7,793	835	8,988
Total	100.0%	3,799	40,892	4,027	43,347

	%	GIA sqm	GIA sqft	GEA sqm	GEA sqft
Unit 3A Warehouse	79.8%	883	9,505	982	10,570
GF Entrance & Core	3.8%	42	452		
FF Office	16.4%	181	1,948	205	2,207
Total	100.0%	1,106	11,905	1,187	12,777

	%	GIA sqm	GIA sqft	GEA sqm	GEA sqft
Unit 3B Warehouse	79.8%	883	9,505	982	10,570
GF Entrance & Core	3.8%	42	452		
FF Office	16.4%	181	1,948	205	2,207
Total	100.0%	1,106	11,905	1,187	12,777

	%	GIA sqm	GIA sqft	GEA sqm	GEA sqft
Unit 4 Warehouse	76.0%	1,970	21,205	2,205	23,735
GF Entrance & Core	5.3%	137	1,475		
FF Office	18.7%	486	5,231	587	6,318
Total	100.0%	2,593	27,911	2,792	30,053

	%	GIA sqm	GIA sqft	GEA sqm	GEA sqft
Unit 5 Warehouse	83.3%	2,889	31,097	3,140	33,799
GF Entrance & Core	3.6%	124	1,335		
FF Office	13.1%	455	4,898	556	5,985
Total	100.0%	3,468	37,330	3,696	39,784

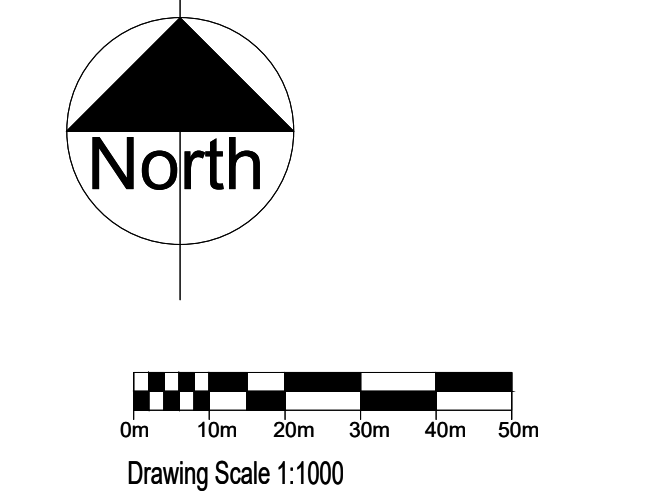
Total Development	GIA sqm	GIA sqft	GEA sqm	GEA sqft
	20,102	216,378	21,247	228,703

Total Site Area: 5.5ha
Note - Unit 1 haunch height of 12m, all other units 10m

LEGEND:

- Unit 1 remote parking
- Unit 5 remote parking
- Ancient Woodland
- 15m Buffer to Ancient Woodland
- Existing Public Right of Way
- Proposed Retaining Structure
- Refer to engineer's drawings for details

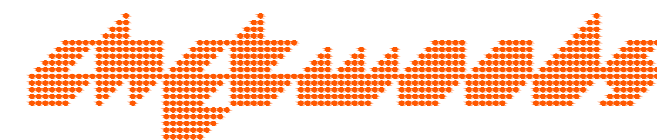
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P3	Further co-ordination with Civils and	22.01.25	JC
P2	Landscape drawings.	20.01.25	SKT
P1	ISSUED FOR COMMENTS.	18/12/24	SKT

Rev	Revision Description	Date	Author/Reviewer
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PLANNING
32 Frederick Street,
Birmingham, B1 3HH



Project
**SHINFIELD PARK
READING**

Client
WRENBRIDGE

Drawing Title
PROPOSED SITE LAYOUT MASTERPLAN

Scale	Size	Drawn	Checked	Date
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1:1000 A1 SKT TM 18/12/24

Project	Originator	Zone	Level	Type	Rate	Number	Rev.
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APPENDIX B – TOPOGRAPHICAL SURVEY & GPR SURVEY

PAS 128: 2014 QUALITY LEVEL GUIDE

QUALITY LEVEL	DESCRIPTION	NOTES
Q1.0	Excellent	Full compliance with PAS 128: 2014
Q1.1	Very Good	Full compliance with PAS 128: 2014
Q1.2	Good	Full compliance with PAS 128: 2014
Q1.3	Fair	Full compliance with PAS 128: 2014
Q1.4	Poor	Full compliance with PAS 128: 2014
Q1.5	Very Poor	Full compliance with PAS 128: 2014
Q1.6	Unacceptable	Full compliance with PAS 128: 2014
Q1.7	Unacceptable	Full compliance with PAS 128: 2014
Q1.8	Unacceptable	Full compliance with PAS 128: 2014
Q1.9	Unacceptable	Full compliance with PAS 128: 2014
Q1.10	Unacceptable	Full compliance with PAS 128: 2014

DETECTION METHOD

IN ACCORDANCE WITH PAS 128: 2014 SURVEY TYPE B

Drainage Survey

All accessible Manholes and Inspection chambers have had their respective covers fitted with pipe sizes, inverts, chamber sizes/depths and service data recorded from ground level. All connections from DPs, Gullies, Drains, VPs, RE's and templates have been proven wherever possible using audible connection (AC) and/or sonde instrumentation where applicable. Where these methods have proved unsuccessful then assumed (AR) straight line connections will be shown.

Electricity

Electric cables will have been predominantly located using EML methodology with electrically derived depths shown. GPR techniques will be employed to achieve greater quality levels as required.

British Telecom

BT cables will have been predominantly located using EML methodology with electrically derived depths shown. GPR techniques will be employed to achieve greater quality levels as required. Due to current laws and legislation regarding BT separation, cables are only located vertically. We therefore compare all our telecom findings against record information to produce the final service layout. In some instances, where high accuracy of cable data is present, we may only be able to identify a linear centre peak signal rather than identifying the individual duct positions. For further information regarding Telecoms apparatus, please contact Openreach directly.

Cable TV & Fibre Optic

Cable TV and/or Fibre Optic cables will have been predominantly located using EML methodology with electrically derived depths shown. GPR techniques will be employed to achieve greater quality levels as required.

Fibre Optic

Fibre Optic cables will have been predominantly located using GPR methodology. This is due to the materials used within fibre optic cabling. In some rare instances, tracer cabling or conductive non fibre optic cabling will be present within some or all ducting. When this is the case, both EML and GPR methodology will be combined to identify service network and achieve greater quality levels.

Leakage & Lateral

Leakage and/or Lateral services will have been predominantly located using EML methodology with electrically derived depths shown. GPR techniques will be employed to achieve greater quality levels as required.

Oil & Water Inc. Fuel Pipes and Hot Water Pipes

CMGS and/or WMMVS pipe work will have been attempted and located using both EML & GPR methodology with electrically derived depths shown for the former and depths to crown levels shown for the latter. When the Gas/Water pipe work is constructed using conductive materials, then we are able to employ multiple geophysical techniques to identify service network and achieve greater quality levels. When a non conductive material is used, GPR methodology will be employed to locate and plot the final service layout.

Ground Penetrating Radar

GPR methodology is used to identify and locate all non metallic, non conductive piping and cabling. We also employ GPR to obtain a greater accuracy levels on EML located services. The GPR has a greater success rate on pipe or service diameter upward of Ø30mm/Ø30mm, as size increments increase, so does the chance of detection. The GPR can produce varying results and as such, wouldn't be used as an independent utility surveying instrument.

Undertaken Traces

All UT's will have been predominantly located using EML methodology with electrically derived depths shown. GPR techniques will be employed to achieve greater quality levels as required. Every effort has been made to identify the service but in this instance, it is not achievable. We recommend excavation work to determine identify and depth where applicable.

Scanning (GCS)

Scanning has been identified on site with a potential of an undetectable service present.

Assumed routes & Service Network

Assumed routes (AR) are shown if there is evidence that a service exists but we are unable to trace it whilst on site. The surveyor will attempt to locate various manholes/connections (service evidence) etc. around site area to successfully determine an assumed route between these points. If there is little evidence on site but that before a service is left present, then a common sense approach to an assumed route shall be employed.

Taken from records (TFR)

Taken from records (TFR) are service routes that are taken from STAT record plans or previous survey information and overlaid onto our drawings.

SURVEY RECOMMENDATIONS

The areas of dense vegetation to be cleared to allow access if any of these areas are deemed critical or of high importance.

To undertake a CCTV drainage survey of the entire site area to establish a more comprehensive drainage network, and assist condition of the pipework.

The sewers with high levels of silt or blockages to be jetted to extend the CCTV drainage survey, if any of these areas are deemed critical or of high importance.

Due to the geophysical nature of subsurface technology, we always recommend excavation works to be carried out within critical areas for verification and to eliminate the possibility of undetectable services present.

UTILITIES & UNDERGROUND INVESTIGATIONS

ABBREVIATIONS & SYMBOLS

10	IC	Duct To Cables	DO	Depth To Down	ABC	Rectangular Block Chamber
11	IC	Duct To Cables	DI	Depth To Invert	ABC	Rectangular Block Chamber
12	IC	Duct To Cables	DS	Depth To Surface	ABC	Rectangular Block Chamber
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32	IC	Duct To Cables	DS	Depth To Surface	ABC	Rectangular Block Chamber
33	IC	Duct To Cables	DS	Depth To Surface	ABC	Rectangular Block Chamber
34	IC	Duct To Cables	DS	Depth To Surface	ABC	Rectangular Block Chamber
35	IC	Duct To Cables	DS	Depth To Surface	ABC	Rectangular Block Chamber
36	IC	Duct To Cables	DS	Depth To Surface	ABC	Rectangular Block Chamber
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97	IC	Duct To Cables	DS	Depth To Surface	ABC	Rectangular Block Chamber
98	IC	Duct To Cables	DS	Depth To Surface	ABC	Rectangular Block Chamber
99	IC	Duct To Cables	DS	Depth To Surface	ABC	Rectangular Block Chamber
100	IC	Duct To Cables	DS	Depth To Surface	ABC	Rectangular Block Chamber

ABBREVIATIONS & SYMBOLS

10	IC	Duct To Cables	DO	Depth To Down	ABC	Rectangular Block Chamber
11	IC	Duct To Cables	DI	Depth To Invert	ABC	Rectangular Block Chamber
12	IC	Duct To Cables	DS	Depth To Surface	ABC	Rectangular Block Chamber
13	IC	Duct To Cables	DS	Depth To Surface	ABC	Rectangular Block Chamber
14	IC	Duct To Cables	DS	Depth To Surface	ABC	Rectangular Block Chamber
15	IC	Duct To Cables	DS	Depth To Surface	ABC	Rectangular Block Chamber
16	IC	Duct To Cables	DS	Depth To Surface	ABC	Rectangular Block Chamber

Q-LEVEL	DESCRIPTION	ACC	Q-LEVEL	DESCRIPTION
QL-D	Service positions taken from records.	Unreliable	QL-B2	Inspector's verbal notation using only one polygraph technique.
QL-C	Visual evidence of service evidence taken from records.	Unreliable	QL-B1	Inspector's verbal notation using multiple polygraph techniques.
QL-84	Unreliable service position taken from an estimated scale (MS).	Q-1, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100	QL-A	Inspector's written notation verified by open examination, matches and/or inspection standards.
QL-B3	Restricted notation by one polygraph technique but			

DETECTION METHOD
IN ACCORDANCE WITH PAS 128: 2014 SURVEY TYPE E

DRAINAGE SURVEY
All accessible Manholes and Inspection chambers have had their respective covers lifted with pipe sizes, inverts, chamber sizes/types and service data recorded from ground level. All connections from DP's, Gullies, Drains, VP's, RE's and lampholes have been proven wherever possible using audible connections (AC) and/or sonde instrumentation where applicable. Where these methods have proven unsuccessful then assumed (AR) straight line connections will be shown.

CCTV DRAINAGE SURVEY
All accessible Manholes and Inspection chambers have had their respective covers lifted with pipe sizes, inverts, chamber sizes/type and service data recorded from ground level. Pipework has been traced, accessed and collected for post processing. Drainage layout, including manhole covers not located by topographical survey, may be taken from CCTV chainage and will be shown as indicative only.

Electricity
Elec cables will have been predominantly located using EML methodology with electronically derived depths shown. GPR techniques will be employed to achieve greater quality levels as required.

British Telecoms
BT cables will have been predominantly located using EML methodology with electrical derived depths shown. GPR techniques will be employed to achieve greater quality levels as required. Due to current laws and legislation protecting all BT apparatus, cabling can only be located remotely. We therefore compare all our telecom findings against record information to produce the final wire layout. In some instances, where high amount of cable ducts are present, we may only be able to identify a linear centre peak signal rather than identifying all the individual duct positions. For further information regarding Telecoms apparatus, please contact Oneearth@bt.com.

Cable TV & Communications
CTV and/or Com cables will have been predominantly located using EML methodology with electronically derived depths shown. GPR techniques will be employed to achieve greater quality levels as required.

Fibre Optic
FO cables will have been predominantly located using GPR methodology. This is due to the materials used within fibre optic cabling. In some rare instances, tracer cabling or conductible non fibre optic cabling will be present within some or all ducting. When this is the case, both EML and GPR methodology will be combined to identify service network and achieve greater quality levels.

Lighting, Traffic Signal & Security Cables
LC, TS and/or Sec cables will have been predominantly located using EML methodology with electronically derived depths shown. GPR techniques will be employed to achieve greater quality levels as required.

GM/GMS and/or WMM/WS pipe work will have been attempted and located using both EML & GPR methodology with electronically derived depths shown for the former and depths to crown levels shown for the latter.

When the Gas/Water pipe work is constructed using conductible materials, then we are able to employ multiple geophysical techniques to identify service network and achieve greater quality levels. When a non conductible material is used, GPR methodology will be employed to locate and plot the final service layout.

Ground Penetrating Radar
GPR methodology is used to identify and locate all non metallic, non conductive piping and cabling. We also employ GPR to obtain a greater accuracy levels on EML locate services. The GPR has a greater success rate on pipe or service diameter upward of Ø63mm, C63mm, as size increments increase, so does the chance of detection. The GPR can produces varying results and as such, wouldn't be used as an independent utility surveying instrument.

Unidentified Traces
All UTs will have been predominantly located using EML methodology with electronically derived depths shown. GPR techniques will be employed to achieve greater quality levels as required. Every effort has been made to identify the service but in this instance, is not achievable. We recommend excavation work to determine identity and depth where applicable.

Scarring (QL-C)
Scarring has been identified on site with a potential of an undetectable service present.

Assumed Routes & Taken from Records (CL-B4/D)
Assumed routes (AR) are shown if there is evidence that a service exists but we are unable to trace it whilst on site. The surveyor will attempt to locate various risers/valves/meters (service evidence) etc. around site area to successfully determine an assumed route between these points. If there is little evidence on site but they believe a service is still present, then a common sense approach to an assumed route shall be employed.

SURVEY RECOMMENDATIONS

The areas of dense vegetation to be cleared to allow access if any of these areas are deemed critical or of high importance.

To undertake a CCTV drainage survey of the entire site area to establish a more comprehensive drainage network, and asset condition of the pipework.

The sewers with high levels of silt or blockages to be jetted to extend the CCTV drainage survey, if any of these areas are deemed critical or of high importance.

Due to the geophysical nature of subsurface technology, we always recommend excavation works to be carried out within critical areas for verification and to eliminate the possibility of undetectable services present.

GENERAL SYNOPSIS

This survey has been carried out in accordance with PAS 128: 2014 & our version of the Royal Institution of Chartered Surveyors (RICS) specification for Measured Surveys of Land, Buildings and Utilities. Our survey extents have been agreed and confirmed with formal acceptance of 677978WUG from WRENBRIDGE SPORT. If you have any queries regarding the final services layout, please may we ask you to carefully read all the information within this title block in its entirety before continuing to do so.

TOPOGRAPHICAL/DWG DRAWING INFORMATION

TOPOGRAPHICAL SURVEY DATE 24/06/2024		
SURVEY TYPE	DESCRIPTION	EFFECT ON SURVEY RESULTS
TOPO	SURVEY SOLUTIONS	
OUTDATED		
OS		
NTS		

GENERAL SITE CONDITIONS

AVERAGE	
ADDITIONAL INFORMATION	EFFECT ON SURVEY RESULTS

DESKTOP UTILITY RECORDS (PAS 128: 2014 SURVEY TYPE D)

ONED: YES

UTILITY	AVAILABILITY	UTILITY COMPANY PROVIDER
SEWER	PUBLIC	THAMES WATER
WATER MAIN	PUBLIC	THAMES WATER
GAS MAIN	PUBLIC	SGN
TELECOM	PUBLIC	BRITISH TELECOM
CABLE TV	PUBLIC	VIRGIN MEDIA
ELECTRICITY	PUBLIC	SSE
OIL PIPES	NO	N/A
OTHER	PUBLIC	CITYFIBRE, TELNET, SKY, VERIZON

REV	DESCRIPTION	DRAWN	CHECKED	APPR	SURVEY DATE



LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

0845 040 5969
survey-solutions.co.uk

PROJECT TITLE
SHINFIELD PARK, READING,
BERKSHIRE, RG2 9FW.

DRAWING DETAIL
UTILITIES AND DRAINAGE SURVEY.
SHEET 3 OF 8

CLIENT WRENBRIDGE SPORT				SCALE 1:200
SURVEYOR JB	SURVEY DATE 24/05/2024	CHECKED BY SD	APPROVED BY GB	DWG STATUS FINAL
DRAWING NUMBER 67797BWUG-03			REVISION	ISSUE DATE 11/07/2024

PAS 128: 2014 QUALITY LEVEL GUIDE

NO.	DESCRIPTION	NO.	DESCRIPTION
Q1.0	Assumed	Q4.02	Assumed
Q1.02	Assumed	Q4.03	Assumed
Q1.03	Assumed	Q4.04	Assumed
Q1.04	Assumed	Q4.05	Assumed
Q1.05	Assumed	Q4.06	Assumed
Q1.06	Assumed	Q4.07	Assumed
Q1.07	Assumed	Q4.08	Assumed
Q1.08	Assumed	Q4.09	Assumed
Q1.09	Assumed	Q4.10	Assumed
Q1.10	Assumed	Q4.11	Assumed
Q1.11	Assumed	Q4.12	Assumed
Q1.12	Assumed	Q4.13	Assumed
Q1.13	Assumed	Q4.14	Assumed
Q1.14	Assumed	Q4.15	Assumed
Q1.15	Assumed	Q4.16	Assumed
Q1.16	Assumed	Q4.17	Assumed
Q1.17	Assumed	Q4.18	Assumed
Q1.18	Assumed	Q4.19	Assumed
Q1.19	Assumed	Q4.20	Assumed
Q1.20	Assumed	Q4.21	Assumed
Q1.21	Assumed	Q4.22	Assumed
Q1.22	Assumed	Q4.23	Assumed
Q1.23	Assumed	Q4.24	Assumed
Q1.24	Assumed	Q4.25	Assumed
Q1.25	Assumed	Q4.26	Assumed
Q1.26	Assumed	Q4.27	Assumed
Q1.27	Assumed	Q4.28	Assumed
Q1.28	Assumed	Q4.29	Assumed
Q1.29	Assumed	Q4.30	Assumed
Q1.30	Assumed	Q4.31	Assumed
Q1.31	Assumed	Q4.32	Assumed
Q1.32	Assumed	Q4.33	Assumed
Q1.33	Assumed	Q4.34	Assumed
Q1.34	Assumed	Q4.35	Assumed
Q1.35	Assumed	Q4.36	Assumed
Q1.36	Assumed	Q4.37	Assumed
Q1.37	Assumed	Q4.38	Assumed
Q1.38	Assumed	Q4.39	Assumed
Q1.39	Assumed	Q4.40	Assumed
Q1.40	Assumed	Q4.41	Assumed
Q1.41	Assumed	Q4.42	Assumed
Q1.42	Assumed	Q4.43	Assumed
Q1.43	Assumed	Q4.44	Assumed
Q1.44	Assumed	Q4.45	Assumed
Q1.45	Assumed	Q4.46	Assumed
Q1.46	Assumed	Q4.47	Assumed
Q1.47	Assumed	Q4.48	Assumed
Q1.48	Assumed	Q4.49	Assumed
Q1.49	Assumed	Q4.50	Assumed
Q1.50	Assumed	Q4.51	Assumed
Q1.51	Assumed	Q4.52	Assumed
Q1.52	Assumed	Q4.53	Assumed
Q1.53	Assumed	Q4.54	Assumed
Q1.54	Assumed	Q4.55	Assumed
Q1.55	Assumed	Q4.56	Assumed
Q1.56	Assumed	Q4.57	Assumed
Q1.57	Assumed	Q4.58	Assumed
Q1.58	Assumed	Q4.59	Assumed
Q1.59	Assumed	Q4.60	Assumed
Q1.60	Assumed	Q4.61	Assumed
Q1.61	Assumed	Q4.62	Assumed
Q1.62	Assumed	Q4.63	Assumed
Q1.63	Assumed	Q4.64	Assumed
Q1.64	Assumed	Q4.65	Assumed
Q1.65	Assumed	Q4.66	Assumed
Q1.66	Assumed	Q4.67	Assumed
Q1.67	Assumed	Q4.68	Assumed
Q1.68	Assumed	Q4.69	Assumed
Q1.69	Assumed	Q4.70	Assumed
Q1.70	Assumed	Q4.71	Assumed
Q1.71	Assumed	Q4.72	Assumed
Q1.72	Assumed	Q4.73	Assumed
Q1.73	Assumed	Q4.74	Assumed
Q1.74	Assumed	Q4.75	Assumed
Q1.75	Assumed	Q4.76	Assumed
Q1.76	Assumed	Q4.77	Assumed
Q1.77	Assumed	Q4.78	Assumed
Q1.78	Assumed	Q4.79	Assumed
Q1.79	Assumed	Q4.80	Assumed
Q1.80	Assumed	Q4.81	Assumed
Q1.81	Assumed	Q4.82	Assumed
Q1.82	Assumed	Q4.83	Assumed
Q1.83	Assumed	Q4.84	Assumed
Q1.84	Assumed	Q4.85	Assumed
Q1.85	Assumed	Q4.86	Assumed
Q1.86	Assumed	Q4.87	Assumed
Q1.87	Assumed	Q4.88	Assumed
Q1.88	Assumed	Q4.89	Assumed
Q1.89	Assumed	Q4.90	Assumed
Q1.90	Assumed	Q4.91	Assumed
Q1.91	Assumed	Q4.92	Assumed
Q1.92	Assumed	Q4.93	Assumed
Q1.93	Assumed	Q4.94	Assumed
Q1.94	Assumed	Q4.95	Assumed
Q1.95	Assumed	Q4.96	Assumed
Q1.96	Assumed	Q4.97	Assumed
Q1.97	Assumed	Q4.98	Assumed
Q1.98	Assumed	Q4.99	Assumed
Q1.99	Assumed	Q4.100	Assumed

DETECTION METHOD

IN ACCORDANCE WITH PAS 128: 2014 SURVEY TYPE B

Drainage Survey

All accessible Manholes and Inspection chambers have had their respective covers lifted with pipe sizes, inverts, chamber sizes/depths and service data recorded from ground level. All connections from DPs, Gullies, Drains, VPs, RE's and manholes have been proven wherever possible using audible connection (AC) and/or sonde instrumentation where applicable. Where these methods have proved unsuccessful then assumed (AR) straight line connections will be shown.

All accessible Manholes and Inspection chambers have had their respective covers lifted with pipe sizes, inverts, chamber sizes/depths and service data recorded from ground level. Pipework has been traced, accessed and collated for post processing. Drainage layout, including manhole covers not located by topographical survey, may be taken from CCTV change and will be shown as indicative only.

Electricity

Electric cables will have been predominantly located using EML methodology with electronically derived depths shown. GPR techniques will be employed to achieve greater quality levels as required.

British Telecom

BT cables will have been predominantly located using EML methodology with electronically derived depths shown. GPR techniques will be employed to achieve greater quality levels as required. Due to current laws and legislation protecting all BT separate cabling (and not only be located vertically). We therefore compare all our telecom findings against record information to produce the final service layout. In some instances, where high amount of cable data is present, we may only be able to identify a linear centre peak signal rather than identifying the individual duct positions. For further information regarding Telecoms apparatus, please contact Openreach directly.

Cable TV & Communications

CTV and/or Com Cables will have been predominantly located using EML methodology with electronically derived depths shown. GPR techniques will be employed to achieve greater quality levels as required.

Fibre Optic

Fibre Optic cables will have been predominantly located using GPR methodology. This is due to the materials used within fibre optic cabling. In some rare instances, tracer cabling or conductive non fibre optic cabling will be present within some or all during. When this is the case, both EML and GPR methodology will be combined to identify service network and achieve greater quality levels.

Gas

Gas pipes will have been predominantly located using EML methodology with electronically derived depths shown. GPR techniques will be employed to achieve greater quality levels as required.

Water

Water pipes will have been predominantly located using EML methodology with electronically derived depths shown. GPR techniques will be employed to achieve greater quality levels as required.

Oil & Waste Inc. Fuel Pipes and Hot Water Pipes

Oil/Gas and/or WWS pipes will have been attempted and located using EML and GPR methodology with electronically derived depths shown for the former and depths to crown levels shown for the latter. When the Gas/Water pipe work is constructed using conductive materials, then we are able to employ multiple geophysical techniques to identify service network and achieve greater quality levels. When a non conductive material is used, GPR methodology will be employed to locate and plot the final service layout.

Ground Penetrating Radar

GPR methodology is used to identify and locate all non metallic, non conductive piping and cabling. We also employ GPR to obtain a greater accuracy levels on EML located services. The GPR has a greater success rate on pipe or service diameter upward of 60mm/63mm, as size increments increase, so does the chance of detection. The GPR can produce varying results and as such, wouldn't be used as an independent utility surveying instrument.

Underground Traces

All UT's will have been predominantly located using EML methodology with electronically derived depths shown. GPR techniques will be employed to achieve greater quality levels as required. Every effort has been made to identify the service but in this instance, it is not achievable. We recommend excavation work to determine identify and depth where applicable.

Scanning (LiDAR)

Scanning (LiDAR) has been identified on site with a potential of an undetectable service present.

Assumed routes (AR) are shown if there is evidence that a service exists but we are unable to trace it whilst on site. The surveyor will attempt to locate various manholes/invert points (service evidence) etc. around site area to successfully determine an assumed route between these points. If there is little evidence on site but they believe a service is still present, then a common sense approach to an assumed route shall be employed.

Taken from records (TFR) are service routes that are taken from STAT record plans or previous survey information and overlaid onto our drawings.

UTILITIES & UNDERGROUND INVESTIGATIONS

ABBREVIATIONS & SYMBOLS

TO: 1. Duct to Cables

TO: 2. Duct to Cables

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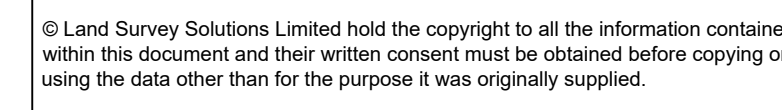
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Due to the geophysical nature of subsurface technology, we always recommend excavation works to be carried out within critical areas for verification and to eliminate the possibility of undetectable services present.



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Taken from records (TFR) are service routes that are taken from STAT record plans or previous survey information and overlaid onto our drawings.

Due to the geophysical nature of subsurface technology, we always recommend excavation works to be carried out within critical areas for verification and to eliminate the possibility of undetectable services present.

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Student Type	Department	Project or Subject Number
Topic	Subject or Assignment	

COMMISSIONED: YES		
UNIT	AVAILABILITY	UTILITY COMPANY LOCATION

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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1. The first step is to identify the problem or question that needs to be answered. This involves understanding the context and the specific requirements of the task.

CLIMATE



SEARCHED INDEXED SERIALIZED REFERENCE
UNIVERSITY MICROFILMS INTERNATIONAL

PROJECT TITLE

BERKSHIRE, RG2 9PY.

UTILITIES AND DRAINAGE SURVEY,
SHEET 8 OF 7

CLIENT WRENBRIDGE SPORT	SCALE 1:200
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SURVEYOR JB	SURVEY DATE 24/08/2024	CHECKED BY SO	APPROVED BY QB	DWG STAT. FINAL
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DRAWING NUMBER 617978WJG-05	REVISION 1	ISSUE DATE 11/07/2005
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ICES



LEGEND

Electricity	
High voltage	---
Low voltage	---
Water	
Mains water	---
Sewer	
Surface water	---
Foul sewer	---
Gas	
Low pressure	---
Medium pressure	---
Intermediate pressure	---
High pressure	---
BT plant	
Comtel cable	---
Fibre optic link	---

Note: The information on this plan is based on information supplied by the Public Utilities and from record drawings and is intended for general guidance only, no guarantee is given of its accuracy.
Only main service routes are shown.

Foster Wheeler Energy Ltd.
Shinfield Park,
Reading,
Berkshire, RG2 9FW.

External Main Services Layout.

Date: May 1999
Scale: 1:500

Drawing no: 14990 - FM - S001