Appendix: Water Resources, Drainage and Flood Risk

Annex 1: Legislative and Planning Policy Context

LEGISLATION AND PLANNING POLICY CONTEXT

1.1 The following subsection provides a summary of relevant planning policy at a National and Local level as well as key environmental legislation. These planning policies and legislation form the basis of planning decision-making in relation to water quality, hydrology and flood risk.

NATIONAL POLICY

National Planning Policy Framework 2019 [1] (NPPF)

1.2 The NPPF sets out the Government's planning policies for England and how these are expected to be applied. The principles of policy relevant to water resources and flood risk are provided in the following sections and, combined with the associated Planning Practice Guidance (PPG), form the current policy at the national level.

- Section 14 'Meeting the challenge of climate change, flooding and coastal change', paragraph 149 and 150 of this section states the following;

  "149. Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures…

  150. New development should be planned for in ways that:

  a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure…"

- Section 15 'Conserving and enhancing the natural environment', Paragraph 170 of this section states the following;

  "170. Planning policies and decisions should contribute to and enhance the natural and local environment by…

  …e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;… "

[1] Department for Communities and Local Government. (2019). National Planning Policy Framework.

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LOCAL POLICY

Woking Borough Council Local Development Document (October 2012)[2]

1.3 The Local Development Document Core Strategy was adopted in October 2012 and provides the local strategic planning policy context for the borough and covers the period up to 2027 but also ensures that its implementation will not compromise the ability of future generations to meet their needs. The following policies are considered relevant to the proposed development:

- **CS9 – Flooding and Water Management**: which states the following…

  "The Council will determine planning applications in accordance with the guidance contained within the NPPF. The SFRA will inform the application of the Sequential and Exceptional Test set out in the NPPF.

  The Council expects development to be in Flood Zone 1 as defined in the SFRA. Applications or allocations within Flood Zone 2 will only be considered if it can be demonstrated that there are no suitable alternatives in areas at lower risk.

  The Council will not encourage development in Flood Zones 3a and 3b however, it accepts that this is possible in exceptional circumstances. Development proposals in Flood Zones 3a and 3b will be required to be accompanied by a comprehensive Flood Risk Assessment to demonstrate that the development will not increase flood risk elsewhere or exacerbate the existing situation. A sequential approach will apply to all developments in Flood Zone 3 and areas at risk of flooding from sources other than river. Any development in Flood Zone 3b will only be acceptable when it is either water compatible, essential infrastructure, or if brownfield land, does not increase the net number of residential units or business floorspace and improves local flood risk.

  The Council will require all significant forms of development to incorporate appropriate sustainable drainage systems (SUDS) as part of any development proposals. If this is not feasible, the Council will require evidence illustrating this.

  A Flood Risk Assessment will be required for development proposals within or adjacent to areas at risk of surface water flooding as identified in the SFRA. To further reduce the risk from surface water flooding, all new development should work towards mimicking greenfield run-off situations. Proposals which relate specifically to reducing the risk of flooding (e.g. defence/ alleviation work) will be supported so long as they do not conflict with other objectives of the Core Strategy for example, those relating to landscape and townscape character.

  In areas at risk of flooding, proposals (including flood compensation proposals) with implications for biodiversity will be carefully considered for all levels of ecological designation. Where the development proposals are demonstrated to adversely affect an SPA, SAC or RAMSAR site, permission will not be granted.

  All development, particularly on brownfield land, should seek to remediate contaminated land to ensure that risk to water quality as a result of development is minimised".

[2] Woking Borough Council. October 2012. Woking Local Development Document Woking Core Strategy.

Woking Borough Council Site Allocations Development Plan Document (Nov 2018)[3]

1.4 The Woking Borough Council Site Allocations Development Plan Document (Nov 2018) identifies that the site is allocated for regeneration under *Policy UA44: Woking Football Club, Woking Gymnastic Club, Woking Snooker Club, Westfield Avenue, Woking, GU22 9AA.* The Policy identifies how the site is allocated for a mixed-use development to include a replacement football stadium, residential including Affordable Housing, and commercial retail uses. There are a number of key requirements identified within the policy that the development must address, those associated with drainage and flood risk are as follows:

- *"Due to the built-up nature of the site and surrounding area surface water flooding should be mitigated in the design of the development; and*
- *Development to meet relevant Sustainable Drainage Systems requirements at the time of planning application for the development of the site."*

LEGISLATIVE CONTEXT

1.5 A summary of key relevant UK water legislation is provided below:

- Environmental Protection Act (1990) [4] : sets out a range of provisions for environmental protection, including integrated pollution control for dangerous substances;
- Water Resources Act (1991)[5]: consolidated previous water legislation with regard to both the quality and quantity of water resources;
- Environment Act (1995)[6]: established a new body (the Environment Agency (EA)) with responsibility for environmental protection and enforcement of legislation. This Act introduced measures to enhance protection of the environment including further powers for the prevention of water pollution;
- Water Industry Act (1999)[7]: consolidated previous legislation relating to water supply and the provision of sewerage services;
- Anti-Pollution Works Regulations (1999)[8]: provides powers to the EA to stop any activity (e.g. construction) that is giving or is likely to give rise to environmental pollution or to adequately enforce pollution control measures;
- Control of Pollution (Oil Storage) (England) Regulations (2001) [9]: Imposes general requirements for preventing pollution of controlled waters from oil storage, particularly fixed tanks or mobile bowsers. Makes contravention a criminal offence;

[3] Woking Borough Council. November 2018. Woking Borough Council Site Allocations Development Plan Document.
[4] Environmental Protection Act 1990 (c. 43). London: Her Majesty's Stationery Office.
[5] Water Resources Act 1991 (c. 57). London: Her Majesty's Stationery Office.
[6] Environment Act 1995 (c. 25). London: Her Majesty's Stationery Office.
[7] Water Industry Act 1999 (c. 9). London: Her Majesty's Stationery Office.
[8] Anti-Pollution Works Regulations S.I. 1999 No. 1006. London: Her Majesty's Stationery Office.
[9] Control of Pollution (Oil Storage) (England) Regulations S.I. 2001 No. 2954. London: Her Majesty's Stationery Office.

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- Water Act (2003)[10]: extends the provisions of the Water Resources Act (1991) and the Environment Act (1995) with regard to abstractions and discharges, water conservation and pollution control;
- Water Environment (Water Framework Directive) (WFD) (England and Wales) Regulations (2003) [11] : requires the development and implementation of a new strategic framework for the management of the water environment and establishes a common approach to protecting and settling environmental objectives for groundwater and surface waters; and
- Flood and Water Management Act (2010) [12] : makes provisions about the management of risks in connection with flooding and coastal erosion.

[10] Water Act 2003 (c. 37). London: Her Majesty's Stationery Office.
[11] Water Environment (Water Framework Directive) (England and Wales) Regulations S.I. 2003 No. 3242. London: Her Majesty's Stationery Office.
[12] Flood and Water Management Act 2010 (c. 29). London: Her Majesty's Stationery Office

Annex 2: Flood Risk Assessment and Drainage Strategy

FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY

Proposed Redevelopment of Woking Football Stadium and Residential Development

Woking Football Stadium
Kingfield Road
Woking
GU22 9AA

Prepared for:
Woking Football Club

20th November 2019

Project Number:
RMA-C1947

environmental planning consultancy

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CONTENTS

1 INTRODUCTION

Background

1.1 RMA Environmental Limited was commissioned by Woking Football Club to prepare a Flood Risk Assessment (FRA) to support a full planning application for the redevelopment of Woking Football Club including new residential development.

1.2 This FRA has been prepared in accordance with the National Planning Policy Framework (NPPF), associated Planning Practice Guidance (PPG) and Environment Agency (EA) standing advice on flood risk for new development.

Site Location and Land Use

1.3 The site is currently occupied by a football stadium (Woking Football Club); a collection of large-footprint, low-rise buildings, including the Woking Snooker Centre; David Lloyd Leisure Centre (including tennis courts), Woking Gymnastics Club; car parking; and a small number of residential properties (81 Westfield Avenue, Hoe View, Park View and 1-6 Kingfield Road) situated in the north of the site.

1.4 The site extends to an area of approximately 5.0 hectares (ha) and is located at National Grid Reference TQ 00566 57330 (refer to Figure 1.1).

1.5 The site is bordered by the following land uses:

- Kingfield Road and residential dwellings are located adjacent to the northern boundary of the site;
- Westfield Avenue forms the western boundary of the site, beyond this is further residential development and Hoe Stream;
- residential dwellings are located along the eastern boundary of the site, a small pond is also located approximately 40 m east of the site;
- a ‘sports facility’ including playing fields form the southern boundary and residential buildings form the south-western boundary of the site; and
- the surrounding area is mostly urbanised with residential development.

1.6 Access to the site is currently via Kingfield Road to the north of the site. Further details on site topography, geology and hydrology are set out in Section 2.

Proposed Development

1.7 The Proposed Development comprises the redevelopment of the site, following the demolition of all existing buildings and structures, to provide a replacement stadium with ancillary facilities, including flexible retail, hospitality and community spaces, independent retail floorspace (Classes A1/A2/A3), a medical centre (Class D1) and vehicle parking, plus

residential accommodation comprising of 1,048 dwellings (Class C3) within 5 buildings of varying heights of between 3 and 10 storeys (and undercroft and part basement levels) on the south and west sides of the site, together with provision of new accesses from Westfield Avenue to car parking, associated landscaping and the provision of a detached residential concierge building.

1.8 Refer to the proposed development layout included within Appendix A.

Requirements for a Flood Risk Assessment

1.9 The requirements for FRA are provided in the NPPF and associated PPG. Paragraph 163 of the NPPF (2018) requires that a site-specific FRA should be submitted with planning applications for all sites greater than 1 ha in Flood Zone 1; for sites of any size within Flood Zones 2 or 3; in an area within Flood Zone 1 which has critical drainage problems; in an area within Flood Zone 1 which is identified in a strategic flood risk assessment as being at increased flood risk in the future; or an area within Flood Zone 1 that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

1.10 Flood Zone 1 is defined as land with little or no flood risk (an annual exceedance probability [AEP] of flooding of less than 0.1%); Flood Zone 2 is defined as having a medium flood risk (an AEP of between 0.1% and 0.5% for tidal areas or 0.1% and 1.0% for rivers); and Flood Zone 3 is defined as high risk (with an AEP of greater than 0.5% for tidal areas or greater than 1.0% for rivers).

1.11 FRAs should describe and assess all flood risks (from rivers, the sea, surface water, reservoirs, sewers and groundwater) to and from the development and demonstrate how they will be managed, including an evaluation of climate change effects.

Consultation

1.12 Consultation has been undertaken with the following consultees and further details of these consultations are included within Section 3 and 4 of this FRA:

- a product 4 request has been undertaken with the EA to obtain the most up to date flood data for the site;
- direct consultation in the form of a meeting and email correspondence has been undertaken with Katherine Waters at Woking Borough Council (who are acting at the Lead Local Flood Authority) to determine modelled flood extents for the Hoe Valley Restoration Scheme and the scope of the surface water drainage strategy; and
- a pre-development enquiry has been undertaken with Thames Water to determine the location of sewers within the site and surrounding are and if there is sufficient capacity within the local foul sewerage system to supply the development.

2 BASELINE ENVIRONMENTAL CONDITIONS

Topography

2.1 A topographical survey of the site is included as Appendix B and this identifies that the site slopes in a north-westerly direction. The lowest recorded level is at 24.01 m above ordnance datum (AOD) in the north-western corner of the site and the highest recorded level is at 25.88 mAOD and is located in the far south-westerly corner of the site.

Hydrology

2.2 There is one 'main river'[1] within a 500 m radius of the site. This is identified as the Hoe Stream which is located approximately 45 m north-west of the site and flows in a north-easterly direction.

2.3 There are no other significant watercourses or water bodies within the surrounding area.

Geology and Hydrogeology

2.4 As reported on the British Geological Survey (BGS) online Geology of Britain Viewer, the site is underlain by the superficial deposits of Kempton Park Gravel comprising sand and gravel. This is further underlain by the bedrock geology of the Bagshot formation comprising sand.

2.5 The EA classify the superficial and bedrock geology as Secondary A Aquifers; these are defined as "*permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers*."

2.6 The far south-eastern part of the site is underlain by the bedrock geology of the London Clay Formation comprising clay silt and sand and this is classified by the EA as unproductive Strata; these are defined as *"rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow."*

2.7 The site is not located within a groundwater Source Protection Zone (SPZ).

[1] Main river is defined by the EA as any watercourse that contributes significantly to the hydrology of a catchment.

3 EXTERNAL FLOOD RISK

Flooding Mechanisms

3.1 The EA's flood map for planning (refer to Figure 3.1) indicates that the site lies entirely within Flood Zone 1 (low risk). Land located within Flood Zones 2 and 3 (medium and high risk, respectively) is located approximately 15 m to the north-west. Due to its close proximity to the site, it is necessary to assess the risk of climate change on the flood extents for the site's operational lifetime (estimated at 100 years). This is discussed further below.

3.2 The EAs risk of flooding from surface water flood maps identify that the majority of the site is at very low surface water flood risk (each year, this area has a chance of flooding of less than 1 in 1000 (0.1%)). There are only minimal areas with up to high surface water flood risk (each year, this area has a chance of flooding of greater than 1 in 30 (3.3%)) located within the north-west and southern areas of the site. This is discussed further below.

3.3 The Woking Borough Council (WBC) Strategic Flood Risk Assessment (SFRA) Volume 2 Technical Report (Nov 2015) identifies that the majority of the site is located within an area "*limited potential for groundwater flooding to occur*". The south-eastern corner of the site, however, is within an area with "*potential for groundwater flooding to occur at the surface".* This is discussed further below.

3.4 The WBC's SFRA identifies that the site lies within a postcode area with 33 records of sewer flooding. This is discussed further below.

3.5 A review of the SFRA and EA flood maps, has identified that there are no other significant sources of flooding at the site, i.e. from reservoirs.

Historic Flooding

3.6 The WBC SFRA (Capita Symonds, 2015) includes a map showing historical fluvial flood events within the borough. This identified that the northern extent of the site was affected by the winter 2013/2014 flood extents as well as the September 1968 flood event.

3.7 The January 2003 flood event flooded the sports ground and playing field directly south of the site.

3.8 The EA's historic flood map (included in Appendix C) identifies one record of historic fluvial flooding for the site dated from 1968. Mapping of the event identifies that fluvial flooding extended approximately 85 m into the northern part of the site.

Fluvial Flooding

3.9 As detailed above, the EA's flood map for planning (refer to Figure 3.1) indicates that the site lies entirely within Flood Zone 1 (low risk); however, the site is located 15 m from land located within Flood Zones 2 and 3 (medium and high risk, respectively), therefore, it is necessary to assess the risk of climate change on the flood extents for the site's operational lifetime (estimated at 100 years).

3.10 Detailed flood data has been obtained from the EA and modelled flood extents are derived from the Hoe Stream Flood Alleviation Scheme mapping (Hoe Stream model (Mayford to Wey confluence) (2014)), carried out using 2D modelling software (ISIS-Tuflow). This data is included within Appendix C of this report and identifies that the site benefits from flood defences along the Hoe Stream.

3.11 Consultation with WBC, who are acting as the Lead Local Flood Authority (LLFA) for the site, has identified that WBC and the EA have been working in partnership to design and implement the Hoe Valley Restoration Scheme and that this involves updating the 2014 modelling and this model is due to be published shortly. WBC have provided the output mapping for the defended scenario including climate change scenarios and the in-channel defended and undefended flood levels incorporation into this FRA (refer to Appendix C). The in-channel flood levels are summarised in Table 3.1 below.

Table 3.1: In-channel flood levels from the updated Hoe Stream Modelling

Return Period	Peak Water Level (mAOD)	
	Defended Scenario	Undefended Scenario
Q100	24.71	24.66
Q100 cc35%	25.08	25.02
Q100 cc70%	25.35	25.28

3.12 As detailed above (and from reviewing the EA's spatial flood defence data), the site benefits from flood defences along the Hoe Stream. Table 3.2 below summarises details of the flood defences that are adjacent to the site.

Table 3.2: EA Flood Defence Data for the site

Type of defence	Location to the site at its closest point	Crest Level (mAOD)		Design standard (Condition)
		DS	US	
Flood embankment (part of the Hoe Stream FAS)	26 m west and extend for 823 m south along the Hoe Stream	25.60	26.00	100 years (Poor)
Reinforced Concrete Flood Wall (Hoe Stream FAS RC17)	20 m north and extends for 50 m north along the Hoe Stream	25.45	25.45	100 years (Fair)
Earth Flood Embankment (Hoe Stream FAS 1j)	50 m north and extends for 58 m north along the Hoe Stream	25.25	25.25	100 years (Good)
Earth Flood Embankment (Hoe Stream FAS 4b)	70 m north and extends for 220 m north along the Hoe Stream	25.90	25.25	100 years (Fair)

3.13 The EA's Guidance on climate change allowances (2016) states that for sites situated within EA Flood Zone 1, the central allowance should be used when determining the impact of climate change on flood risk.

3.14 The site falls within the Thames river basin district and the central allowance for the year 2115 is 25%. The updated EA modelling data for the site includes the 35% and 70% climate change scenarios and therefore, for the purpose of this report (and as a conservative measure) the 35% climate change scenario has been considered when determining the impacts of climate change on the proposed development.

3.15 From reviewing Table 3.1 and 3.2 above, the crest levels of the fluvial flood defences are approximately 0.17 m to 0.82 m above the defended modelled 100-year flood level with 35% allowance for climate change and, therefore, it is concluded that the flood defences would provide protection for the operational lifetime of the development.

Worst-Case Scenario

3.16 The undefended 100-year flood event with a 35% allowance for climate change (25.02 mAOD) has been used as the worst-case scenario for the proposed development. It is important to note that this scenario is assuming that all flood defences within Woking were to breach during a 100-year flood event, which is considered to be improbable. A breach in the flood defences protecting the site would result in a lower flood risk to the site when compared to the undefended scenario; however, in the absence of breach modelling, the 100 year with 35% climate change allowance level is being used as a conservative measure.

3.17 During this flood event, the site would flood to a maximum depth of 1 m which would occur in the northern part of the site. The central part of the site will remain dry; however, some of the southern extent of the site would experience shallow flooding to depths up to 0.2 m as flood water would flow down Kingfield Road and enter the site from the south-east.

3.18 All residential development is proposed to be located approximately 1.5 m above existing ground level. The lowest residential finished floor level (which is located within Block 1 in the north-west of the site) is 25.5 mAOD; this is 480 mm above the undefended 100-year event with 35% climate change level and therefore, should this event occur, a safe refuge would be provided within the residential dwellings. Any land uses below this flood level are classified as 'less vulnerable' land uses.

3.19 Based on the above, it is concluded that the site will be provided protection from flooding by the flood defences along the Hoe Stream for its operational lifetime (assumed to be 100 years). In the very unlikely event of a breach of the defences for the 100 years 35% climate change event, then part of the site will be flooded to a maximum depth of 1 m. However, all residential development is located a significant freeboard above this flood level providing a safe refuge for future occupants.

Surface Water Flooding

3.20 The EA's risk of flooding from surface water mapping identifies that most of the site has a very low risk of surface water flooding, as does much of the surrounding area. Very low surface water flood risk is defined where *"each year, this area has a chance of flooding of less than 1 in 1000 (0.1%)."*

3.21 There are small areas of low surface water flood risk located within the north-western corner of the site as well as in the south. Low surface water flood risk is defined where *"each year, this area has a chance of flooding between 1 in 1000 (0.1%) and 1 in 100 (1%)".*

3.22 There are very limited areas of medium and high surface water flood risk in the north-western and southern areas of the site. Medium surface water flood risk is defined where *"each year, this area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%)".* High surface water flood risk is defined where "*each year, this area has a chance of flooding of greater than 1 in 30 (3.3%)*".

3.23 The EA's mapping indicates that the areas of surface water flood risk on site are limited in size and do not appear to constitute any flow paths (i.e. they originate within the site boundary). The extents of medium/high surface water flood risk are located with existing areas of hardstanding surrounding the buildings and is ultimately ponded water. Post-development, it is considered that any ponding of surface water in extreme events will be re-distributed to the new low points within the site (i.e. areas of open space and roads) and managed by the surface water drainage strategy.

3.24 The EA's surface water flood risk mapping shows what "*happens when rainwater does not drain away through the normal drainage systems or soak into the ground but lies on or flows over the ground instead*." It is noted that this type of flooding is difficult to predict and was based on the best information available to the EA regarding ground levels and drainage.

3.25 Surface water flood risk is deemed to be less significant than the fluvial flood risk and, consequently, would also be mitigated by measures outlined for the fluvial risk below as well as being reduced through the implementation of the proposed drainage strategy.

Groundwater Flooding

3.26 As previously stated, the majority of the site is located within an area "*limited potential for groundwater flooding to occur*" and the south-eastern corner of the site is within an area with "*potential for groundwater flooding to occur at the surface".*

3.27 From reviewing the borehole records on site included within the Geo-Environmental and Geotechnical Assessment (Ground Investigation) Report, it is identified that groundwater is located at a level of between 22.22 and 23.26 m AOD which ranges between 1.7 m bgl and 2.87 m bgl within the Kempton Park Gravel that underlies the site (refer to Figure 3.2). The borehole data indicate a hydraulic gradient in a northerly direction towards to Hoe Stream, as expected.

3.28 The proposed development involves the construction of five residential blocks up to ten storeys high and the inclusion of a new football stadium. The two southern blocks (Block 4 and Block 5) include a lower ground level and a basement level. The three western blocks (Blocks 1, 2 and 3) comprise of just a lower ground level. The lowest proposed finished floor levels (FFL) of the lower ground level for all of the blocks is 22.50 mAOD. The proposed FFL of the basement levels is 20.50 m ADO. There are no basement levels proposed for the football stadium.

3.29 From reviewing the borehole records on site, in the area in which the western blocks are situated, groundwater was encountered between 22.22 and 23.26 mAOD. The proposed FFL of the lower ground level within these blocks is 22.50 m AOD and therefore the lower ground level will be located partially below groundwater level.

3.30 Groundwater depths within the area where the two southern blocks are proposed are identified to be between 22.87 and 23.16 mAOD. The proposed FFL for the basements within these blocks is 20.50 m AOD and therefore, they will be located primarily within the Kempton Park Gravel.

3.31 The land uses proposed within the lower ground level and basement level within the residential blocks will be used for parking uses only and in accordance with Table 2 of the NPPF, these land uses are classified as 'less vulnerable' to flooding.

3.32 Based on the above, it is considered likely that the lower ground level and basement levels of the residential blocks would extend below the anticipated groundwater levels. Considering that the footprint of the blocks are relatively small and there are only one-storey basement levels proposed, the volume of displaced groundwater may result in a rise in groundwater level locally; however it is considered that this would not increase the risk of groundwater emergence at the surface. The Kempton Park Gravel Formation is a Secondary A Aquifer with a relatively high transmissivity which would allow vertical and lateral migration of surface water.

3.33 Therefore, the risk of groundwater flooding affecting the proposed development and the potential to increase groundwater flood risk is deemed to be low.

Sewer Flooding

3.34 The Woking Borough Council historic flood records within the SFRA (2015) show that the site lies within a postcode area with 33 records of overloaded sewer flooding. However, the exact magnitude, extent and location of these flooding incidents are not recorded.

Mitigation Measures

Groundwater Flooding

3.35 It is recommended that the construction of the basements incorporates flood resistant techniques to ensure that the basement would remain free from groundwater ingress. Techniques may include the likes of a cofferdam around the perimeter of the basement to prevent lateral movement of groundwater, dewatering of the excavation for the development and retaining walls within the basement levels are likely to be required.

Sewer Flooding

3.36 Mitigation against sewer flooding could be achieved through the provision of non-return valves which prevent water entering the properties from drains or sewers. Non-return valves can be installed with gravity sewers or drains, within the site's private sewer system. Further information is provided in the CIRIA publication *'Low cost options for revention of flooding from sewers'*.

Safe Access/Egress

3.37 Access/egress to the site is via Kingfield Road to the north of the site and via Westfield Avenue located along the western boundary of the site.

3.38 As previously stated, the site will be provided protection via the flood defences along the Hoe Stream for its operational lifetime and, therefore, safe access/egress via Westfield Avenue along the western boundary is readily achievable.

3.39 During the worst-case scenario, (i.e. the undefended 100-year flood event with 35% allowance for climate change (25.02 mAOD)), Kingfield Road and the northern extent of Westfield Avenue would flood to a maximum depth of 1 m. The central area of the site would remain dry.

3.40 All residential development is located approximately 1.5 m above the existing ground level and at least 480 mm above the undefended 100-year event with 35% climate change level. Therefore, should this event occur, a safe refuge would be provided within all of the residential dwellings.

3.41 On this basis, it is concluded that future occupants of the development would be safe during the design flood event for the operational lifetime of the development.

3.42 The future occupants of the site would be required to sign up to the EA's flood warning service for the Hoe Stream, to ensure that sufficient warning is provided in the event of an extreme flood. This will ensure that, should the EA issue a flood warning for the area, all occupants would have sufficient time to leave the site.

3.43 The home owners will be responsible for acting on flood warnings and the procedures to be followed in the event of a flood. These measures will be set in a Flood Evacuation Plan, which would be submitted to the EA and Council for approval prior to commencement of the proposed development.

Land Use Vulnerability

3.44 Table 2 of the NPPF PPG sets out a schedule of land uses based on their vulnerability or sensitivity to flooding. As set out in Table 2, the proposed residential development is classified as a land use that is 'more vulnerable' and the commercial development is classified as 'less vulnerable' to flooding.

3.45 The site is currently located within Flood Zone 1 (low risk) and from receiving detailed flood data from the EA, the site is protected by flood defences for its operational lifetime. During the worst-case scenario (the undefended 100 year flood event with 35% allowance for climate change), parts of the site will be located within future Flood Zone 2 and 3 and the lower ground level and basements will flood; however, these comprise of car parking areas and all residential 'more vulnerable' development will be located at least 480 mm above the flood level.

3.46 Referring to Table 3 of the PPG, all land uses are considered appropriate within Flood Zone 1, however, the Sequential Test would need to be passed for any proposed development in Flood Zones 2 or 3a.

3.47 The Woking Borough Council Site Allocations Development Plan Document (November 2018) identifies that the site is allocated for regeneration under *Policy UA44: Woking Football Club, Woking Gymnastic Club, Woking Snooker Club, Westfield Avenue, Woking, GU22 9AA.* The Policy identifies how the site is allocated for a mixed-use development to include a replacement football stadium, residential including affordable housing and commercial retail uses. There are a number of key requirements identified within the policy that the development must address, those associated with drainage and flood risk are as follows:

- *Due to the built-up nature of the site and surrounding area surface water flooding should be mitigated in the design of the development; and*
- *Development to meet relevant Sustainable Drainage Systems requirements at the time of planning application for the development of the site.*

3.48 Considering that the site is currently located within Flood Zone 1 (low risk) and is identified within the Woking Borough Council Site Allocations Development Plan, the development should be deemed appropriate in planning policy terms in its proposed location.

4 DRAINAGE ASSESSMENT

Introduction

4.1 This drainage strategy has been prepared in accordance with Defra's *"Non-statutory technical standards for sustainable drainage systems"* (March 2015) to ensure that the proposed development does not increase flood risk to the site or elsewhere and where practicable reduces flood risk over the lifetime of the development.

4.2 Peak rainfall intensity is expected to increase as a result of climate change and, as such, storage calculations have included a 40% increase in rainfall depths in accordance with current climate change guidance.

4.3 The surface water drainage strategy has been prepared by Pitman Associates in association with RMA Environmental Ltd and is provided in Appendix D.

Summary

4.4 The site currently comprises of Woking football stadium, a leisure centre comprising tennis courts, a snooker club, gymnasium, various sports halls and car parking area and residential dwellings.

4.5 Falling head permeability tests have been undertaken within the existing wells on site to determine whether infiltration is feasible. Due to logistical reasons and considering that the Kingfield site is still operational, BRE365 compliant infiltration testing was not practicable on site at this time. The falling head permeability test results are included in Appendix D of this report. This testing confirmed that there is low potential for infiltration across most of the site. Hoe Stream is located just 40 m north-west of the site and it is proposed to maintain the existing connections on site and discharge surface water into the surface water sewer on Westfield Road which ultimately discharges to Hoe Stream.

4.6 Table 4.1 provides an overview of the feasibility of a range of Sustainable Drainage Systems (SuDS) techniques which are considered in accordance with the SuDS hierarchy in order to identify the most appropriate for the proposed development.

Table 4.1: Type and Feasibility of SuDS

Technique	Comments	Feasibility	Utilised	
Green roofs	Requires flat or minimal slope roofs. Limited value for runoff attenuation in comparison with other techniques.	Feasible	✓	Green roofs are proposed on residential blocks, where practicable.
Soakaways and infiltration trenches	Require infiltration rates of 1 x 10^{-6} m/s or greater. Shallow soakaways or infiltration trenches would be required where groundwater is shallow (i.e. less than 2.0 mbgl).	Not Feasible	x	Falling head tests have been completed and infiltration rates and groundwater depth are not suitable for soakaways.
Infiltration basins / swales	Are widely applicable for attenuation and treatment of surface runoff by infiltration into the ground. Require slope of no more than 4-10% and can act as a substitute for soakaways where groundwater is shallow.	Not Feasible	x	Falling head tests have been completed and infiltration rates and groundwater depth are not suitable for soakaways.
Bio-retention – landscaped infiltration areas	Primarily used to remove pollutants from runoff and due to their shallow nature are not as effective at runoff attenuation as other SUDS techniques.	Feasible	✓	Runoff from surfaces will be diverted to tree pits and rain gardens with excess runoff being diverted to the positive drainage system.
Permeable pavement	Ideally requires a level site and favourable underlying ground conditions. May be suitable in areas of relatively flat topography. Can be linked with geocellular storage or a porous sub-base.	Feasible	✓	Lined permeable paving will be used for non-adopted areas.
Non-infiltration swales	Used in the same way as carrier ditches or storage bunds. Shallow swales can be used for conveyance and/or storage.	Not Feasible	x	Insufficient space is available within the layout as a result of economic constraints (refer to Para 4.6)
Filter drains	These are normally used adjacent to areas of car parking or roads and convey runoff via flow through an engineered substrate.	Feasible	x	Not proposed.
Balancing ponds or attenuation basins	These are permanent ponds or basins that provide storage. These are appropriate for most sites but require suitable space.	Not Feasible	x	Insufficient space is available within the layout as a result of economic constraints (refer to Para 4.6)
Geo-cellular storage	Geo-cellular storage or similar sub-base medium beneath car parking areas and/or other areas of hardstanding and/or other forms of underground attenuation.	Feasible	✓	Storage provided within roads and permeable paving above the tanks will provide additional storage and appropriate treatment for runoff from road surface

4.7 The site at Kingfield Road has been designed to enable the development of a new football stadium with a capacity of 9,026 seats. In order to enable the redevelopment of the football stadium and make it financially sustainable, the site must incorporate a certain quantum of residential development. Given the economic and technical constraints on this site, insufficient space is available within the layout for above ground SuDS features, such as swales and ponds. Falling head tests have been completed and confirmed that infiltration rates and groundwater depths are not suitable for soakaways, however, green roofs are proposed on all residential blocks and bio-retention areas incorporating tree pits and rain gardens are also to be provided, where possible. Lined permeable paving will be also be used to improve the quality of runoff.

4.8 The rate of discharge to the public sewer will be controlled by a hydro-brake. Refer to drawings SK001/A AND S002/A within Appendix D of this report.

4.9 The drainage arrangement for the proposed development will limit runoff for all events up to and including the 100 year plus 40% climate change to approximately 80% of the 1 year rate of runoff from the site i.e. to a rate of 30 l/s. This is likely to be significantly less than the existing runoff rates for storms in excess of the 1 in 15 year return period.

4.10 Full details of the proposed surface water drainage strategy are provided in Appendix D.

Designing for Exceedance Events

4.11 If the proposed drainage system were to become blocked or an event above the design event occur, then exceedance flows would be routed along the road network towards the northern boundary onto Kingfield Road and ultimately into Hoe Stream (refer to Figure 4.1). This would mimic what would occur on the site in its existing condition and would ensure that the proposed development is safe during an exceedance event.

4.12 To account for the possibility of surcharge in the receiving public surface water sewer, the model outputs have been included within Appendix D of this report and the outfall from the model has been surcharged to 23.02 m AOD (the soffit level at the point of connection). This confirmed that there is no flooding within the site during the surcharged condition.

Long Term Maintenance of SuDS

4.13 Where SuDS features serve more than one property, it would be the responsibility of the developer to either maintain the SuDS features themselves or to negotiate with and secure the agreement of a third party to maintain the sustainable drainage system.

4.14 The maintenance requirements of the proposed SuDS features for use in the drainage strategy are detailed in the SuDS Manual and would be carried out accordingly.

Foul Drainage

4.15 Consultation with Thames Water (refer to Appendix E) identifies the location of sewers in the vicinity of the Site. This has identified that there are foul sewers along Westfield Avenue to the west of the site.

4.16 Consultation with Thames Water was undertaken to determine if there is sufficient capacity within the local foul sewerage system (refer to Appendix E). This concluded that the foul sewerage network does not currently have enough capacity to serve the development. Therefore, Thames Water are required to carry out detailed modelling work and potential off-site reinforcement to ensure the necessary improvement are in place prior to the development going ahead.

4.17 It should be noted that since the publication of the new connections and development charging rules in April 2018, drainage authorities in England are obligated to provide a point of connection and undertake any mitigation or improvement works and network reinforcements, where necessary. These will be programmed once planning consents are granted. Therefore, it is recommended that Thames Water should be consulted following planning consent so this detailed network modelling can be undertaken.

5 CONCLUSIONS

5.1 The requirements for Flood Risk Assessment are provided in the National Planning Policy Framework and its associated Planning Practice Guidance, together with the Environment Agency's Guidance Notes. This policy and associated guidance have been followed in the preparation of this FRA.

5.2 The EA's flood map for planning identifies that the entire site lies within Flood Zone 1 (low risk). Land located within Flood Zones 2 and 3 (medium and high risk, respectively) is located approximately 15 m to the north-west and, therefore, it is necessary to assess the risk of climate change on the flood extents for the site's operational lifetime (estimated at 100 years).

5.3 WBC and the EA have been working in partnership to design and implement the Hoe Valley Restoration Scheme and that this involves updating the 2014 modelling and this model is due to be published shortly. WBC have provided the output mapping for the defended scenario including climate change scenarios and this concludes that the crest levels of the fluvial flood defences are approximately 0.17 m to 0.82 m above the defended modelled 100-year flood level with 35% allowance for climate change and, therefore, it is concluded that the flood defences would provide protection for the operational lifetime of the development.

5.4 The undefended 100-year flood event with a 35% allowance for climate change (25.02 mAOD) has been used as the worst-case scenario for the proposed development and during this flood event, the site would flood to a maximum depth of 1 m which would occur in the northern part of the site. The central part of the site will remain dry; however, some of the southern extent of the site would experience shallow flooding to depths up to 0.2 m as flood water would flow down Kingfield Road and enter the site via the south-east.

5.5 All residential development is proposed to be located approximately 1.5 m above the existing ground level and this is at a minimum 480 mm above the undefended 100-year event with 35% climate change level. Therefore, should this event occur, a safe refuge would be provided within the residential dwellings. Any land uses below this flood level are classified as 'less vulnerable' land uses.

5.6 When referring to surface water flood mapping, most of the site has a very low to low risk of surface water flooding. There are very limited areas of medium and high surface water flood risk in the north-western and southern areas of the site; however, these areas are limited in size and do not constitute any flow paths (i.e. they originate within the site boundary). The extents of medium/high surface water flood risk are located with existing areas of hardstanding surrounding the buildings and is ultimately ponded water. Post-development, any ponding of surface water in extreme events will be re-distributed to the new low points within the site (i.e. areas of open space and roads), as well as being reduced through the implementation of the proposed drainage strategy.

5.7 From reviewing the borehole records on site included within the Ground Investigation report, groundwater is located between 1.7 and 2.87 m bgl within the Kempton Park Gravel. When assessing groundwater levels and FFLs of the basement and lower ground level, it is considered likely that the lower ground level and basement levels of the residential blocks would extend below the anticipated groundwater levels.

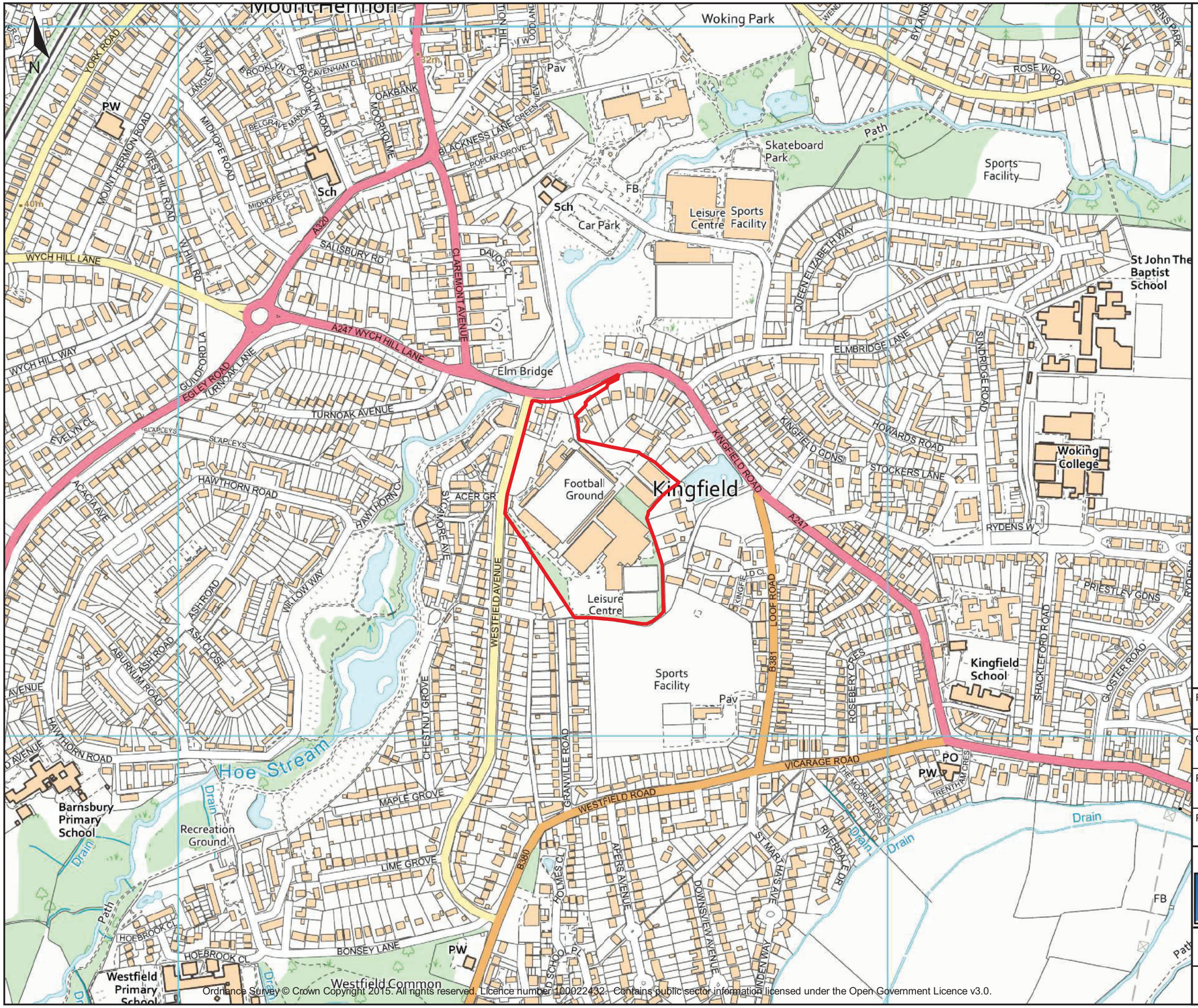
5.8 Considering that the footprints of the blocks are relatively small and there is only one-storey basement levels proposed, the volume of displaced groundwater may result in a small rise in groundwater level locally; however, it is considered unlikely that the risk of groundwater emergence at the surface would be increased. It is recommended that the construction of the basements incorporate flood resistant techniques to ensure that they would remain free from groundwater ingress.

5.9 The WBC historic flood records show that the site lies within a postcode area with 33 records of overloaded sewer flooding. However, the exact magnitude, extent and location of these flooding incidents are not recorded. Mitigation against sewer flooding could be achieved through the provision of non-return valves which prevent water entering the properties from drains and sewers.

5.10 The proposed drainage strategy comprises of green roofs, lined permeable paving and geo-cellular tanks and would ensure that surface water runoff rates for the proposed development would be limited to 30 l/s which is 80% of the existing 1 in 1 year runoff rate. Surface water runoff would discharge into the public sewer along Kingfield Road which ultimately drains to the Hoe Stream. Attenuation would be provided for all return periods up to and including the 1 in 100 year event inclusive of a 40% allowance for climate change.

5.11 This FRA has therefore demonstrated that the proposed development will be safe and that it would not increase flood risk elsewhere. The proposed land uses are classified as ‘more vulnerable’ and ‘less vulnerable’ development which are considered appropriate in relation to the flood risk vulnerability classifications set out in Table 3 of the NPPF. The development should therefore be considered acceptable in planning policy terms.

Figures



Key

Red Line Boundary

Figure 1.1: **Site Location Plan**

Client: **Woking Football Club**

Project: **Woking Sites EIA**

Project No.: **C1947**

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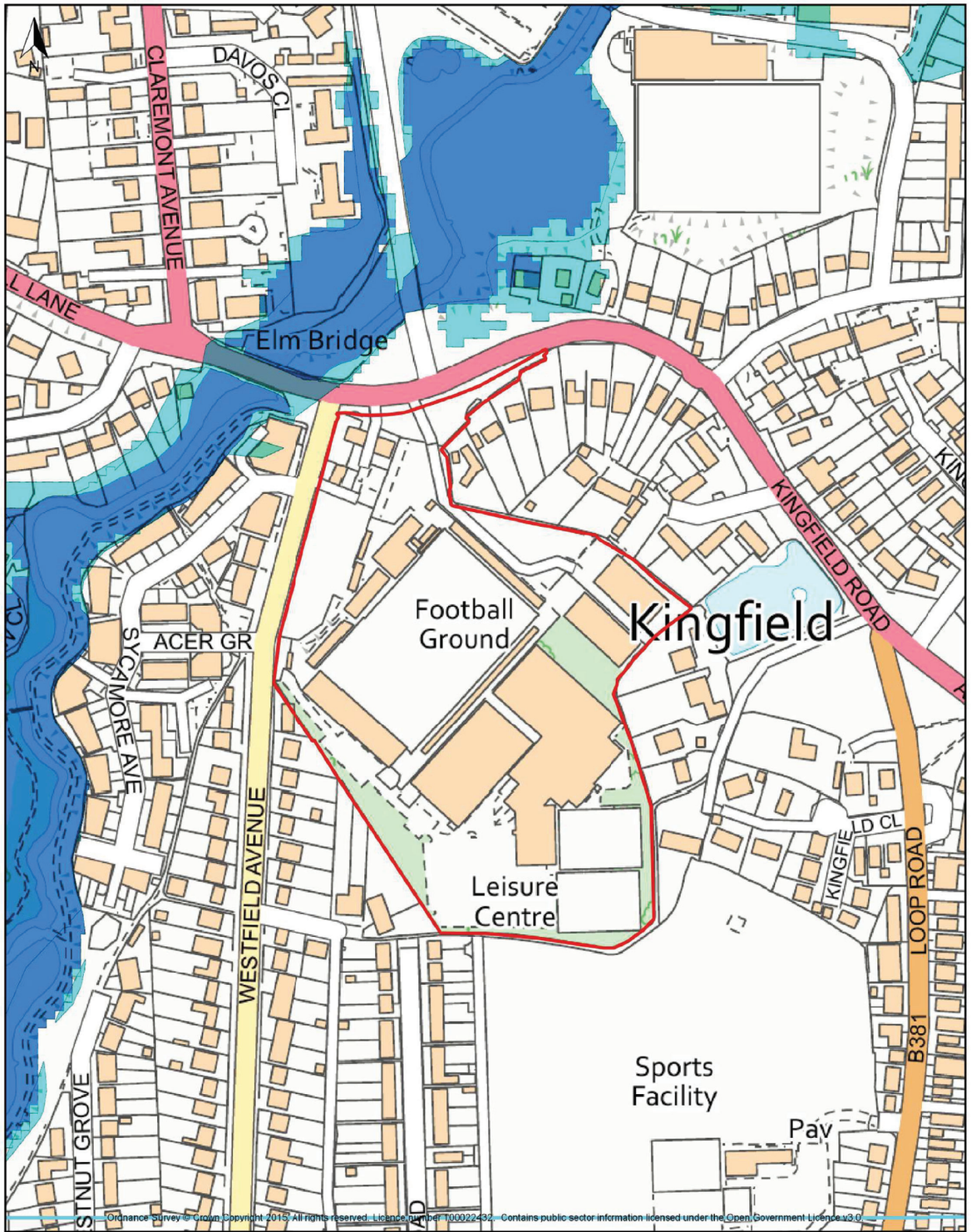

Key

- Red Line Boundary
- EA Flood Zone 2
- EA Flood Zone 3

Figure 3.1: **EA's Flood Map for Planning**

Client: **Woking Football Club**

Project: **Woking FC FRA**

Project No.: **C1947**

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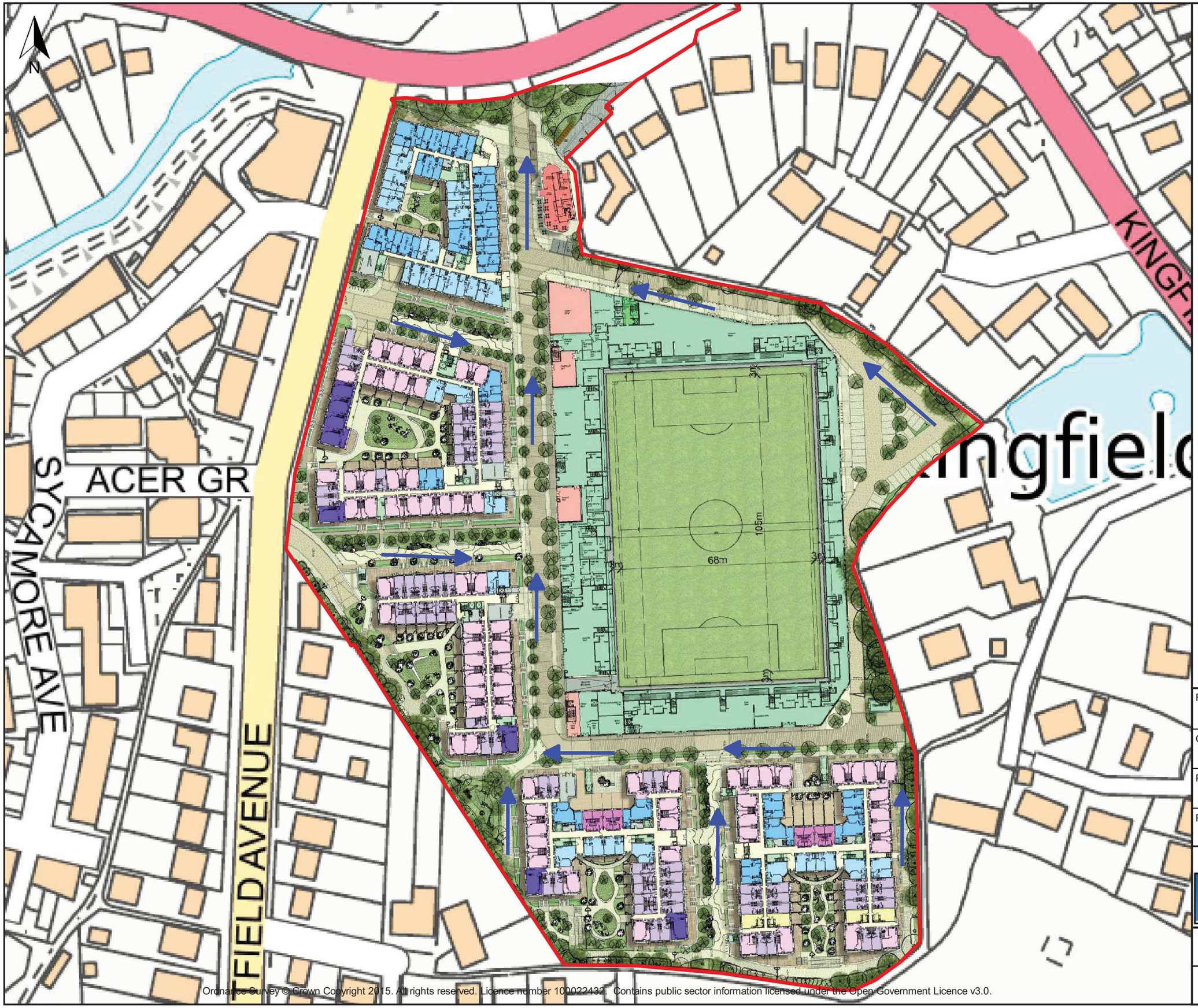

Key

- Red Line Boundary
- Surface Water Flow Path

Figure 4.1:	**Surface Water Flow Paths in an Exceedance Event**
Client:	**Woking Football Club**
Project:	**Woking FC**
Project No.:	**C1947**

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Appendix A: Proposed Development Layout

KEY

- STUDIO APARTMENT
- 1 BEDROOM APARTMENT
- 1 BEDROOM DUPLEX / TOWNHOUSE
- 2 BEDROOM APARTMENT
- 2 BEDROOM TOWNHOUSE
- 2 BEDROOM UPPER DUPLEX
- 2 BEDROOM LOWER DUPLEX
- 3 BEDROOM APARTMENT / TOWNHOUSE
- COMMUNITY CONCIERGE
- COMMERCIAL AREA
- DOCTORS AND DENTIST FACILITY
- STADIUM

0 10 20m 40m

SCALE @ 1:500

LeachRhodesWalker Architects

Ground Floor West 50 Dearmans Place Manchester M3 5LH t 0161 833 0211 e info@lrw.co.uk www.lrw.co.uk

7884 Cardinal Court Inc. Woking Football Club : PROPOSED GROUND FLOOR (COLOUR)

Scale: **1:500@A1** Auth By: **CJG** Drawn By: **AM** Date: **05.09.19** Dwg No: **7884-L(00)79L**

Appendix B: Topographical Survey

Notes

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KEY

- Bottom of slope / batter
- Building
- Catch bottom
- Dropped Kerb
- Edge of change in surface
- Eaves and Fillips (E)
- Fence
- Fillips (Outline)
- Hedge
- Kerb
- Pile String
- Road Centre Line
- Road Line
- Hedge Rooline
- Road Markings
- Road Sign board
- Siting ground level
- Top of slope / batter
- Track
- Track Centre
- Telegraph pole
- Verge
- Wall
- Wall Centre
- Bush
- Gate
- Road Markings (Hoo Speed)
- Tree
- Bollard
- Telephone cover
- Box
- Fire Hydrant
- Gate post point
- Gulley Square
- Gulley Round
- Inspection cover
- Manhole
- Marker post (yellow/Blue)
- Manhole (circle)
- Water meter
- Road sign
- Vent pipe
- FWS
- SWS

Point	Northing	Easting	Code
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100	159252.241	157249.881	PLAN

Rev	Description	Drawn	Checked	Date
A	UPDATED SURVEY FOLLOWING HOUSE AMENDMENTS.	NC	SGB	15+Oct2018

Preliminary ■ Information ■ Tender ■ Construction ■ As Built ■

Woods Hardwick
Architects, Engineers and Development Consultants

TITLE: WOKING FOOTBALL CLUB AND DAVID LLOYD GYM
WOKING

DWG: TOPOGRAPHIC SURVEY
SHEET 1 of 3

Scale: 1=200 @ A0 Date: 26-09-2018 Drawn: NC Ch: SGB

0189-7-851A

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1:200

KEY

- Bottom of slope / batter
- Building
- Ditch bottom
- Dropped Kerb
- Edge of change in surface
- Eaves and Ridge 2D
- Fence
- Foliage (Outline)
- Hedge
- Kerb
- Pillar, Stiffing
- Road Centre Line
- Road Line
- Hedge Roadline
- Road Markings
- Road Sign board
- Stiffing ground level
- Top of slope / batter
- Track
- Track Centre
- Telegraph pole
- Verge
- Wall
- Wall Centre
- Bush
- Gate
- Road Markings (Max Speed)
- Tree
- Bollard
- Telephone cover
- Box
- Fire Hydrant
- Gate post point
- Gulley Square
- Gulley Round
- Inspection cover
- Manhole
- Marker post (unidentified)
- Manhole (circle)
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- Road sign
- Vent pipe
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- SWS

Notes

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SURVEY STATION(S) NATIONAL GPS NETWORK: OSA4200

Name	Eastings	Northings	Height
ST45	500393.703	157392.094	25.281
ST46	500502.259	157389.557	24.893
ST42	500578.047	157341.351	24.855
ST43	500617.824	157276.611	25.013
ST44	500584.378	157283.842	25.240
ST47	500531.049	157432.298	24.328
ST48	500477.241	157482.144	24.328
ST49	500360.784	157492.548	24.348
ST41	500482.708	157488.518	24.897
ST40	500511.327	157488.254	24.699
ST6	500479.270	157412.111	24.381
ST39	500441.287	157408.820	24.258
ST38	500401.287	157358.820	24.450
ST37	500351.014	157357.845	24.371
ST36	500344.629	157345.328	24.475
ST35	500347.439	157325.597	24.774
ST34	500350.439	157314.597	24.774
ST33	500426.493	157174.342	25.139
ST32	500666.700	157245.098	26.023
ST31	500655.198	157256.354	26.148
ST30	500552.178	157256.154	25.287
ST29	500569.418	157304.440	25.332
ST28	500574.258	157336.457	25.223
ST27	500529.702	157351.352	24.883
ST26	500529.702	157351.352	24.883
ST25	500550.216	157402.568	24.928
ST24	500506.350	157346.881	25.281
ST23	500527.468	157190.977	25.405
ST22	500579.075	157198.242	25.473
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Rev	Description	Drawn	Checked	Date
A	UPDATED SURVEY FOLLOWING MINOR AMENDMENTS.	NC	SGB	15-10-2018

Preliminary ☐ Information ☐ Tender ☐ Construction ☐ As Built ☐

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F. +44 (0)1234 353034
mail@woodshardwick.com
www.woodshardwick.com

Title: WOKING FOOTBALL CLUB AND DAVID LLOYD GYM WOKING

Details: TOPOGRAPHIC SURVEY SHEET 2 of 3

Scale: 1-200 @ A0 Date: 26-09-2018 Drawn: NC Chk: SGB

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- Gulley Round
- Inspection cover
- Manhole
- Marker post (unidentified)
- Manhole (circle)
- Water meter
- Road sign
- Vent pipe
- FWS
- SWS

SURVEY STATIONS | NATIONAL GPS NETWORK (ETRS89)

Name	Easting	Northing	Height
ST01	500855.765	157350.894	25.097
ST02	500882.258	157356.511	24.955
ST03	500878.295	157341.832	24.955
ST04	500835.144	157350.7	25.211
ST05	500834.978	157355.892	25.456
ST06	500834.978	157355.892	25.456
ST07	500911.587	157375.258	24.525
ST08	500940.196	157415.148	24.345
ST09	500940.196	157415.148	24.345
ST10	500911.587	157415.111	24.385
ST11	500912.270	157412.111	24.381
ST12	500954.274	157401.469	24.734
ST13	500881.081	157358.830	24.806
ST14	500881.081	157358.830	24.806
ST15	500948.270	157345.338	24.475
ST16	500961.436	157350.930	24.374
ST17	500980.680	157376.161	24.307
ST18	500924.895	157174.340	25.170
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ST22	500985.678	157354.495	25.201
ST23	500974.200	157358.7	25.083
ST24	500962.402	157359.402	24.983
ST25	500976.254	157351.234	25.055
ST26	500959.295	157402.899	24.906
ST27	500927.268	157401.577	25.001
ST28	500927.268	157350.577	25.001
ST29	500879.075	157185.842	25.473
ST30	500879.075	157194.713	25.175
ST31	500943.744	157371.979	25.136

Rev	Revision	Description	Drawn	Checked	Date
A		UPDATED SURVEY FOLLOWING MINOR AMENDMENTS.	NC	SGB	15-10-2018

Preliminary ☐ Information ☐ Tender ☐ Construction ☐ As Built ☐

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Architects, Engineers and Development Consultants

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Title: WOKING FOOTBALL CLUB AND DAVID LLOYD GYM
WOKING

Details: TOPOGRAPHIC SURVEY
SHEET 3 of 3

Scale: 1-200 @ A0 Date: 26-09-2018 Drawn: NC Chk: SGB

0189-7-853A

Please consider the environment before printing this drawing

1:200 0m 2m 4m 8m 12m 20m

Appendix C: EA Flood Data

Product 4 (Detailed Flood Risk) for Woking Football Club
Our Ref: THM_116387

Product 4 is designed for developers where Flood Risk Standing Advice FRA (Flood Risk Assessment) Guidance Note 3 Applies. This is:

i) "all applications in Flood Zone 3, other than non-domestic extensions less than 250 sq metres; and all domestic extensions", and
ii) "all applications with a site area greater than 1 ha" in Flood Zone 2.

Product 4 includes the following information:

Ordnance Survey 1:25k colour raster base mapping;
Flood Zone 2 and Flood Zone 3;
Relevant model node locations and unique identifiers (for cross referencing to the water levels, depths and flows table);
Model extents showing *defended* scenarios;
FRA site boundary (where a suitable GIS layer is supplied);
Flood defence locations (where available/relevant) and unique identifiers; (supplied separately)
Flood Map areas benefiting from defences (where available/relevant);
Flood Map flood storage areas (where available/relevant);
Historic flood events outlines (where available/relevant, not the Historic Flood Map) and unique identifiers;
Statutory (Sealed) Main River (where available within map extents);

A table showing:

i) Model node X/Y coordinate locations, unique identifiers, and levels and flows for *defended* scenarios.
ii) Flood defence locations unique identifiers and attributes; (supplied seperately)
iii) Historic flood events outlines unique identifiers and attributes; and
iv) Local flood history data (where available/relevant).

Please note:

If you will be carrying out computer modelling as part of your Flood Risk Assessment, please request our guidance which sets out the requirements and best practice for computer river modelling.

This information is based on that currently available as of the date of this letter. You may feel it is appropriate to contact our office at regular intervals, to check whether any amendments/ improvements have been made. Should you re-contact us after a period of time, please quote the above reference in order to help us deal with your query.

This information is provided subject to the enclosed notice which you should read.

This letter is not a Flood Risk Assessment. The information supplied can be used to form part of your Flood Risk Assessment. Further advice and guidance regarding Flood Risk Assessments can be found on our website at:

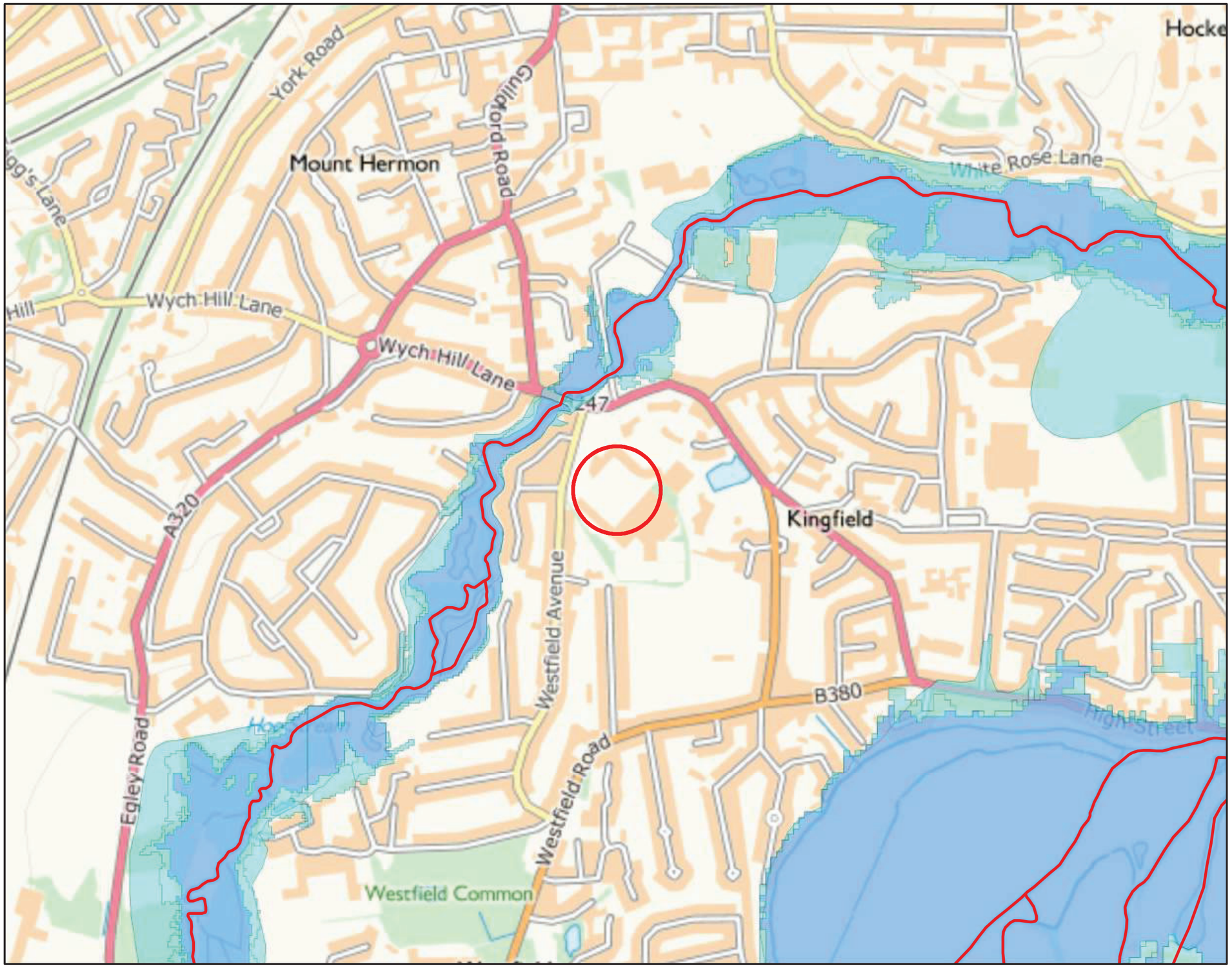
https://www.gov.uk/guidance/flood-risk-assessment-local-planning-authorities

If you would like advice from us regarding your development proposals you can complete our pre application enquiry form which can be found at:

https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Red Kite House, Howbery Park, Wallingford, Oxon OX10 8BD
Customer services line: 08708 506 506
Email: WTenquiries@environment-agency.gov.uk

Flood Map for Planning centred on Woking Football Club
Created on 25/02/2019 REF: THM_116387



Environment Agency

Kilometres

0 0.25 0.5

Legend

- Main River
- Flooding from rivers or sea (FZ3)
- Extent of extreme flood (FZ2)

Flooding from rivers or sea without defences (Flood Zone 3) shows the area that could be affected by flooding:
- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

The Extent of an extreme flood (Flood Zone 2) shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Defence information

THM_116387

Defence Location:	Hoe Stream FAS
Description:	This location is offered protection from the Hoe Valley Scheme. This consists of flood walls and embankments running from Westfield Primary School through to Woking Leisure Centre. These defences are currently maintained by the Environment Agency. The scheme offers protection up to 1 in 100 protection (1% chance of occurring annually) and includes an allowance for climate change. There are no other defences planned in the area.

Model information

THM_116387

Model: Hoe Stream (Mayford to Wey confluence) 2014

Description: The information provided is from the Hoe Stream Flood Alleviation Scheme mapping completed in April 2014. The study was carried out using 2D modelling software (ISIS-Tuflow).

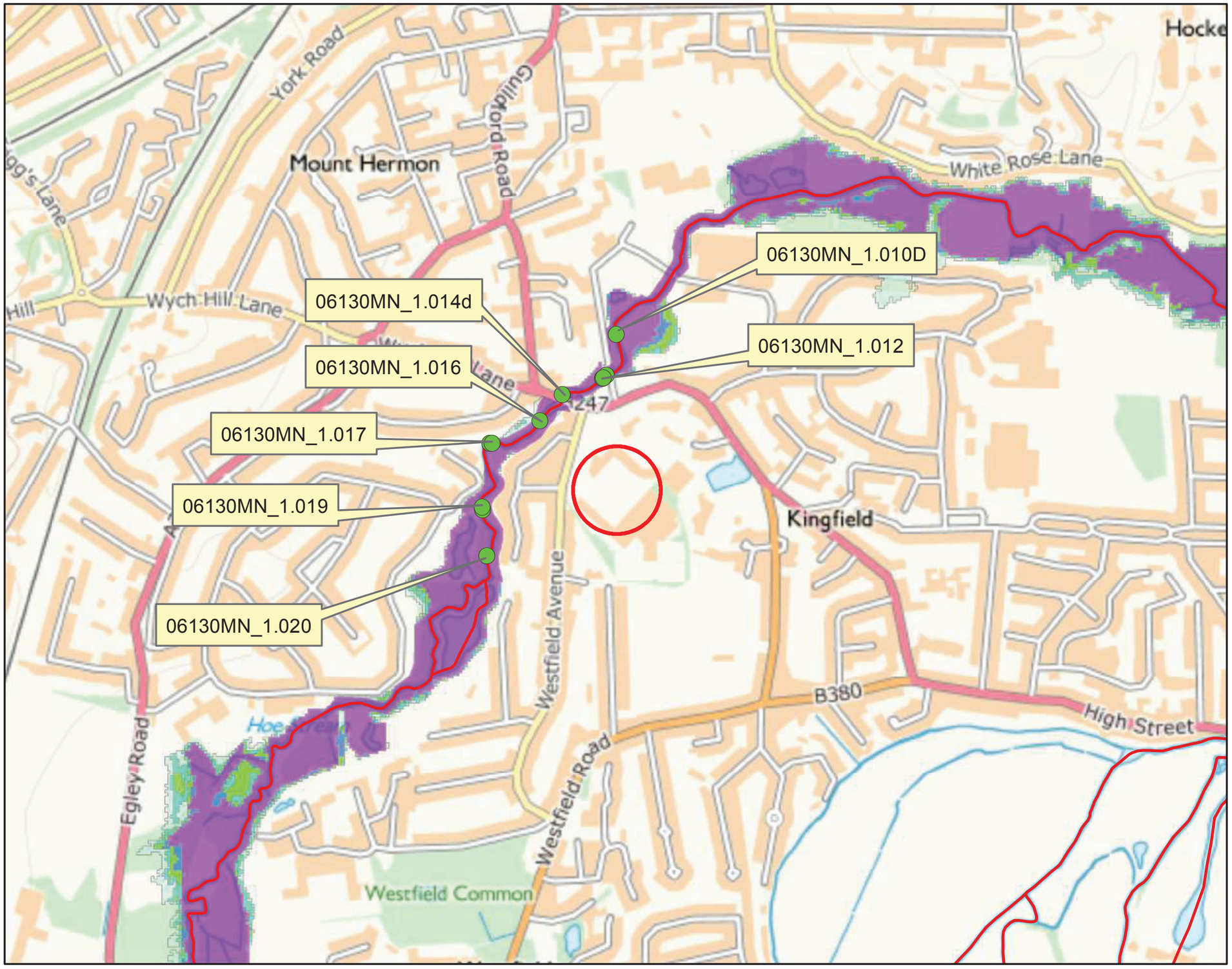
The mapping and modelling was split into two sections, Purbright to Mayford and Mayford to the Wey confluence.

Model design runs:
1 in 5 / 20% Annual Exceedance Probability (AEP); 1 in 20 / 5% AEP; 1 in 75 / 1.3% AEP; 1 in 100 / 1% AEP, 1 in 100+20% / 1% AEP plus 20% increase in flows and 1 in 1000 / 0.1% AEP.

Mapped outputs:
1 in 5 / 20% AEP; 1 in 20 / 5% AEP; 1 in 75 / 1.3% AEP; 1 in 100 / 1% AEP and 1 in 1000 / 0.1% AEP.

Model accuracy:
Levels ± 250mm

FRA Map centred on Woking Football Club
Created on 25/02/2019 REF: THM_116387



Environment Agency

Kilometres

0 0.25 0.5

Legend

- Hoe Stream Model Node Data
- Main River
- 20% AEP Flood Outline
- 5% AEP Flood Outline
- 1% AEP Flood Outline
- 1%+20% AEP Flood Outline
- 0.1% AEP Flood Outline

AEP = Annual Exceedance Probability
The probability of a flood of a particular magnitude, or greater, occuring in any given year

Where available climate change extents have been calculated with an additional flow added to an AEP event. An example of how this is written is 1%+20% AEP.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Modelled in-channel flood flows and levels

THM_116387

The modelled flood levels and flows for the closest most appropriate model node points for your site that are within the river channel are provided below:

				Flood Levels (mAOD)				
Node label	Model	Easting	Northing	20% AEP	5% AEP	1% AEP	1% AEP (+20% increase in flows)	0.1% AEP
06130MN_1.010D	Hoe Stream (Mayford to Wey confluence) 2014	500553	157612	23.77	23.87	24.01	24.21	24.42
06130MN_1.012	Hoe Stream (Mayford to Wey confluence) 2014	500528	157533	23.84	23.94	24.09	24.28	24.49
06130MN_1.014d	Hoe Stream (Mayford to Wey confluence) 2014	500456	157504	23.91	24.02	24.16	24.36	24.58
06130MN_1.016	Hoe Stream (Mayford to Wey confluence) 2014	500417	157457	23.90	24.01	24.16	24.36	24.58
06130MN_1.017	Hoe Stream (Mayford to Wey confluence) 2014	500327	157417	24.08	24.19	24.34	24.55	24.78
06130MN_1.019	Hoe Stream (Mayford to Wey confluence) 2014	500314	157298	24.30	24.38	24.52	24.70	24.92
06130MN_1.020	Hoe Stream (Mayford to Wey confluence) 2014	500322	157216	24.36	24.45	24.58	24.76	24.97

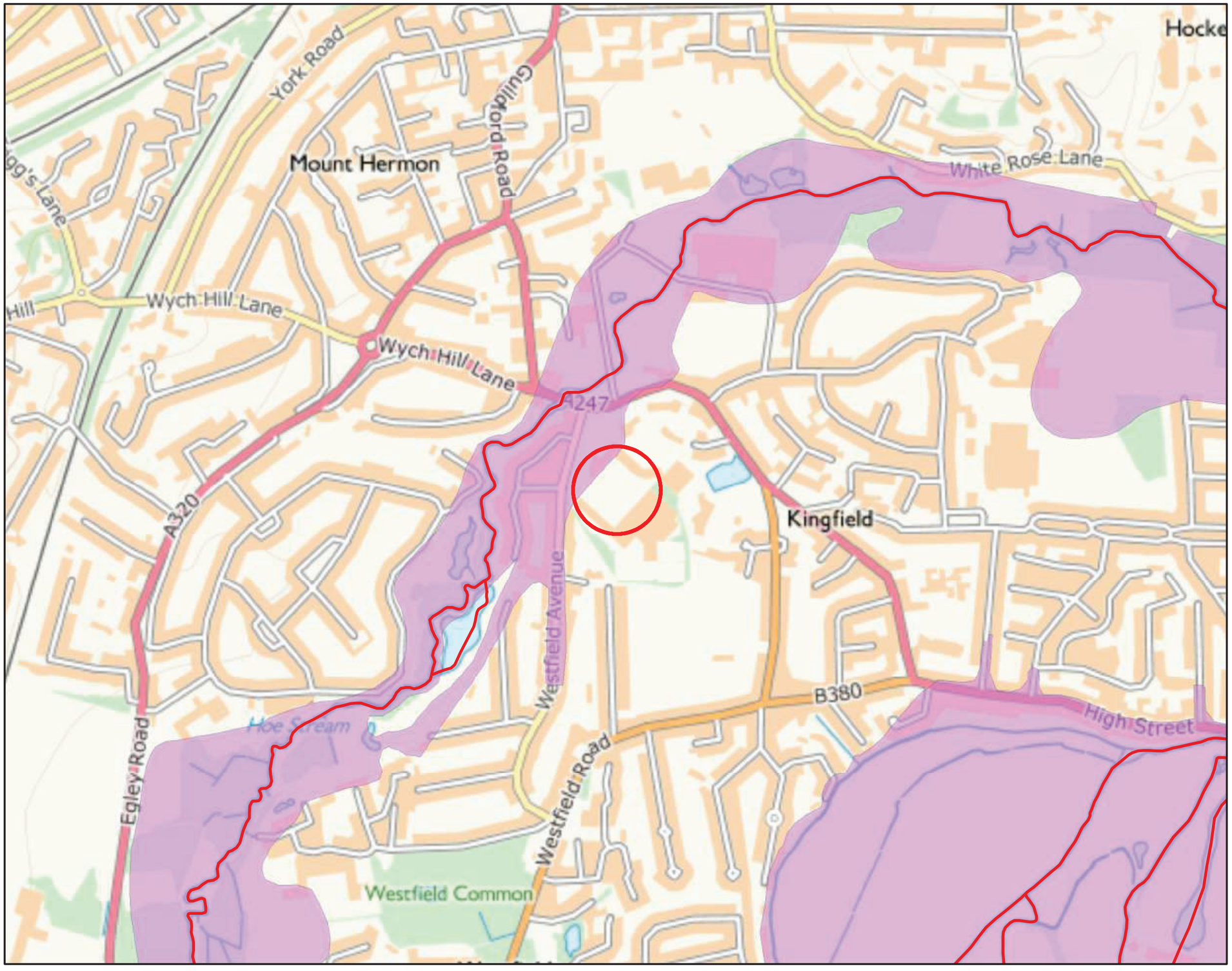
				Flood Flows (m3/s)				
Node label	Model	Easting	Northing	20% AEP	5% AEP	1% AEP	1% AEP (+20% increase in flows)	0.1% AEP
06130MN_1.010D	Hoe Stream (Mayford to Wey confluence) 2014	500553	157612	15.17	16.64	18.90	22.08	25.87
06130MN_1.012	Hoe Stream (Mayford to Wey confluence) 2014	500528	157533	12.77	14.29	16.74	20.67	25.64
06130MN_1.014d	Hoe Stream (Mayford to Wey confluence) 2014	500456	157504	16.31	18.55	22.08	27.42	33.92
06130MN_1.016	Hoe Stream (Mayford to Wey confluence) 2014	500417	157457	16.32	18.55	22.08	27.44	33.92
06130MN_1.017	Hoe Stream (Mayford to Wey confluence) 2014	500327	157417	11.85	12.24	12.93	14.12	15.47
06130MN_1.019	Hoe Stream (Mayford to Wey confluence) 2014	500314	157298	14.29	15.48	17.39	20.38	24.04
06130MN_1.020	Hoe Stream (Mayford to Wey confluence) 2014	500322	157216	8.91	9.20	10.17	11.63	13.67

Note:

Due to changes in guidance on the allowances for climate change, the 20% increase in river flows should no longer to be used for development design purposes. The data included in this Product can be used for interpolation of levels as part of an intermediate level assessment.

For further advice on the new allowances please visit
https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Historic Flood Map centred on Woking Football Club
Created on 25/02/2019 REF: THM_116387



Environment Agency

Kilometres

0 0.25 0.5

Legend

Main River

year

1968

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Historic flood data

THM_116387

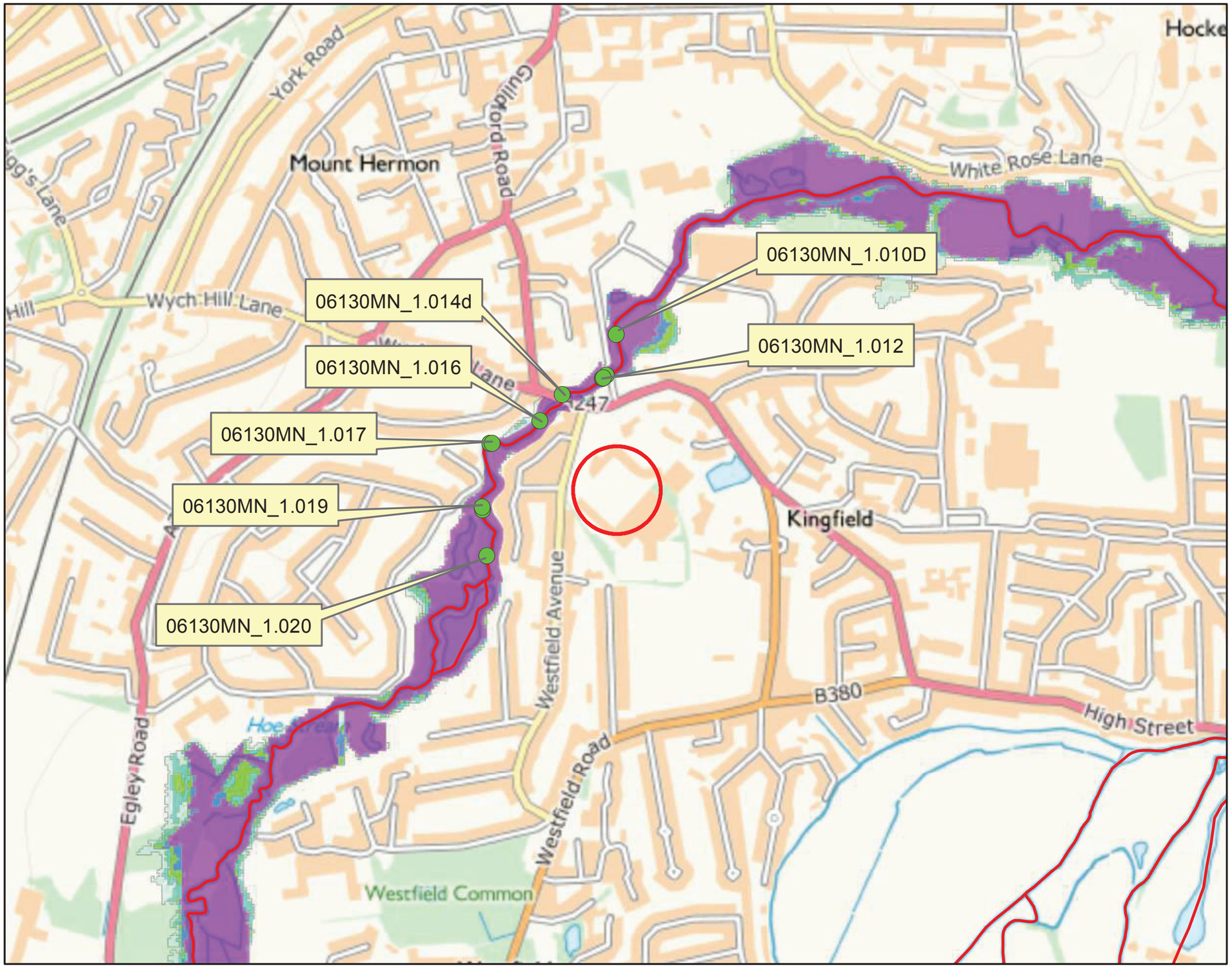
Our records show that the area of your site has been affected by flooding.
Information on the floods that have affected your site is provided in the table below:

Flood Event Code	Flood Event Name	Start Date	End Date	Source of Flooding	Cause of Flooding
EA0619680900220a	06SeptemberAutumn1968	01/01/1968	12/12/1968	main river	channel capacity exceeded (no raised defences)

Please note the Environment Agency maps flooding to land not individual properties. Floodplain extents are an indication of the geographical extent of a historic flood. They do not provide information regarding levels of individual properties, nor do they imply that a property has flooded internally.

Start and End Dates shown above may represent a wider range where the exact dates are not available.

FRA Map centred on Woking Football Club
Created on 25/02/2019 REF: THM_116387



Environment Agency

Kilometres

0 0.25 0.5

Legend

- Hoe Stream Model Node Data
- Main River
- 20% AEP Flood Outline
- 5% AEP Flood Outline
- 1% AEP Flood Outline
- 1%+20% AEP Flood Outline
- 0.1% AEP Flood Outline

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Where available climate change extents have been calculated with an additional flow added to an AEP event. An example of how this is written is 1%+20% AEP.

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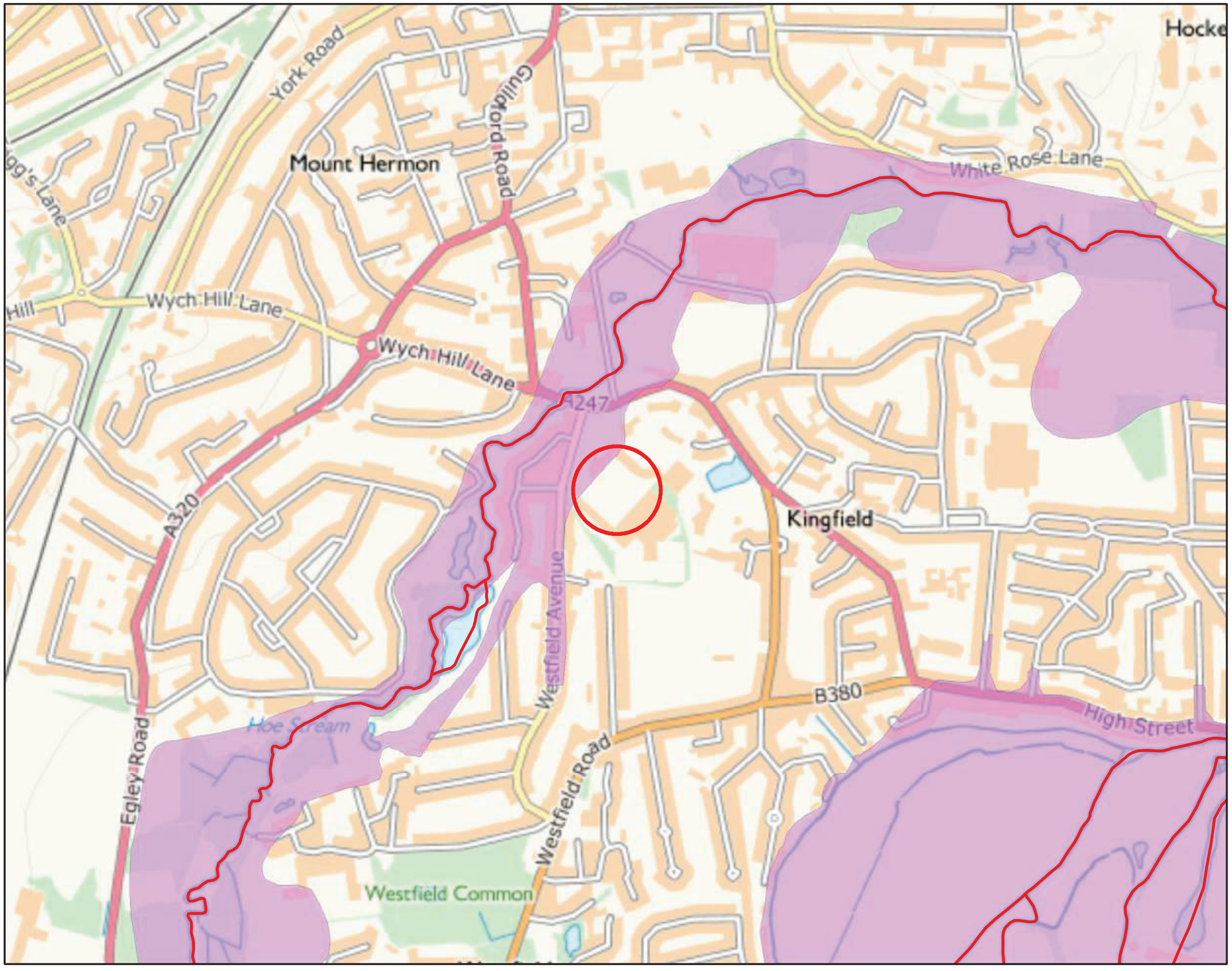

Environment Agency

Kilometres

0 0.25 0.5

Legend

Main River

year

1968

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Woking
Kingsfield Road

WOKING BOROUGH COUNCIL

Flood Risk

Key

- Hoe Stream 5 year
- Hoe Stream 20 Year
- Hoe Stream 100 Year
- HS 100 Year plus CC70

ordinary watercourses

FUNCTION

- Former Ditch
- Highways
- Land Drainage
- Private
- SW Extent_1_in_30_year
- SW Extent_1_in_100_year
- SW Extent_1_in_1000_year

N

SCALE 1:1,973

40 20 0 40 Metres

Engineering
Woking Borough Council
Civic Offices
Gloucester Square
Woking, Surrey GU21 6YL

Melissa Seymour

From: Katherine Waters <Katherine.Waters@woking.gov.uk>
Sent: 06 August 2019 15:43
To: Melissa Seymour
Subject: RE: Hoe Stream Model Update

Afternoon Melissa,

I have just been sent the undefended levels as follows:

Defended water levels are in the Table below:

Return Period	Peak Water Level (mAOD)
0100	24.71
0100cc35	25.08
0100cc70	25.35

The Climate Change levels actually overtop the defence opposite the site which would increase the probability of a breach scenario occurring at this location as this is a soft embankment. In addition the 70% goes around the defence through Queen Elizabeth Way and up to wards the football club along Kingfield Road.

There cannot be a loss of flood storage for the climate change scenario and any changes in the flow routes the development causes must not affect other areas.

Kind Regards

Katherine Waters
Drainage and Flood Risk Engineer

Woking Borough Council, Civic Offices, Gloucester Square, Woking, Surrey, GU21 6YL
T: +44 (0)1483 743725 | www.woking.gov.uk
For general enquiries, please call Woking Borough Council's Contact Centre on 01483 755855

From: Melissa Seymour <Melissa.seymour@rma-environmental.co.uk>
Sent: 31 July 2019 11:48
To: Katherine Waters <Katherine.Waters@woking.gov.uk>
Subject: RE: Hoe Stream Model Update

Morning Katherine,

Would you be able to get back to me on the below approach and provide me with the draft Hoe stream modelling defended 100 year + 35% CC flood level and the defended 100 year + 70 CC flood level?

I would really apprceiate it if you could get back to me on this this week as our deadline is fast approaching.

Many Thanks,
Melissa

From: Melissa Seymour
Sent: 16 July 2019 15:40
To: Katherine Waters <Katherine.Waters@woking.gov.uk>
Cc: Rob Murdock <rob.murdock@rma-environmental.co.uk>
Subject: RE: Hoe Stream Model Update

Hi Katherine,

Thank you for providing us with the draft defended flood mapping and the draft undefended flood levels for the Woking FC site which are based on the new Hoe Stream draft flood modelling. We understand that given that this modelling is draft and is likely to be published in the near future, the draft results of this modelling need to be considered for the proposed planning application.

Following a review of this data and your meeting with Rob, it is proposed that the site will consider mitigation measures for the **defended 100 year + 35% CC event** and the **defended 100 year + 70 CC flood event**, based on the draft mapping you provided.

It is considered that the undefended flood scenarios are unlikely to occur and are a residual flood risk to the site. However, the undefended flood levels will be considered in terms of how they will impact the scheme and the safety of access/egress of future occupants on site.

It is important to note that each block is proposing car parking at semi-basement level and this ensures that all more vulnerable land uses (residential uses) will be located above both the defended and undefended flood levels providing an area of safe refuge during the unlikely event of a failure of the flood defences.

I welcome your comments on the above approach and I hope this approach is considered acceptable to the LLFA. Please if you have any queries on this, do not hesitate to get in touch.

Please would you also be able to provide us with the draft Hoe stream modelling **defended 100 year + 35% CC flood level** and the **defended 100 year + 70 CC flood level** for the site as we currently only have the draft mapping of these scenarios.

I look forward to hearing from you shortly.

Many thanks,
Melissa

From: Katherine Waters <Katherine.Waters@woking.gov.uk>
Sent: 10 July 2019 17:05
To: Melissa Seymour <Melissa.seymour@rma-environmental.co.uk>
Cc: Rob Murdock <rob.murdock@rma-environmental.co.uk>
Subject: RE: Hoe Stream Model Update

Hi Melissa,

Can you let me know what your queries are and I'll see if I can get answers for you. The consultants time is paid for through the project and I need to ensure that the project costs do not go up with additional charges beyond that agreed. As you are aware as this would be additional work from the project scope the project would get the consultants hourly charge out rate for the additional time spent.

If there are any queries with the mapping and the levels the difference would be the levels provided are the undefended levels whilst the map I provided is the defended level. This is due to the fact the defence can be over top and breach opposite the site.

Please see below the water levels relevant to the Football Club Site. These are still draft as we are awaiting the EA to sign them off officially.

Kind Regards

Katherine Waters
Drainage and Flood Risk Engineer

Woking Borough Council, Civic Offices, Gloucester Square, Woking, Surrey, GU21 6YL
T: +44 (0)1483 743725 | www.woking.gov.uk
For general enquiries, please call Woking Borough Council's Contact Centre on 01483 755855

From: Matthew Savill
Sent: 08 July 2019 16:36
To: Katherine Waters <Katherine.Waters@woking.gov.uk>
Subject: RE: Hoe Stream Model Update

Hi Katherine,

Requested water levels are found in the table below. These are taken from model node 1.016:

Return Period	Peak Water Level
0100	24.66
0100cc35	25.02
0100cc70	25.28
1000	25.09

Kind Regards

Matt

Matt Savill
Senior Flood Risk Engineer

Appendix D: Drainage Strategy

PURPOSE

The purpose of this Design Statement is to describe how the surface water drainage strategy for the proposed redevelopment of the Woking Football Club site will manage runoff in a manner that will mitigate the risk of flooding and pollution to the environment.

SCOPE

This design addresses runoff from areas within the red line boundary for the planning application.

DESIGN CONSTRAINTS

A ground investigation has been carried out. A combination of high groundwater levels and low percolation rates indicates that infiltration will not be feasible. Refer to the main body of the report for a description of the ground investigations carried out at the site.

There is limited information on the drainage arrangements for the existing site. However, the topographic survey shows a significant proportion of the site draining to soakaway. Given the age of the development and the likely limitations on the performance of soakaways a precautionary approach to the likely rate of discharge from the site has been adopted and it is proposed to limit the peak rate of discharge from the site to the 30year greenfield rate.

DESIGN STANDARDS

The proposed surface water drainage system is to be designed to ensure that all runoff from the 100year rainfall event plus a 40% increase in rainfall intensity is managed in accordance with DEFRA's Technical Standards for Sustainable Drainage Systems.

DESIGN - STRATEGY

It is proposed to attenuate runoff prior to discharge to the public surface water sewer. Attenuation will be provided in:

- green roofs;
- the granular material beneath permeable paving;
- lined geocellular tanks.

The rate of discharge to the public sewer will be controlled by means of a Hydro-Brake.

The proposed drainage layout is shown on drawing SK001 in Appendix B.

DESIGN - DETAIL

Volumetric Control

The MicroDrainage software suite has been used to model the performance of the proposed drainage system. The model and simulation results are included in Appendix A.

Treatment Design

The pollution treatment requirements for the site have been established using the Simple Index Approach set out in Table 26.1 of the SUDS Manual.

Pollution hazard levels have been derived From Table 26.2 and are shown in the following table.

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-Carbons
Roads with more than 300 vehicle movements/day	Medium	0.7	0.6	0.7
Residential roofs	Very low	0.2	0.2	0.05

Table 1 – Pollution Hazard Indices

The following table shows how runoff from the above areas will be treated. The figure in brackets is the target level of treatment.

Land Use	Treatment	Total Suspended Solids (TSS)	Metals	Hydro-Carbons
Roads with more than 300 vehicle movements/day	Permeable paving	0.7 (0.7) OK	0.6 (0.6) OK	0.7 (0.7) OK
Residential roofs	Bioretention areas (i.e. rain gardens and tree pits)	0.2 (0.8) OK	0.2 (0.8) OK	0.05 (0.8) OK

Table 2 – Proposed SuDS Mitigation Indices

Comparing the pollution hazard indices in Table 1 with the mitigation indices in Table 2 indicates that the proposed treatment measures are appropriate for the site use.

Compliance with Technical Standards for Sustainable Drainage Systems

The following sections describe how the proposed surface water drainage system meets the requirements of the DEFRA document Non-Statutory Technical Standards for Sustainable Drainage Systems.

S1 *Where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body (e.g. the sea or a large estuary) the peak flow control standards (**S2** and **S3** below) and volume control technical standards (**S4** and **S6** below) need not apply*

There are no water bodies in the vicinity of the proposed development that are capable of accommodating uncontrolled runoff without increasing flood risk.

S2 *For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event.*

Not applicable – brownfield site.

S3 *For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.*

Greenfield runoff rates for the existing site area have been estimated using the MicroDrainage software suite (see Appendix A) and are shown in the following table.

Return Period (years)	Runoff (l/s)
Qbar	16.86
1	14.33
30	38.21
100	53.79

Table 3 – Greenfield Runoff Rates for Entire Site

Drawing SK003 in Appendix B shows the drainage arrangements for the existing site. Although much of the site is shown to drain to soakaways there are a number of areas adjacent to Westfield Avenue which drain to the public surface water sewer. The runoff rates from these areas have been estimated from a simple MicroDrainage model and are summarised in the following table. Model printouts are included in Appendix A.

Return Period (years)	Runoff (l/s)
Qbar	-
1	24.70
30	56.70
100	67.10
100+40%	80.7

Table 4 – Estimate of Discharge Rates to the Public Sewer

The greenfield runoff rates from the remainder of the site have been estimated using the MicroDrainage software suite (see Appendix A) and are shown in the following table.

Return Period (years)	Runoff (l/s)
Qbar	16.40
1	13.94
30	37.18
100	52.34

Table 5 – Greenfield Runoff Rates for Areas Not Draining to Public Sewer

In the absence of detailed information for the existing drainage system and the performance of the soakaways in particular (which are likely to have been designed to accommodate runoff for events up to only the 10year return period event), a precautionary approach to the estimation of existing runoff rates has been adopted. Rates have been estimated as the sum of the greenfield rate and the brownfield rate shown in Tables 4 and 5 above.

Return Period (years)	Runoff (l/s)
Qbar	-
1	38.64
30	93.88
100	119.44

Table 6 – Estimate of Runoff Rates from the Existing Site

S4 *Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event should never exceed the greenfield runoff volume for the same event.*

Not applicable – brownfield site.

S5 *Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.*

Not practicable due to reduction in volume of runoff proposed to be disposed of by means of infiltration.

S6 *Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with* ***S4*** *or* ***S5*** *above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.*

Without extensive testing of the existing drainage system it is not possible to estimate the volume of runoff from the existing site. However, it is likely that the soakaways have been designed to accommodate runoff from events up to only the 10year return period. Most of the runoff from more-extreme events is likely to flow overland to Westfield Avenue and the A427.

The drainage arrangements for the new development will limit runoff to approximately 80% of the 1year rate of runoff from the site. This is likely to be significantly less than existing runoff rates for storms in excess of the 1 in 15year return period, and will not adversely affect flood risk.

S7 *The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event.*

The drainage system has been designed such that runoff from all events up to the 100year +40% will be stored below ground level. Refer to the MicroDrainage outputs in Appendix A.

S8 *The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.*

See S7 above.

S9 *The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property.*

Refer to Section 4.10 in the main body of the report.

S10 *Components must be designed to ensure structural integrity of the drainage system and any adjacent structures or infrastructure under anticipated loading conditions over the design life of the development taking into account the requirement for reasonable levels of maintenance.*

Where practicable the drainage system will be located beyond the zone of influence of adjacent foundations. Where this is not practicable, foundations will be designed to allow for the replacement of the drainage system without the need for special support.

S11 *The materials, including products, components, fittings or naturally*

occurring materials, which are specified by the designer must be of a suitable nature and quality for their intended use.

The surface water system will be designed in accordance with the SuDS Manual. The design will allow for replacement of component parts without long-term detriment to the performance of the system.

***S12** Pumping should only be used to facilitate drainage for those parts of the site where it is not reasonably practicable to drain water by gravity.*

Runoff will generally be disposed of by means of gravity. The only exception will be the need for a small submersible pump to deal with any rain falling on the vehicular ramp down to the basement.

***S13** The mode of construction of any communication with an existing sewer or drainage system must be such that the making of the communication would not be prejudicial to the structural integrity and functionality of the sewerage or drainage system.*

Connections to the existing drainage system will be made only by appropriately qualified and licensed contractors.

***S14** Damage to the drainage system resulting from associated construction activities must be minimised and must be rectified before the drainage system is considered to be completed.*

See S13 above.

APPENDIX A

CALCULATIONS

1. Greenfield runoff rates
2. MicroDrainage printout for proposed drainage system - 100year +40% rainfall event
3. MicroDrainage printout for existing drainage system - 100year +40% rainfall event

1. Greenfield Runoff Rates

Pitman Associates Ltd		Page 1
South Lodge Exminster Devon EX6 8AT		Micro Drainage
Date 01/09/2019 16:27 File	Designed by Karl Checked by	
XP Solutions	Source Control 2019.1	

IH 124 Mean Annual Flood

Input

Return Period (years)	1	Soil	0.400
Area (ha)	50.000	Urban	0.000
SAAR (mm)	700	Region Number	Region 6

Results	l/s
QBAR Rural	170.1
QBAR Urban	170.1
Q1 year	144.6
Q1 year	144.6
Q2 years	149.9
Q5 years	217.7
Q10 years	275.6
Q20 years	340.8
Q25 years	365.4
Q30 years	385.5
Q50 years	445.7
Q100 years	542.7
Q200 years	637.9
Q250 years	668.6
Q1000 years	877.8

Pro-rata for total site area (4.956ha):

Qbar = 16.86l/s

1yr = 14.33l/s

30yr = 38.21l/s

100yr = 53.79l/s

Pro-rata for site area not draining to public sewer (4.822ha):

Qbar = 16.40l/s

1yr = 13.94l/s

30yr = 37.18l/s

100yr = 52.34l/s

2. MicroDrainage printout for proposed drainage system 100year +40% rainfall event

NB To account for the possibility of surcharge in the receiving public surface water sewer the outfall from the model has been surcharged to 23.02mAD, the soffit level at the point of connection.

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	72.000	0.300	240.0	0.057	4.00	0.0	0.600		o	300	Pipe/Conduit	
S1.001	68.000	0.300	226.7	0.119	0.00	0.0		0.020	→[↓]		Cellular Storage	
S2.000	77.000	0.200	385.0	0.213	4.00	0.0	0.600		o	300	Pipe/Conduit	
S3.000	30.000	0.150	200.0	0.000	4.00	0.0	0.600		o	300	Pipe/Conduit	
S4.000	30.000	0.150	200.0	0.238	4.00	0.0	0.600		o	300	Pipe/Conduit	
S1.002	56.300	0.100	563.0	0.070	0.00	0.0		0.020	→[↓]		Cellular Storage	
S5.000	30.000	0.300	100.0	0.000	4.00	0.0	0.600		o	300	Pipe/Conduit	
S6.000	30.000	0.300	100.0	0.237	4.00	0.0	0.600		o	300	Pipe/Conduit	
S7.000	18.000	0.300	60.0	0.080	4.00	0.0	0.600		o	300	Pipe/Conduit	
S1.003	72.500	0.100	725.0	0.127	0.00	0.0		0.020	→[↓]		Cellular Storage	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	75.00	5.19	24.000	0.057	0.0	0.0	0.0	1.01	71.4	11.6
S1.001	75.00	6.15	23.700	0.176	0.0	0.0	0.0	1.18	3016.9	35.7
S2.000	75.00	5.61	23.600	0.213	0.0	0.0	0.0	0.80	56.2	43.3
S3.000	75.00	4.45	23.700	0.000	0.0	0.0	0.0	1.11	78.3	0.0
S4.000	75.00	4.45	23.700	0.238	0.0	0.0	0.0	1.11	78.3	48.3
S1.002	75.00	7.24	23.400	0.697	0.0	0.0	0.0	0.86	2857.4	141.6
S5.000	75.00	4.32	23.750	0.000	0.0	0.0	0.0	1.57	111.1	0.0
S6.000	75.00	4.32	23.750	0.237	0.0	0.0	0.0	1.57	111.1	48.1
S7.000	75.00	4.15	23.750	0.080	0.0	0.0	0.0	2.03	143.7	16.2
S1.003	75.00	8.84	23.300	1.141	0.0	0.0	0.0	0.76	2517.8	231.8

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S8.000	30.000	0.100	300.0	0.000	4.00	0.0	0.600		o	300	Pipe/Conduit	
S9.000	30.000	0.100	300.0	0.210	4.00	0.0	0.600		o	300	Pipe/Conduit	
S10.000	72.000	0.200	360.0	0.190	4.00	0.0	0.600		o	300	Pipe/Conduit	
S1.004	72.500	0.100	725.0	0.112	0.00	0.0		0.020	→[↓]		Cellular Storage	
S11.000	30.000	0.100	300.0	0.000	4.00	0.0	0.600		o	300	Pipe/Conduit	
S12.000	30.000	0.100	300.0	0.254	4.00	0.0	0.600		o	300	Pipe/Conduit	
S13.000	50.000	0.150	333.3	0.101	4.00	0.0	0.600		o	300	Pipe/Conduit	
S1.005	24.500	0.050	490.0	0.049	0.00	0.0		0.020	→[↓]		Cellular Storage	
S14.000	30.000	0.100	300.0	0.000	4.00	0.0	0.600		o	300	Pipe/Conduit	
S15.000	30.000	0.100	300.0	0.181	4.00	0.0	0.600		o	300	Pipe/Conduit	
S16.000	49.000	0.200	245.0	0.018	4.00	0.0		0.020	→[↓]		Cellular Storage	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S8.000	75.00	4.55	23.450	0.000	0.0	0.0	0.0	0.90	63.8	0.0
S9.000	75.00	4.55	23.450	0.210	0.0	0.0	0.0	0.90	63.8	42.7
S10.000	75.00	5.46	23.550	0.190	0.0	0.0	0.0	0.82	58.2	38.6
S1.004	75.00	10.44	23.200	1.653	0.0	0.0	0.0	0.76	2517.8	335.8
S11.000	75.00	4.55	23.350	0.000	0.0	0.0	0.0	0.90	63.8	0.0
S12.000	75.00	4.55	23.350	0.254	0.0	0.0	0.0	0.90	63.8	51.6
S13.000	75.00	4.97	23.400	0.101	0.0	0.0	0.0	0.86	60.5	20.5
S1.005	75.00	10.88	23.100	2.057	0.0	0.0	0.0	0.92	3064.5	417.8
S14.000	75.00	4.55	23.300	0.000	0.0	0.0	0.0	0.90	63.8	0.0
S15.000	75.00	4.55	23.300	0.181	0.0	0.0	0.0	0.90	63.8	36.8
S16.000	75.00	4.79	24.000	0.018	0.0	0.0	0.0	1.04	2215.4	3.7

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S16.001	17.000	0.100	170.0	0.037	0.00	0.0		0.020	→[↓]		Cellular Storage	
S16.002	34.000	0.100	340.0	0.134	0.00	0.0		0.020	→[↓]		Cellular Storage	
S16.003	33.000	0.150	220.0	0.052	0.00	0.0		0.020	→[↓]		Cellular Storage	
S16.004	99.000	0.250	396.0	0.082	0.00	0.0		0.020	→[↓]		Cellular Storage	
S17.000	50.000	0.200	250.0	0.800	4.00	0.0	0.600		o	450	Pipe/Conduit	
S17.001	50.000	1.000	50.0	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S1.006	56.000	0.100	560.0	0.142	0.00	0.0		0.020	→[↓]		Cellular Storage	
S1.007	30.000	0.100	300.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S18.000	30.000	0.500	60.0	0.000	4.00	0.0	0.600		o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S16.001	75.00	5.00	23.800	0.055	0.0	0.0	0.0	1.32	3202.5	11.2
S16.002	75.00	5.59	23.700	0.189	0.0	0.0	0.0	0.96	2463.3	38.4
S16.003	75.00	6.04	23.600	0.241	0.0	0.0	0.0	1.22	3314.6	49.0
S16.004	75.00	7.79	23.450	0.323	0.0	0.0	0.0	0.94	2759.5	65.6
S17.000	75.00	4.65	24.500	0.800	0.0	0.0	0.0	1.28	203.8	162.5
S17.001	75.00	5.23	24.300	0.800	0.0	0.0	0.0	1.43	25.2«	162.5
S1.006	75.00	11.97	23.050	3.503	0.0	0.0	0.0	0.86	2866.3	711.5
S1.007	75.00	12.52	22.950	3.503	0.0	0.0	0.0	0.90	63.8«	711.5
S18.000	75.00	4.38	24.000	0.000	0.0	0.0	0.0	1.30	23.0	0.0

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	25.200	1.200	Open Manhole	1200	S1.000	24.000	300				
S2	25.200	1.500	Open Manhole	3000	S1.001	23.700		S1.000	23.700	300	
S2	25.200	1.600	Junction		S2.000	23.600	300				
S3	26.000	2.300	Open Manhole	1200	S3.000	23.700	300				
S4	26.000	2.300	Open Manhole	1200	S4.000	23.700	300				
S6	25.000	1.600	Open Manhole	3000	S1.002	23.400		S1.001	23.400		
								S2.000	23.400	300	
								S3.000	23.550	300	
								S4.000	23.550	300	
S7	26.000	2.250	Open Manhole	1200	S5.000	23.750	300				
S8	26.000	2.250	Open Manhole	1200	S6.000	23.750	300				
S9	25.000	1.250	Open Manhole	1200	S7.000	23.750	300				
S10	25.000	1.700	Open Manhole	3000	S1.003	23.300		S1.002	23.300		
								S5.000	23.450	300	
								S6.000	23.450	300	
								S7.000	23.450	300	
S11	26.000	2.550	Open Manhole	1200	S8.000	23.450	300				
S12	26.000	2.550	Open Manhole	1200	S9.000	23.450	300				
S13	25.000	1.450	Open Manhole	1200	S10.000	23.550	300				
S14	25.000	1.800	Open Manhole	3000	S1.004	23.200		S1.003	23.200		
								S8.000	23.350	300	
								S9.000	23.350	300	
								S10.000	23.350	300	
S15	26.000	2.650	Open Manhole	1200	S11.000	23.350	300				
S16	26.000	2.650	Open Manhole	1200	S12.000	23.350	300				
S17	25.000	1.600	Open Manhole	1200	S13.000	23.400	300				
S18	25.000	1.900	Open Manhole	3000	S1.005	23.100		S1.004	23.100		
								S11.000	23.250	300	
								S12.000	23.250	300	
								S13.000	23.250	300	
S19	26.000	2.700	Open Manhole	1200	S14.000	23.300	300				
S20	26.000	2.700	Open Manhole	1200	S15.000	23.300	300				
S21	25.000	1.000	Open Manhole	3000	S16.000	24.000					
S22	25.000	1.200	Open Manhole	3000	S16.001	23.800		S16.000	23.800		
S23	25.000	1.300	Open Manhole	3000	S16.002	23.700		S16.001	23.700		
S24	25.000	1.400	Open Manhole	3000	S16.003	23.600		S16.002	23.600		
S25	25.000	1.550	Open Manhole	3000	S16.004	23.450		S16.003	23.450		
S26	25.000	0.500	Open Manhole	1350	S17.000	24.500	450				

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S27	25.000	0.700	Open Manhole	1350	S17.001	24.300	150	S17.000	24.300	450	
S28	25.000	1.950	Open Manhole	3000	S1.006	23.050		S1.005	23.050		
								S14.000	23.200	300	
								S15.000	23.200	300	
								S16.004	23.200		100
								S17.001	23.300	150	
S29	24.600	1.650	Open Manhole	3000	S1.007	22.950	300	S1.006	22.950		
S	24.600	1.750	Open Manhole	0		OUTFALL		S1.007	22.850	300	
S30	24.600	0.600	Open Manhole	1200	S18.000	24.000	150				
S	24.600	1.100	Open Manhole	0		OUTFALL		S18.000	23.500	150	

No coordinates have been specified, layout information cannot be produced.

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o		S1	25.200	24.000	0.900	Open Manhole	1200
S1.001	→[↓]		S2	25.200	23.700	0.399	Open Manhole	3000
S2.000	o	300	S2	25.200	23.600	1.300	Junction	
S3.000	o	300	S3	26.000	23.700	2.000	Open Manhole	1200
S4.000	o	300	S4	26.000	23.700	2.000	Open Manhole	1200
S1.002	→[↓]		S6	25.000	23.400	0.199	Open Manhole	3000
S5.000	o	300	S7	26.000	23.750	1.950	Open Manhole	1200
S6.000	o	300	S8	26.000	23.750	1.950	Open Manhole	1200
S7.000	o	300	S9	25.000	23.750	0.950	Open Manhole	1200
S1.003	→[↓]		S10	25.000	23.300	0.299	Open Manhole	3000
S8.000	o	300	S11	26.000	23.450	2.250	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	72.000	240.0	S2	25.200	23.700	1.200	Open Manhole	3000
S1.001	68.000	226.7	S6	25.000	23.400	0.499	Open Manhole	3000
S2.000	77.000	385.0	S6	25.000	23.400	1.300	Open Manhole	3000
S3.000	30.000	200.0	S6	25.000	23.550	1.150	Open Manhole	3000
S4.000	30.000	200.0	S6	25.000	23.550	1.150	Open Manhole	3000
S1.002	56.300	563.0	S10	25.000	23.300	0.299	Open Manhole	3000
S5.000	30.000	100.0	S10	25.000	23.450	1.250	Open Manhole	3000
S6.000	30.000	100.0	S10	25.000	23.450	1.250	Open Manhole	3000
S7.000	18.000	60.0	S10	25.000	23.450	1.250	Open Manhole	3000
S1.003	72.500	725.0	S14	25.000	23.200	0.399	Open Manhole	3000
S8.000	30.000	300.0	S14	25.000	23.350	1.350	Open Manhole	3000

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S9.000	o	300	S12	26.000	23.450	2.250	Open Manhole	1200
S10.000	o	300	S13	25.000	23.550	1.150	Open Manhole	1200
S1.004	→[↓]		S14	25.000	23.200	0.399	Open Manhole	3000
S11.000	o	300	S15	26.000	23.350	2.350	Open Manhole	1200
S12.000	o	300	S16	26.000	23.350	2.350	Open Manhole	1200
S13.000	o	300	S17	25.000	23.400	1.300	Open Manhole	1200
S1.005	→[↓]		S18	25.000	23.100	0.499	Open Manhole	3000
S14.000	o	300	S19	26.000	23.300	2.400	Open Manhole	1200
S15.000	o	300	S20	26.000	23.300	2.400	Open Manhole	1200
S16.000	→[↓]		S21	25.000	24.000	0.199	Open Manhole	3000
S16.001	→[↓]		S22	25.000	23.800	0.199	Open Manhole	3000
S16.002	→[↓]		S23	25.000	23.700	0.199	Open Manhole	3000

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S9.000	30.000	300.0	S14	25.000	23.350	1.350	Open Manhole	3000
S10.000	72.000	360.0	S14	25.000	23.350	1.350	Open Manhole	3000
S1.004	72.500	725.0	S18	25.000	23.100	0.499	Open Manhole	3000
S11.000	30.000	300.0	S18	25.000	23.250	1.450	Open Manhole	3000
S12.000	30.000	300.0	S18	25.000	23.250	1.450	Open Manhole	3000
S13.000	50.000	333.3	S18	25.000	23.250	1.450	Open Manhole	3000
S1.005	24.500	490.0	S28	25.000	23.050	0.549	Open Manhole	3000
S14.000	30.000	300.0	S28	25.000	23.200	1.500	Open Manhole	3000
S15.000	30.000	300.0	S28	25.000	23.200	1.500	Open Manhole	3000
S16.000	49.000	245.0	S22	25.000	23.800	0.399	Open Manhole	3000
S16.001	17.000	170.0	S23	25.000	23.700	0.299	Open Manhole	3000
S16.002	34.000	340.0	S24	25.000	23.600	0.299	Open Manhole	3000

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S16.003	→[↓]		S24	25.000	23.600	0.199	Open Manhole	3000
S16.004	→[↓]		S25	25.000	23.450	0.199	Open Manhole	3000
S17.000	o	450	S26	25.000	24.500	0.050	Open Manhole	1350
S17.001	o	150	S27	25.000	24.300	0.550	Open Manhole	1350
S1.006	→[↓]		S28	25.000	23.050	0.549	Open Manhole	3000
S1.007	o	300	S29	24.600	22.950	1.350	Open Manhole	3000
S18.000	o	150	S30	24.600	24.000	0.450	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S16.003	33.000	220.0	S25	25.000	23.450	0.349	Open Manhole	3000
S16.004	99.000	396.0	S28	25.000	23.200	0.449	Open Manhole	3000
S17.000	50.000	250.0	S27	25.000	24.300	0.250	Open Manhole	1350
S17.001	50.000	50.0	S28	25.000	23.300	1.550	Open Manhole	3000
S1.006	56.000	560.0	S29	24.600	22.950	0.249	Open Manhole	3000
S1.007	30.000	300.0	S	24.600	22.850	1.450	Open Manhole	0
S18.000	30.000	60.0	S	24.600	23.500	0.950	Open Manhole	0

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.007	S	24.600	22.850	0.000	0	0

Datum (m) 0.000 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	23.020	7	23.020	13	23.020	19	23.020	25	23.020	31	23.020
2	23.020	8	23.020	14	23.020	20	23.020	26	23.020	32	23.020
3	23.020	9	23.020	15	23.020	21	23.020	27	23.020	33	23.020
4	23.020	10	23.020	16	23.020	22	23.020	28	23.020	34	23.020
5	23.020	11	23.020	17	23.020	23	23.020	29	23.020	35	23.020
6	23.020	12	23.020	18	23.020	24	23.020	30	23.020	36	23.020

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
37	23.020	87	23.020	137	23.020	187	23.020	237	23.020	287	23.020
38	23.020	88	23.020	138	23.020	188	23.020	238	23.020	288	23.020
39	23.020	89	23.020	139	23.020	189	23.020	239	23.020	289	23.020
40	23.020	90	23.020	140	23.020	190	23.020	240	23.020	290	23.020
41	23.020	91	23.020	141	23.020	191	23.020	241	23.020	291	23.020
42	23.020	92	23.020	142	23.020	192	23.020	242	23.020	292	23.020
43	23.020	93	23.020	143	23.020	193	23.020	243	23.020	293	23.020
44	23.020	94	23.020	144	23.020	194	23.020	244	23.020	294	23.020
45	23.020	95	23.020	145	23.020	195	23.020	245	23.020	295	23.020
46	23.020	96	23.020	146	23.020	196	23.020	246	23.020	296	23.020
47	23.020	97	23.020	147	23.020	197	23.020	247	23.020	297	23.020
48	23.020	98	23.020	148	23.020	198	23.020	248	23.020	298	23.020
49	23.020	99	23.020	149	23.020	199	23.020	249	23.020	299	23.020
50	23.020	100	23.020	150	23.020	200	23.020	250	23.020	300	23.020
51	23.020	101	23.020	151	23.020	201	23.020	251	23.020	301	23.020
52	23.020	102	23.020	152	23.020	202	23.020	252	23.020	302	23.020
53	23.020	103	23.020	153	23.020	203	23.020	253	23.020	303	23.020
54	23.020	104	23.020	154	23.020	204	23.020	254	23.020	304	23.020
55	23.020	105	23.020	155	23.020	205	23.020	255	23.020	305	23.020
56	23.020	106	23.020	156	23.020	206	23.020	256	23.020	306	23.020
57	23.020	107	23.020	157	23.020	207	23.020	257	23.020	307	23.020
58	23.020	108	23.020	158	23.020	208	23.020	258	23.020	308	23.020
59	23.020	109	23.020	159	23.020	209	23.020	259	23.020	309	23.020
60	23.020	110	23.020	160	23.020	210	23.020	260	23.020	310	23.020
61	23.020	111	23.020	161	23.020	211	23.020	261	23.020	311	23.020
62	23.020	112	23.020	162	23.020	212	23.020	262	23.020	312	23.020
63	23.020	113	23.020	163	23.020	213	23.020	263	23.020	313	23.020
64	23.020	114	23.020	164	23.020	214	23.020	264	23.020	314	23.020
65	23.020	115	23.020	165	23.020	215	23.020	265	23.020	315	23.020
66	23.020	116	23.020	166	23.020	216	23.020	266	23.020	316	23.020
67	23.020	117	23.020	167	23.020	217	23.020	267	23.020	317	23.020
68	23.020	118	23.020	168	23.020	218	23.020	268	23.020	318	23.020
69	23.020	119	23.020	169	23.020	219	23.020	269	23.020	319	23.020
70	23.020	120	23.020	170	23.020	220	23.020	270	23.020	320	23.020
71	23.020	121	23.020	171	23.020	221	23.020	271	23.020	321	23.020
72	23.020	122	23.020	172	23.020	222	23.020	272	23.020	322	23.020
73	23.020	123	23.020	173	23.020	223	23.020	273	23.020	323	23.020
74	23.020	124	23.020	174	23.020	224	23.020	274	23.020	324	23.020
75	23.020	125	23.020	175	23.020	225	23.020	275	23.020	325	23.020
76	23.020	126	23.020	176	23.020	226	23.020	276	23.020	326	23.020
77	23.020	127	23.020	177	23.020	227	23.020	277	23.020	327	23.020
78	23.020	128	23.020	178	23.020	228	23.020	278	23.020	328	23.020
79	23.020	129	23.020	179	23.020	229	23.020	279	23.020	329	23.020
80	23.020	130	23.020	180	23.020	230	23.020	280	23.020	330	23.020
81	23.020	131	23.020	181	23.020	231	23.020	281	23.020	331	23.020
82	23.020	132	23.020	182	23.020	232	23.020	282	23.020	332	23.020
83	23.020	133	23.020	183	23.020	233	23.020	283	23.020	333	23.020
84	23.020	134	23.020	184	23.020	234	23.020	284	23.020	334	23.020
85	23.020	135	23.020	185	23.020	235	23.020	285	23.020	335	23.020
86	23.020	136	23.020	186	23.020	236	23.020	286	23.020	336	23.020

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
337	23.020	387	23.020	437	23.020	487	23.020	537	23.020	587	23.020
338	23.020	388	23.020	438	23.020	488	23.020	538	23.020	588	23.020
339	23.020	389	23.020	439	23.020	489	23.020	539	23.020	589	23.020
340	23.020	390	23.020	440	23.020	490	23.020	540	23.020	590	23.020
341	23.020	391	23.020	441	23.020	491	23.020	541	23.020	591	23.020
342	23.020	392	23.020	442	23.020	492	23.020	542	23.020	592	23.020
343	23.020	393	23.020	443	23.020	493	23.020	543	23.020	593	23.020
344	23.020	394	23.020	444	23.020	494	23.020	544	23.020	594	23.020
345	23.020	395	23.020	445	23.020	495	23.020	545	23.020	595	23.020
346	23.020	396	23.020	446	23.020	496	23.020	546	23.020	596	23.020
347	23.020	397	23.020	447	23.020	497	23.020	547	23.020	597	23.020
348	23.020	398	23.020	448	23.020	498	23.020	548	23.020	598	23.020
349	23.020	399	23.020	449	23.020	499	23.020	549	23.020	599	23.020
350	23.020	400	23.020	450	23.020	500	23.020	550	23.020	600	23.020
351	23.020	401	23.020	451	23.020	501	23.020	551	23.020	601	23.020
352	23.020	402	23.020	452	23.020	502	23.020	552	23.020	602	23.020
353	23.020	403	23.020	453	23.020	503	23.020	553	23.020	603	23.020
354	23.020	404	23.020	454	23.020	504	23.020	554	23.020	604	23.020
355	23.020	405	23.020	455	23.020	505	23.020	555	23.020	605	23.020
356	23.020	406	23.020	456	23.020	506	23.020	556	23.020	606	23.020
357	23.020	407	23.020	457	23.020	507	23.020	557	23.020	607	23.020
358	23.020	408	23.020	458	23.020	508	23.020	558	23.020	608	23.020
359	23.020	409	23.020	459	23.020	509	23.020	559	23.020	609	23.020
360	23.020	410	23.020	460	23.020	510	23.020	560	23.020	610	23.020
361	23.020	411	23.020	461	23.020	511	23.020	561	23.020	611	23.020
362	23.020	412	23.020	462	23.020	512	23.020	562	23.020	612	23.020
363	23.020	413	23.020	463	23.020	513	23.020	563	23.020	613	23.020
364	23.020	414	23.020	464	23.020	514	23.020	564	23.020	614	23.020
365	23.020	415	23.020	465	23.020	515	23.020	565	23.020	615	23.020
366	23.020	416	23.020	466	23.020	516	23.020	566	23.020	616	23.020
367	23.020	417	23.020	467	23.020	517	23.020	567	23.020	617	23.020
368	23.020	418	23.020	468	23.020	518	23.020	568	23.020	618	23.020
369	23.020	419	23.020	469	23.020	519	23.020	569	23.020	619	23.020
370	23.020	420	23.020	470	23.020	520	23.020	570	23.020	620	23.020
371	23.020	421	23.020	471	23.020	521	23.020	571	23.020	621	23.020
372	23.020	422	23.020	472	23.020	522	23.020	572	23.020	622	23.020
373	23.020	423	23.020	473	23.020	523	23.020	573	23.020	623	23.020
374	23.020	424	23.020	474	23.020	524	23.020	574	23.020	624	23.020
375	23.020	425	23.020	475	23.020	525	23.020	575	23.020	625	23.020
376	23.020	426	23.020	476	23.020	526	23.020	576	23.020	626	23.020
377	23.020	427	23.020	477	23.020	527	23.020	577	23.020	627	23.020
378	23.020	428	23.020	478	23.020	528	23.020	578	23.020	628	23.020
379	23.020	429	23.020	479	23.020	529	23.020	579	23.020	629	23.020
380	23.020	430	23.020	480	23.020	530	23.020	580	23.020	630	23.020
381	23.020	431	23.020	481	23.020	531	23.020	581	23.020	631	23.020
382	23.020	432	23.020	482	23.020	532	23.020	582	23.020	632	23.020
383	23.020	433	23.020	483	23.020	533	23.020	583	23.020	633	23.020
384	23.020	434	23.020	484	23.020	534	23.020	584	23.020	634	23.020
385	23.020	435	23.020	485	23.020	535	23.020	585	23.020	635	23.020
386	23.020	436	23.020	486	23.020	536	23.020	586	23.020	636	23.020

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
637	23.020	687	23.020	737	23.020	787	23.020	837	23.020	887	23.020
638	23.020	688	23.020	738	23.020	788	23.020	838	23.020	888	23.020
639	23.020	689	23.020	739	23.020	789	23.020	839	23.020	889	23.020
640	23.020	690	23.020	740	23.020	790	23.020	840	23.020	890	23.020
641	23.020	691	23.020	741	23.020	791	23.020	841	23.020	891	23.020
642	23.020	692	23.020	742	23.020	792	23.020	842	23.020	892	23.020
643	23.020	693	23.020	743	23.020	793	23.020	843	23.020	893	23.020
644	23.020	694	23.020	744	23.020	794	23.020	844	23.020	894	23.020
645	23.020	695	23.020	745	23.020	795	23.020	845	23.020	895	23.020
646	23.020	696	23.020	746	23.020	796	23.020	846	23.020	896	23.020
647	23.020	697	23.020	747	23.020	797	23.020	847	23.020	897	23.020
648	23.020	698	23.020	748	23.020	798	23.020	848	23.020	898	23.020
649	23.020	699	23.020	749	23.020	799	23.020	849	23.020	899	23.020
650	23.020	700	23.020	750	23.020	800	23.020	850	23.020	900	23.020
651	23.020	701	23.020	751	23.020	801	23.020	851	23.020	901	23.020
652	23.020	702	23.020	752	23.020	802	23.020	852	23.020	902	23.020
653	23.020	703	23.020	753	23.020	803	23.020	853	23.020	903	23.020
654	23.020	704	23.020	754	23.020	804	23.020	854	23.020	904	23.020
655	23.020	705	23.020	755	23.020	805	23.020	855	23.020	905	23.020
656	23.020	706	23.020	756	23.020	806	23.020	856	23.020	906	23.020
657	23.020	707	23.020	757	23.020	807	23.020	857	23.020	907	23.020
658	23.020	708	23.020	758	23.020	808	23.020	858	23.020	908	23.020
659	23.020	709	23.020	759	23.020	809	23.020	859	23.020	909	23.020
660	23.020	710	23.020	760	23.020	810	23.020	860	23.020	910	23.020
661	23.020	711	23.020	761	23.020	811	23.020	861	23.020	911	23.020
662	23.020	712	23.020	762	23.020	812	23.020	862	23.020	912	23.020
663	23.020	713	23.020	763	23.020	813	23.020	863	23.020	913	23.020
664	23.020	714	23.020	764	23.020	814	23.020	864	23.020	914	23.020
665	23.020	715	23.020	765	23.020	815	23.020	865	23.020	915	23.020
666	23.020	716	23.020	766	23.020	816	23.020	866	23.020	916	23.020
667	23.020	717	23.020	767	23.020	817	23.020	867	23.020	917	23.020
668	23.020	718	23.020	768	23.020	818	23.020	868	23.020	918	23.020
669	23.020	719	23.020	769	23.020	819	23.020	869	23.020	919	23.020
670	23.020	720	23.020	770	23.020	820	23.020	870	23.020	920	23.020
671	23.020	721	23.020	771	23.020	821	23.020	871	23.020	921	23.020
672	23.020	722	23.020	772	23.020	822	23.020	872	23.020	922	23.020
673	23.020	723	23.020	773	23.020	823	23.020	873	23.020	923	23.020
674	23.020	724	23.020	774	23.020	824	23.020	874	23.020	924	23.020
675	23.020	725	23.020	775	23.020	825	23.020	875	23.020	925	23.020
676	23.020	726	23.020	776	23.020	826	23.020	876	23.020	926	23.020
677	23.020	727	23.020	777	23.020	827	23.020	877	23.020	927	23.020
678	23.020	728	23.020	778	23.020	828	23.020	878	23.020	928	23.020
679	23.020	729	23.020	779	23.020	829	23.020	879	23.020	929	23.020
680	23.020	730	23.020	780	23.020	830	23.020	880	23.020	930	23.020
681	23.020	731	23.020	781	23.020	831	23.020	881	23.020	931	23.020
682	23.020	732	23.020	782	23.020	832	23.020	882	23.020	932	23.020
683	23.020	733	23.020	783	23.020	833	23.020	883	23.020	933	23.020
684	23.020	734	23.020	784	23.020	834	23.020	884	23.020	934	23.020
685	23.020	735	23.020	785	23.020	835	23.020	885	23.020	935	23.020
686	23.020	736	23.020	786	23.020	836	23.020	886	23.020	936	23.020

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
937	23.020	987	23.020	1037	23.020	1087	23.020	1137	23.020	1187	23.020
938	23.020	988	23.020	1038	23.020	1088	23.020	1138	23.020	1188	23.020
939	23.020	989	23.020	1039	23.020	1089	23.020	1139	23.020	1189	23.020
940	23.020	990	23.020	1040	23.020	1090	23.020	1140	23.020	1190	23.020
941	23.020	991	23.020	1041	23.020	1091	23.020	1141	23.020	1191	23.020
942	23.020	992	23.020	1042	23.020	1092	23.020	1142	23.020	1192	23.020
943	23.020	993	23.020	1043	23.020	1093	23.020	1143	23.020	1193	23.020
944	23.020	994	23.020	1044	23.020	1094	23.020	1144	23.020	1194	23.020
945	23.020	995	23.020	1045	23.020	1095	23.020	1145	23.020	1195	23.020
946	23.020	996	23.020	1046	23.020	1096	23.020	1146	23.020	1196	23.020
947	23.020	997	23.020	1047	23.020	1097	23.020	1147	23.020	1197	23.020
948	23.020	998	23.020	1048	23.020	1098	23.020	1148	23.020	1198	23.020
949	23.020	999	23.020	1049	23.020	1099	23.020	1149	23.020	1199	23.020
950	23.020	1000	23.020	1050	23.020	1100	23.020	1150	23.020	1200	23.020
951	23.020	1001	23.020	1051	23.020	1101	23.020	1151	23.020	1201	23.020
952	23.020	1002	23.020	1052	23.020	1102	23.020	1152	23.020	1202	23.020
953	23.020	1003	23.020	1053	23.020	1103	23.020	1153	23.020	1203	23.020
954	23.020	1004	23.020	1054	23.020	1104	23.020	1154	23.020	1204	23.020
955	23.020	1005	23.020	1055	23.020	1105	23.020	1155	23.020	1205	23.020
956	23.020	1006	23.020	1056	23.020	1106	23.020	1156	23.020	1206	23.020
957	23.020	1007	23.020	1057	23.020	1107	23.020	1157	23.020	1207	23.020
958	23.020	1008	23.020	1058	23.020	1108	23.020	1158	23.020	1208	23.020
959	23.020	1009	23.020	1059	23.020	1109	23.020	1159	23.020	1209	23.020
960	23.020	1010	23.020	1060	23.020	1110	23.020	1160	23.020	1210	23.020
961	23.020	1011	23.020	1061	23.020	1111	23.020	1161	23.020	1211	23.020
962	23.020	1012	23.020	1062	23.020	1112	23.020	1162	23.020	1212	23.020
963	23.020	1013	23.020	1063	23.020	1113	23.020	1163	23.020	1213	23.020
964	23.020	1014	23.020	1064	23.020	1114	23.020	1164	23.020	1214	23.020
965	23.020	1015	23.020	1065	23.020	1115	23.020	1165	23.020	1215	23.020
966	23.020	1016	23.020	1066	23.020	1116	23.020	1166	23.020	1216	23.020
967	23.020	1017	23.020	1067	23.020	1117	23.020	1167	23.020	1217	23.020
968	23.020	1018	23.020	1068	23.020	1118	23.020	1168	23.020	1218	23.020
969	23.020	1019	23.020	1069	23.020	1119	23.020	1169	23.020	1219	23.020
970	23.020	1020	23.020	1070	23.020	1120	23.020	1170	23.020	1220	23.020
971	23.020	1021	23.020	1071	23.020	1121	23.020	1171	23.020	1221	23.020
972	23.020	1022	23.020	1072	23.020	1122	23.020	1172	23.020	1222	23.020
973	23.020	1023	23.020	1073	23.020	1123	23.020	1173	23.020	1223	23.020
974	23.020	1024	23.020	1074	23.020	1124	23.020	1174	23.020	1224	23.020
975	23.020	1025	23.020	1075	23.020	1125	23.020	1175	23.020	1225	23.020
976	23.020	1026	23.020	1076	23.020	1126	23.020	1176	23.020	1226	23.020
977	23.020	1027	23.020	1077	23.020	1127	23.020	1177	23.020	1227	23.020
978	23.020	1028	23.020	1078	23.020	1128	23.020	1178	23.020	1228	23.020
979	23.020	1029	23.020	1079	23.020	1129	23.020	1179	23.020	1229	23.020
980	23.020	1030	23.020	1080	23.020	1130	23.020	1180	23.020	1230	23.020
981	23.020	1031	23.020	1081	23.020	1131	23.020	1181	23.020	1231	23.020
982	23.020	1032	23.020	1082	23.020	1132	23.020	1182	23.020	1232	23.020
983	23.020	1033	23.020	1083	23.020	1133	23.020	1183	23.020	1233	23.020
984	23.020	1034	23.020	1084	23.020	1134	23.020	1184	23.020	1234	23.020
985	23.020	1035	23.020	1085	23.020	1135	23.020	1185	23.020	1235	23.020
986	23.020	1036	23.020	1086	23.020	1136	23.020	1186	23.020	1236	23.020

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1237	23.020	1287	23.020	1337	23.020	1387	23.020	1437	23.020	1487	23.020
1238	23.020	1288	23.020	1338	23.020	1388	23.020	1438	23.020	1488	23.020
1239	23.020	1289	23.020	1339	23.020	1389	23.020	1439	23.020	1489	23.020
1240	23.020	1290	23.020	1340	23.020	1390	23.020	1440	23.020	1490	23.020
1241	23.020	1291	23.020	1341	23.020	1391	23.020	1441	23.020	1491	23.020
1242	23.020	1292	23.020	1342	23.020	1392	23.020	1442	23.020	1492	23.020
1243	23.020	1293	23.020	1343	23.020	1393	23.020	1443	23.020	1493	23.020
1244	23.020	1294	23.020	1344	23.020	1394	23.020	1444	23.020	1494	23.020
1245	23.020	1295	23.020	1345	23.020	1395	23.020	1445	23.020	1495	23.020
1246	23.020	1296	23.020	1346	23.020	1396	23.020	1446	23.020	1496	23.020
1247	23.020	1297	23.020	1347	23.020	1397	23.020	1447	23.020	1497	23.020
1248	23.020	1298	23.020	1348	23.020	1398	23.020	1448	23.020	1498	23.020
1249	23.020	1299	23.020	1349	23.020	1399	23.020	1449	23.020	1499	23.020
1250	23.020	1300	23.020	1350	23.020	1400	23.020	1450	23.020	1500	23.020
1251	23.020	1301	23.020	1351	23.020	1401	23.020	1451	23.020	1501	23.020
1252	23.020	1302	23.020	1352	23.020	1402	23.020	1452	23.020	1502	23.020
1253	23.020	1303	23.020	1353	23.020	1403	23.020	1453	23.020	1503	23.020
1254	23.020	1304	23.020	1354	23.020	1404	23.020	1454	23.020	1504	23.020
1255	23.020	1305	23.020	1355	23.020	1405	23.020	1455	23.020	1505	23.020
1256	23.020	1306	23.020	1356	23.020	1406	23.020	1456	23.020	1506	23.020
1257	23.020	1307	23.020	1357	23.020	1407	23.020	1457	23.020	1507	23.020
1258	23.020	1308	23.020	1358	23.020	1408	23.020	1458	23.020	1508	23.020
1259	23.020	1309	23.020	1359	23.020	1409	23.020	1459	23.020	1509	23.020
1260	23.020	1310	23.020	1360	23.020	1410	23.020	1460	23.020	1510	23.020
1261	23.020	1311	23.020	1361	23.020	1411	23.020	1461	23.020	1511	23.020
1262	23.020	1312	23.020	1362	23.020	1412	23.020	1462	23.020	1512	23.020
1263	23.020	1313	23.020	1363	23.020	1413	23.020	1463	23.020	1513	23.020
1264	23.020	1314	23.020	1364	23.020	1414	23.020	1464	23.020	1514	23.020
1265	23.020	1315	23.020	1365	23.020	1415	23.020	1465	23.020	1515	23.020
1266	23.020	1316	23.020	1366	23.020	1416	23.020	1466	23.020	1516	23.020
1267	23.020	1317	23.020	1367	23.020	1417	23.020	1467	23.020	1517	23.020
1268	23.020	1318	23.020	1368	23.020	1418	23.020	1468	23.020	1518	23.020
1269	23.020	1319	23.020	1369	23.020	1419	23.020	1469	23.020	1519	23.020
1270	23.020	1320	23.020	1370	23.020	1420	23.020	1470	23.020	1520	23.020
1271	23.020	1321	23.020	1371	23.020	1421	23.020	1471	23.020	1521	23.020
1272	23.020	1322	23.020	1372	23.020	1422	23.020	1472	23.020	1522	23.020
1273	23.020	1323	23.020	1373	23.020	1423	23.020	1473	23.020	1523	23.020
1274	23.020	1324	23.020	1374	23.020	1424	23.020	1474	23.020	1524	23.020
1275	23.020	1325	23.020	1375	23.020	1425	23.020	1475	23.020	1525	23.020
1276	23.020	1326	23.020	1376	23.020	1426	23.020	1476	23.020	1526	23.020
1277	23.020	1327	23.020	1377	23.020	1427	23.020	1477	23.020	1527	23.020
1278	23.020	1328	23.020	1378	23.020	1428	23.020	1478	23.020	1528	23.020
1279	23.020	1329	23.020	1379	23.020	1429	23.020	1479	23.020	1529	23.020
1280	23.020	1330	23.020	1380	23.020	1430	23.020	1480	23.020	1530	23.020
1281	23.020	1331	23.020	1381	23.020	1431	23.020	1481	23.020	1531	23.020
1282	23.020	1332	23.020	1382	23.020	1432	23.020	1482	23.020	1532	23.020
1283	23.020	1333	23.020	1383	23.020	1433	23.020	1483	23.020	1533	23.020
1284	23.020	1334	23.020	1384	23.020	1434	23.020	1484	23.020	1534	23.020
1285	23.020	1335	23.020	1385	23.020	1435	23.020	1485	23.020	1535	23.020
1286	23.020	1336	23.020	1386	23.020	1436	23.020	1486	23.020	1536	23.020

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1537	23.020	1587	23.020	1637	23.020	1687	23.020	1737	23.020	1787	23.020
1538	23.020	1588	23.020	1638	23.020	1688	23.020	1738	23.020	1788	23.020
1539	23.020	1589	23.020	1639	23.020	1689	23.020	1739	23.020	1789	23.020
1540	23.020	1590	23.020	1640	23.020	1690	23.020	1740	23.020	1790	23.020
1541	23.020	1591	23.020	1641	23.020	1691	23.020	1741	23.020	1791	23.020
1542	23.020	1592	23.020	1642	23.020	1692	23.020	1742	23.020	1792	23.020
1543	23.020	1593	23.020	1643	23.020	1693	23.020	1743	23.020	1793	23.020
1544	23.020	1594	23.020	1644	23.020	1694	23.020	1744	23.020	1794	23.020
1545	23.020	1595	23.020	1645	23.020	1695	23.020	1745	23.020	1795	23.020
1546	23.020	1596	23.020	1646	23.020	1696	23.020	1746	23.020	1796	23.020
1547	23.020	1597	23.020	1647	23.020	1697	23.020	1747	23.020	1797	23.020
1548	23.020	1598	23.020	1648	23.020	1698	23.020	1748	23.020	1798	23.020
1549	23.020	1599	23.020	1649	23.020	1699	23.020	1749	23.020	1799	23.020
1550	23.020	1600	23.020	1650	23.020	1700	23.020	1750	23.020	1800	23.020
1551	23.020	1601	23.020	1651	23.020	1701	23.020	1751	23.020	1801	23.020
1552	23.020	1602	23.020	1652	23.020	1702	23.020	1752	23.020	1802	23.020
1553	23.020	1603	23.020	1653	23.020	1703	23.020	1753	23.020	1803	23.020
1554	23.020	1604	23.020	1654	23.020	1704	23.020	1754	23.020	1804	23.020
1555	23.020	1605	23.020	1655	23.020	1705	23.020	1755	23.020	1805	23.020
1556	23.020	1606	23.020	1656	23.020	1706	23.020	1756	23.020	1806	23.020
1557	23.020	1607	23.020	1657	23.020	1707	23.020	1757	23.020	1807	23.020
1558	23.020	1608	23.020	1658	23.020	1708	23.020	1758	23.020	1808	23.020
1559	23.020	1609	23.020	1659	23.020	1709	23.020	1759	23.020	1809	23.020
1560	23.020	1610	23.020	1660	23.020	1710	23.020	1760	23.020	1810	23.020
1561	23.020	1611	23.020	1661	23.020	1711	23.020	1761	23.020	1811	23.020
1562	23.020	1612	23.020	1662	23.020	1712	23.020	1762	23.020	1812	23.020
1563	23.020	1613	23.020	1663	23.020	1713	23.020	1763	23.020	1813	23.020
1564	23.020	1614	23.020	1664	23.020	1714	23.020	1764	23.020	1814	23.020
1565	23.020	1615	23.020	1665	23.020	1715	23.020	1765	23.020	1815	23.020
1566	23.020	1616	23.020	1666	23.020	1716	23.020	1766	23.020	1816	23.020
1567	23.020	1617	23.020	1667	23.020	1717	23.020	1767	23.020	1817	23.020
1568	23.020	1618	23.020	1668	23.020	1718	23.020	1768	23.020	1818	23.020
1569	23.020	1619	23.020	1669	23.020	1719	23.020	1769	23.020	1819	23.020
1570	23.020	1620	23.020	1670	23.020	1720	23.020	1770	23.020	1820	23.020
1571	23.020	1621	23.020	1671	23.020	1721	23.020	1771	23.020	1821	23.020
1572	23.020	1622	23.020	1672	23.020	1722	23.020	1772	23.020	1822	23.020
1573	23.020	1623	23.020	1673	23.020	1723	23.020	1773	23.020	1823	23.020
1574	23.020	1624	23.020	1674	23.020	1724	23.020	1774	23.020	1824	23.020
1575	23.020	1625	23.020	1675	23.020	1725	23.020	1775	23.020	1825	23.020
1576	23.020	1626	23.020	1676	23.020	1726	23.020	1776	23.020	1826	23.020
1577	23.020	1627	23.020	1677	23.020	1727	23.020	1777	23.020	1827	23.020
1578	23.020	1628	23.020	1678	23.020	1728	23.020	1778	23.020	1828	23.020
1579	23.020	1629	23.020	1679	23.020	1729	23.020	1779	23.020	1829	23.020
1580	23.020	1630	23.020	1680	23.020	1730	23.020	1780	23.020	1830	23.020
1581	23.020	1631	23.020	1681	23.020	1731	23.020	1781	23.020	1831	23.020
1582	23.020	1632	23.020	1682	23.020	1732	23.020	1782	23.020	1832	23.020
1583	23.020	1633	23.020	1683	23.020	1733	23.020	1783	23.020	1833	23.020
1584	23.020	1634	23.020	1684	23.020	1734	23.020	1784	23.020	1834	23.020
1585	23.020	1635	23.020	1685	23.020	1735	23.020	1785	23.020	1835	23.020
1586	23.020	1636	23.020	1686	23.020	1736	23.020	1786	23.020	1836	23.020

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Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1837	23.020	1887	23.020	1937	23.020	1987	23.020	2037	23.020	2087	23.020
1838	23.020	1888	23.020	1938	23.020	1988	23.020	2038	23.020	2088	23.020
1839	23.020	1889	23.020	1939	23.020	1989	23.020	2039	23.020	2089	23.020
1840	23.020	1890	23.020	1940	23.020	1990	23.020	2040	23.020	2090	23.020
1841	23.020	1891	23.020	1941	23.020	1991	23.020	2041	23.020	2091	23.020
1842	23.020	1892	23.020	1942	23.020	1992	23.020	2042	23.020	2092	23.020
1843	23.020	1893	23.020	1943	23.020	1993	23.020	2043	23.020	2093	23.020
1844	23.020	1894	23.020	1944	23.020	1994	23.020	2044	23.020	2094	23.020
1845	23.020	1895	23.020	1945	23.020	1995	23.020	2045	23.020	2095	23.020
1846	23.020	1896	23.020	1946	23.020	1996	23.020	2046	23.020	2096	23.020
1847	23.020	1897	23.020	1947	23.020	1997	23.020	2047	23.020	2097	23.020
1848	23.020	1898	23.020	1948	23.020	1998	23.020	2048	23.020	2098	23.020
1849	23.020	1899	23.020	1949	23.020	1999	23.020	2049	23.020	2099	23.020
1850	23.020	1900	23.020	1950	23.020	2000	23.020	2050	23.020	2100	23.020
1851	23.020	1901	23.020	1951	23.020	2001	23.020	2051	23.020	2101	23.020
1852	23.020	1902	23.020	1952	23.020	2002	23.020	2052	23.020	2102	23.020
1853	23.020	1903	23.020	1953	23.020	2003	23.020	2053	23.020	2103	23.020
1854	23.020	1904	23.020	1954	23.020	2004	23.020	2054	23.020	2104	23.020
1855	23.020	1905	23.020	1955	23.020	2005	23.020	2055	23.020	2105	23.020
1856	23.020	1906	23.020	1956	23.020	2006	23.020	2056	23.020	2106	23.020
1857	23.020	1907	23.020	1957	23.020	2007	23.020	2057	23.020	2107	23.020
1858	23.020	1908	23.020	1958	23.020	2008	23.020	2058	23.020	2108	23.020
1859	23.020	1909	23.020	1959	23.020	2009	23.020	2059	23.020	2109	23.020
1860	23.020	1910	23.020	1960	23.020	2010	23.020	2060	23.020	2110	23.020
1861	23.020	1911	23.020	1961	23.020	2011	23.020	2061	23.020	2111	23.020
1862	23.020	1912	23.020	1962	23.020	2012	23.020	2062	23.020	2112	23.020
1863	23.020	1913	23.020	1963	23.020	2013	23.020	2063	23.020	2113	23.020
1864	23.020	1914	23.020	1964	23.020	2014	23.020	2064	23.020	2114	23.020
1865	23.020	1915	23.020	1965	23.020	2015	23.020	2065	23.020	2115	23.020
1866	23.020	1916	23.020	1966	23.020	2016	23.020	2066	23.020	2116	23.020
1867	23.020	1917	23.020	1967	23.020	2017	23.020	2067	23.020	2117	23.020
1868	23.020	1918	23.020	1968	23.020	2018	23.020	2068	23.020	2118	23.020
1869	23.020	1919	23.020	1969	23.020	2019	23.020	2069	23.020	2119	23.020
1870	23.020	1920	23.020	1970	23.020	2020	23.020	2070	23.020	2120	23.020
1871	23.020	1921	23.020	1971	23.020	2021	23.020	2071	23.020	2121	23.020
1872	23.020	1922	23.020	1972	23.020	2022	23.020	2072	23.020	2122	23.020
1873	23.020	1923	23.020	1973	23.020	2023	23.020	2073	23.020	2123	23.020
1874	23.020	1924	23.020	1974	23.020	2024	23.020	2074	23.020	2124	23.020
1875	23.020	1925	23.020	1975	23.020	2025	23.020	2075	23.020	2125	23.020
1876	23.020	1926	23.020	1976	23.020	2026	23.020	2076	23.020	2126	23.020
1877	23.020	1927	23.020	1977	23.020	2027	23.020	2077	23.020	2127	23.020
1878	23.020	1928	23.020	1978	23.020	2028	23.020	2078	23.020	2128	23.020
1879	23.020	1929	23.020	1979	23.020	2029	23.020	2079	23.020	2129	23.020
1880	23.020	1930	23.020	1980	23.020	2030	23.020	2080	23.020	2130	23.020
1881	23.020	1931	23.020	1981	23.020	2031	23.020	2081	23.020	2131	23.020
1882	23.020	1932	23.020	1982	23.020	2032	23.020	2082	23.020	2132	23.020
1883	23.020	1933	23.020	1983	23.020	2033	23.020	2083	23.020	2133	23.020
1884	23.020	1934	23.020	1984	23.020	2034	23.020	2084	23.020	2134	23.020
1885	23.020	1935	23.020	1985	23.020	2035	23.020	2085	23.020	2135	23.020
1886	23.020	1936	23.020	1986	23.020	2036	23.020	2086	23.020	2136	23.020

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Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
2137	23.020	2187	23.020	2237	23.020	2287	23.020	2337	23.020	2387	23.020
2138	23.020	2188	23.020	2238	23.020	2288	23.020	2338	23.020	2388	23.020
2139	23.020	2189	23.020	2239	23.020	2289	23.020	2339	23.020	2389	23.020
2140	23.020	2190	23.020	2240	23.020	2290	23.020	2340	23.020	2390	23.020
2141	23.020	2191	23.020	2241	23.020	2291	23.020	2341	23.020	2391	23.020
2142	23.020	2192	23.020	2242	23.020	2292	23.020	2342	23.020	2392	23.020
2143	23.020	2193	23.020	2243	23.020	2293	23.020	2343	23.020	2393	23.020
2144	23.020	2194	23.020	2244	23.020	2294	23.020	2344	23.020	2394	23.020
2145	23.020	2195	23.020	2245	23.020	2295	23.020	2345	23.020	2395	23.020
2146	23.020	2196	23.020	2246	23.020	2296	23.020	2346	23.020	2396	23.020
2147	23.020	2197	23.020	2247	23.020	2297	23.020	2347	23.020	2397	23.020
2148	23.020	2198	23.020	2248	23.020	2298	23.020	2348	23.020	2398	23.020
2149	23.020	2199	23.020	2249	23.020	2299	23.020	2349	23.020	2399	23.020
2150	23.020	2200	23.020	2250	23.020	2300	23.020	2350	23.020	2400	23.020
2151	23.020	2201	23.020	2251	23.020	2301	23.020	2351	23.020	2401	23.020
2152	23.020	2202	23.020	2252	23.020	2302	23.020	2352	23.020	2402	23.020
2153	23.020	2203	23.020	2253	23.020	2303	23.020	2353	23.020	2403	23.020
2154	23.020	2204	23.020	2254	23.020	2304	23.020	2354	23.020	2404	23.020
2155	23.020	2205	23.020	2255	23.020	2305	23.020	2355	23.020	2405	23.020
2156	23.020	2206	23.020	2256	23.020	2306	23.020	2356	23.020	2406	23.020
2157	23.020	2207	23.020	2257	23.020	2307	23.020	2357	23.020	2407	23.020
2158	23.020	2208	23.020	2258	23.020	2308	23.020	2358	23.020	2408	23.020
2159	23.020	2209	23.020	2259	23.020	2309	23.020	2359	23.020	2409	23.020
2160	23.020	2210	23.020	2260	23.020	2310	23.020	2360	23.020	2410	23.020
2161	23.020	2211	23.020	2261	23.020	2311	23.020	2361	23.020	2411	23.020
2162	23.020	2212	23.020	2262	23.020	2312	23.020	2362	23.020	2412	23.020
2163	23.020	2213	23.020	2263	23.020	2313	23.020	2363	23.020	2413	23.020
2164	23.020	2214	23.020	2264	23.020	2314	23.020	2364	23.020	2414	23.020
2165	23.020	2215	23.020	2265	23.020	2315	23.020	2365	23.020	2415	23.020
2166	23.020	2216	23.020	2266	23.020	2316	23.020	2366	23.020	2416	23.020
2167	23.020	2217	23.020	2267	23.020	2317	23.020	2367	23.020	2417	23.020
2168	23.020	2218	23.020	2268	23.020	2318	23.020	2368	23.020	2418	23.020
2169	23.020	2219	23.020	2269	23.020	2319	23.020	2369	23.020	2419	23.020
2170	23.020	2220	23.020	2270	23.020	2320	23.020	2370	23.020	2420	23.020
2171	23.020	2221	23.020	2271	23.020	2321	23.020	2371	23.020	2421	23.020
2172	23.020	2222	23.020	2272	23.020	2322	23.020	2372	23.020	2422	23.020
2173	23.020	2223	23.020	2273	23.020	2323	23.020	2373	23.020	2423	23.020
2174	23.020	2224	23.020	2274	23.020	2324	23.020	2374	23.020	2424	23.020
2175	23.020	2225	23.020	2275	23.020	2325	23.020	2375	23.020	2425	23.020
2176	23.020	2226	23.020	2276	23.020	2326	23.020	2376	23.020	2426	23.020
2177	23.020	2227	23.020	2277	23.020	2327	23.020	2377	23.020	2427	23.020
2178	23.020	2228	23.020	2278	23.020	2328	23.020	2378	23.020	2428	23.020
2179	23.020	2229	23.020	2279	23.020	2329	23.020	2379	23.020	2429	23.020
2180	23.020	2230	23.020	2280	23.020	2330	23.020	2380	23.020	2430	23.020
2181	23.020	2231	23.020	2281	23.020	2331	23.020	2381	23.020	2431	23.020
2182	23.020	2232	23.020	2282	23.020	2332	23.020	2382	23.020	2432	23.020
2183	23.020	2233	23.020	2283	23.020	2333	23.020	2383	23.020	2433	23.020
2184	23.020	2234	23.020	2284	23.020	2334	23.020	2384	23.020	2434	23.020
2185	23.020	2235	23.020	2285	23.020	2335	23.020	2385	23.020	2435	23.020
2186	23.020	2236	23.020	2286	23.020	2336	23.020	2386	23.020	2436	23.020

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
2437	23.020	2487	23.020	2537	23.020	2587	23.020	2637	23.020	2687	23.020
2438	23.020	2488	23.020	2538	23.020	2588	23.020	2638	23.020	2688	23.020
2439	23.020	2489	23.020	2539	23.020	2589	23.020	2639	23.020	2689	23.020
2440	23.020	2490	23.020	2540	23.020	2590	23.020	2640	23.020	2690	23.020
2441	23.020	2491	23.020	2541	23.020	2591	23.020	2641	23.020	2691	23.020
2442	23.020	2492	23.020	2542	23.020	2592	23.020	2642	23.020	2692	23.020
2443	23.020	2493	23.020	2543	23.020	2593	23.020	2643	23.020	2693	23.020
2444	23.020	2494	23.020	2544	23.020	2594	23.020	2644	23.020	2694	23.020
2445	23.020	2495	23.020	2545	23.020	2595	23.020	2645	23.020	2695	23.020
2446	23.020	2496	23.020	2546	23.020	2596	23.020	2646	23.020	2696	23.020
2447	23.020	2497	23.020	2547	23.020	2597	23.020	2647	23.020	2697	23.020
2448	23.020	2498	23.020	2548	23.020	2598	23.020	2648	23.020	2698	23.020
2449	23.020	2499	23.020	2549	23.020	2599	23.020	2649	23.020	2699	23.020
2450	23.020	2500	23.020	2550	23.020	2600	23.020	2650	23.020	2700	23.020
2451	23.020	2501	23.020	2551	23.020	2601	23.020	2651	23.020	2701	23.020
2452	23.020	2502	23.020	2552	23.020	2602	23.020	2652	23.020	2702	23.020
2453	23.020	2503	23.020	2553	23.020	2603	23.020	2653	23.020	2703	23.020
2454	23.020	2504	23.020	2554	23.020	2604	23.020	2654	23.020	2704	23.020
2455	23.020	2505	23.020	2555	23.020	2605	23.020	2655	23.020	2705	23.020
2456	23.020	2506	23.020	2556	23.020	2606	23.020	2656	23.020	2706	23.020
2457	23.020	2507	23.020	2557	23.020	2607	23.020	2657	23.020	2707	23.020
2458	23.020	2508	23.020	2558	23.020	2608	23.020	2658	23.020	2708	23.020
2459	23.020	2509	23.020	2559	23.020	2609	23.020	2659	23.020	2709	23.020
2460	23.020	2510	23.020	2560	23.020	2610	23.020	2660	23.020	2710	23.020
2461	23.020	2511	23.020	2561	23.020	2611	23.020	2661	23.020	2711	23.020
2462	23.020	2512	23.020	2562	23.020	2612	23.020	2662	23.020	2712	23.020
2463	23.020	2513	23.020	2563	23.020	2613	23.020	2663	23.020	2713	23.020
2464	23.020	2514	23.020	2564	23.020	2614	23.020	2664	23.020	2714	23.020
2465	23.020	2515	23.020	2565	23.020	2615	23.020	2665	23.020	2715	23.020
2466	23.020	2516	23.020	2566	23.020	2616	23.020	2666	23.020	2716	23.020
2467	23.020	2517	23.020	2567	23.020	2617	23.020	2667	23.020	2717	23.020
2468	23.020	2518	23.020	2568	23.020	2618	23.020	2668	23.020	2718	23.020
2469	23.020	2519	23.020	2569	23.020	2619	23.020	2669	23.020	2719	23.020
2470	23.020	2520	23.020	2570	23.020	2620	23.020	2670	23.020	2720	23.020
2471	23.020	2521	23.020	2571	23.020	2621	23.020	2671	23.020	2721	23.020
2472	23.020	2522	23.020	2572	23.020	2622	23.020	2672	23.020	2722	23.020
2473	23.020	2523	23.020	2573	23.020	2623	23.020	2673	23.020	2723	23.020
2474	23.020	2524	23.020	2574	23.020	2624	23.020	2674	23.020	2724	23.020
2475	23.020	2525	23.020	2575	23.020	2625	23.020	2675	23.020	2725	23.020
2476	23.020	2526	23.020	2576	23.020	2626	23.020	2676	23.020	2726	23.020
2477	23.020	2527	23.020	2577	23.020	2627	23.020	2677	23.020	2727	23.020
2478	23.020	2528	23.020	2578	23.020	2628	23.020	2678	23.020	2728	23.020
2479	23.020	2529	23.020	2579	23.020	2629	23.020	2679	23.020	2729	23.020
2480	23.020	2530	23.020	2580	23.020	2630	23.020	2680	23.020	2730	23.020
2481	23.020	2531	23.020	2581	23.020	2631	23.020	2681	23.020	2731	23.020
2482	23.020	2532	23.020	2582	23.020	2632	23.020	2682	23.020	2732	23.020
2483	23.020	2533	23.020	2583	23.020	2633	23.020	2683	23.020	2733	23.020
2484	23.020	2534	23.020	2584	23.020	2634	23.020	2684	23.020	2734	23.020
2485	23.020	2535	23.020	2585	23.020	2635	23.020	2685	23.020	2735	23.020
2486	23.020	2536	23.020	2586	23.020	2636	23.020	2686	23.020	2736	23.020

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
2737	23.020	2761	23.020	2785	23.020	2809	23.020	2833	23.020	2857	23.020
2738	23.020	2762	23.020	2786	23.020	2810	23.020	2834	23.020	2858	23.020
2739	23.020	2763	23.020	2787	23.020	2811	23.020	2835	23.020	2859	23.020
2740	23.020	2764	23.020	2788	23.020	2812	23.020	2836	23.020	2860	23.020
2741	23.020	2765	23.020	2789	23.020	2813	23.020	2837	23.020	2861	23.020
2742	23.020	2766	23.020	2790	23.020	2814	23.020	2838	23.020	2862	23.020
2743	23.020	2767	23.020	2791	23.020	2815	23.020	2839	23.020	2863	23.020
2744	23.020	2768	23.020	2792	23.020	2816	23.020	2840	23.020	2864	23.020
2745	23.020	2769	23.020	2793	23.020	2817	23.020	2841	23.020	2865	23.020
2746	23.020	2770	23.020	2794	23.020	2818	23.020	2842	23.020	2866	23.020
2747	23.020	2771	23.020	2795	23.020	2819	23.020	2843	23.020	2867	23.020
2748	23.020	2772	23.020	2796	23.020	2820	23.020	2844	23.020	2868	23.020
2749	23.020	2773	23.020	2797	23.020	2821	23.020	2845	23.020	2869	23.020
2750	23.020	2774	23.020	2798	23.020	2822	23.020	2846	23.020	2870	23.020
2751	23.020	2775	23.020	2799	23.020	2823	23.020	2847	23.020	2871	23.020
2752	23.020	2776	23.020	2800	23.020	2824	23.020	2848	23.020	2872	23.020
2753	23.020	2777	23.020	2801	23.020	2825	23.020	2849	23.020	2873	23.020
2754	23.020	2778	23.020	2802	23.020	2826	23.020	2850	23.020	2874	23.020
2755	23.020	2779	23.020	2803	23.020	2827	23.020	2851	23.020	2875	23.020
2756	23.020	2780	23.020	2804	23.020	2828	23.020	2852	23.020	2876	23.020
2757	23.020	2781	23.020	2805	23.020	2829	23.020	2853	23.020	2877	23.020
2758	23.020	2782	23.020	2806	23.020	2830	23.020	2854	23.020	2878	23.020
2759	23.020	2783	23.020	2807	23.020	2831	23.020	2855	23.020	2879	23.020
2760	23.020	2784	23.020	2808	23.020	2832	23.020	2856	23.020	2880	23.020

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S18.000	S	24.600	23.500	0.000	0	0

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S29, DS/PN: S1.007, Volume (m³): 188.1

Unit Reference	MD-SHE-0223-3000-2000-3000
Design Head (m)	2.000
Design Flow (l/s)	30.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	223
Invert Level (m)	22.950
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	30.0
Flush-Flo™	0.586	30.0
Kick-Flo®	1.268	24.1
Mean Flow over Head Range	-	26.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.5	1.200	25.7	3.000	36.4	7.000	54.9
0.200	22.0	1.400	25.3	3.500	39.2	7.500	56.7
0.300	27.8	1.600	26.9	4.000	41.8	8.000	58.5
0.400	29.2	1.800	28.5	4.500	44.3	8.500	60.3
0.500	29.8	2.000	30.0	5.000	46.6	9.000	62.0
0.600	30.0	2.200	31.4	5.500	48.8	9.500	63.6
0.800	29.5	2.400	32.7	6.000	50.9		
1.000	28.4	2.600	34.0	6.500	52.9		

10 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Volumetric Runoff Coeff	0.750	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs	0	Number of Storage Structures	12
Number of Online Controls	1	Number of Time/Area Diagrams	7
Number of Offline Controls	0	Number of Real Time Controls	0

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	10, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	10	+0%				
S1.001	S2	15 Winter	10	+0%				
S2.000	S2	15 Winter	10	+0%				
S3.000	S3	30 Winter	10	+0%				
S4.000	S4	15 Winter	10	+0%	30/15 Summer			
S1.002	S6	15 Winter	10	+0%				
S5.000	S7	30 Winter	10	+0%				
S6.000	S8	15 Winter	10	+0%	100/15 Summer			
S7.000	S9	15 Winter	10	+0%				
S1.003	S10	360 Winter	10	+0%				
S8.000	S11	30 Winter	10	+0%	100/360 Winter			
S9.000	S12	15 Summer	10	+0%	30/15 Summer			
S10.000	S13	15 Winter	10	+0%	30/15 Summer			
S1.004	S14	360 Winter	10	+0%				
S11.000	S15	30 Winter	10	+0%	100/120 Winter			
S12.000	S16	15 Winter	10	+0%	10/15 Summer			
S13.000	S17	15 Winter	10	+0%	100/15 Summer			
S1.005	S18	360 Winter	10	+0%				
S14.000	S19	30 Winter	10	+0%	100/120 Summer			
S15.000	S20	15 Winter	10	+0%	30/15 Summer			
S16.000	S21	10080 Winter	10	+0%				
S16.001	S22	15 Summer	10	+0%				
S16.002	S23	15 Winter	10	+0%				
S16.003	S24	15 Winter	10	+0%				

10 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	24.099	-0.201	0.000	0.24		16.4	OK	
S1.001	S2	23.704	-1.097	0.000	0.02		48.5	OK	
S2.000	S2	23.900	0.000	0.000	0.99		55.6	SURCHARGED*	
S3.000	S3	23.785	-0.215	0.000	0.18		12.7	OK	
S4.000	S4	23.934	-0.066	0.000	0.96		68.6	OK	
S1.002	S6	23.450	-1.351	0.000	0.07		172.2	OK	
S5.000	S7	23.800	-0.250	0.000	0.06		6.5	OK	
S6.000	S8	23.931	-0.119	0.000	0.68		68.4	OK	
S7.000	S9	23.837	-0.213	0.000	0.19		23.1	OK	
S1.003	S10	23.361	-1.340	0.000	0.02		39.2	OK	
S8.000	S11	23.517	-0.233	0.000	0.11		6.6	OK	
S9.000	S12	23.750	0.000	0.000	1.03		59.5	OK	
S10.000	S13	23.787	-0.063	0.000	0.98		54.6	OK	
S1.004	S14	23.361	-1.240	0.000	0.02		36.0	OK	
S11.000	S15	23.454	-0.196	0.000	0.26		15.0	OK	
S12.000	S16	23.695	0.045	0.000	1.26		72.8	SURCHARGED	
S13.000	S17	23.552	-0.148	0.000	0.51		29.1	OK	
S1.005	S18	23.361	-1.140	0.000	0.02		43.3	OK	
S14.000	S19	23.373	-0.227	0.000	0.14		7.9	OK	
S15.000	S20	23.522	-0.078	0.000	0.90		52.2	OK	
S16.000	S21	24.001	-0.800	0.000	0.00		0.1	OK	
S16.001	S22	23.802	-0.999	0.000	0.01		15.8	OK	
S16.002	S23	23.711	-1.090	0.000	0.02		53.6	OK	
S16.003	S24	23.607	-1.194	0.000	0.02		67.4	OK	

10 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S16.004	S25	15 Winter	10	+0%					23.457
S17.000	S26	60 Winter	10	+0%					24.662
S17.001	S27	2160 Winter	10	+0%					24.330
S1.006	S28	360 Winter	10	+0%					23.362
S1.007	S29	360 Winter	10	+0%	10/15 Winter				23.363
S18.000	S30	360 Winter	10	+0%					24.000

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S16.004	S25	-1.344	0.000	0.03		84.1	OK	
S17.000	S26	-0.288	0.000	0.28		52.1	OK	
S17.001	S27	-0.120	0.000	0.09		2.1	OK	
S1.006	S28	-1.089	0.000	0.02		40.1	OK	
S1.007	S29	0.113	0.000	0.48		27.8	SURCHARGED	
S18.000	S30	-0.150	0.000	0.00		0.0	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Volumetric Runoff Coeff	0.750	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs	0	Number of Storage Structures	12
Number of Online Controls	1	Number of Time/Area Diagrams	7
Number of Offline Controls	0	Number of Real Time Controls	0

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 10, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	30	+0%				
S1.001	S2	15 Winter	30	+0%				
S2.000	S2	15 Winter	30	+0%				
S3.000	S3	30 Winter	30	+0%				
S4.000	S4	15 Winter	30	+0%	30/15 Summer			
S1.002	S6	15 Winter	30	+0%				
S5.000	S7	30 Winter	30	+0%				
S6.000	S8	15 Winter	30	+0%	100/15 Summer			
S7.000	S9	15 Winter	30	+0%				
S1.003	S10	240 Winter	30	+0%				
S8.000	S11	30 Winter	30	+0%	100/360 Winter			
S9.000	S12	15 Winter	30	+0%	30/15 Summer			
S10.000	S13	15 Winter	30	+0%	30/15 Summer			
S1.004	S14	240 Winter	30	+0%				
S11.000	S15	30 Winter	30	+0%	100/120 Winter			
S12.000	S16	15 Winter	30	+0%	10/15 Summer			
S13.000	S17	15 Winter	30	+0%	100/15 Summer			
S1.005	S18	240 Winter	30	+0%				
S14.000	S19	240 Winter	30	+0%	100/120 Summer			
S15.000	S20	15 Winter	30	+0%	30/15 Summer			
S16.000	S21	8640 Winter	30	+0%				
S16.001	S22	15 Summer	30	+0%				
S16.002	S23	15 Winter	30	+0%				
S16.003	S24	15 Winter	30	+0%				

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	24.113	-0.187	0.000	0.30		20.9	OK	
S1.001	S2	23.705	-1.096	0.000	0.02		59.9	OK	
S2.000	S2	23.900	0.000	0.000	1.23		69.1	SURCHARGED*	
S3.000	S3	23.799	-0.201	0.000	0.24		16.8	OK	
S4.000	S4	24.060	0.060	0.000	1.21		86.3	SURCHARGED	
S1.002	S6	23.462	-1.339	0.000	0.08		215.4	OK	
S5.000	S7	23.809	-0.241	0.000	0.09		8.7	OK	
S6.000	S8	23.965	-0.085	0.000	0.86		86.7	OK	
S7.000	S9	23.849	-0.201	0.000	0.24		29.3	OK	
S1.003	S10	23.418	-1.283	0.000	0.03		59.9	OK	
S8.000	S11	23.527	-0.223	0.000	0.15		8.7	OK	
S9.000	S12	23.811	0.061	0.000	1.32		76.4	SURCHARGED	
S10.000	S13	23.941	0.091	0.000	1.21		67.5	SURCHARGED	
S1.004	S14	23.419	-1.182	0.000	0.02		51.0	OK	
S11.000	S15	23.472	-0.178	0.000	0.34		20.0	OK	
S12.000	S16	23.792	0.142	0.000	1.58		91.9	SURCHARGED	
S13.000	S17	23.576	-0.124	0.000	0.65		37.0	OK	
S1.005	S18	23.421	-1.080	0.000	0.03		67.0	OK	
S14.000	S19	23.425	-0.175	0.000	0.10		5.6	OK	
S15.000	S20	23.616	0.016	0.000	1.13		65.7	SURCHARGED	
S16.000	S21	24.001	-0.800	0.000	0.00		0.1	OK	
S16.001	S22	23.803	-0.998	0.000	0.01		20.1	OK	
S16.002	S23	23.714	-1.087	0.000	0.03		68.0	OK	
S16.003	S24	23.609	-1.192	0.000	0.03		85.6	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S16.004	S25	15 Winter	30	+0%					23.459
S17.000	S26	30 Winter	30	+0%					24.688
S17.001	S27	1440 Winter	30	+0%					24.336
S1.006	S28	240 Winter	30	+0%					23.424
S1.007	S29	240 Winter	30	+0%	10/15 Winter				23.438
S18.000	S30	360 Winter	30	+0%					24.000

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S16.004	S25	-1.342	0.000	0.04		106.0	OK	
S17.000	S26	-0.262	0.000	0.37		67.7	OK	
S17.001	S27	-0.114	0.000	0.13		3.2	OK	
S1.006	S28	-1.027	0.000	0.02		62.0	OK	
S1.007	S29	0.188	0.000	0.50		28.8	SURCHARGED	
S18.000	S30	-0.150	0.000	0.00		0.0	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Volumetric Runoff Coeff	0.750	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs	0	Number of Storage Structures	12
Number of Online Controls	1	Number of Time/Area Diagrams	7
Number of Offline Controls	0	Number of Real Time Controls	0

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	10, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	100	+40%				
S1.001	S2	15 Winter	100	+40%				
S2.000	S2	30 Winter	100	+40%				
S3.000	S3	30 Winter	100	+40%				
S4.000	S4	15 Winter	100	+40%	30/15 Summer			
S1.002	S6	480 Winter	100	+40%				
S5.000	S7	30 Winter	100	+40%				
S6.000	S8	15 Winter	100	+40%	100/15 Summer			
S7.000	S9	15 Winter	100	+40%				
S1.003	S10	360 Winter	100	+40%				
S8.000	S11	360 Winter	100	+40%	100/360 Winter			
S9.000	S12	15 Winter	100	+40%	30/15 Summer			
S10.000	S13	15 Winter	100	+40%	30/15 Summer			
S1.004	S14	480 Winter	100	+40%				
S11.000	S15	960 Winter	100	+40%	100/120 Winter			
S12.000	S16	15 Winter	100	+40%	10/15 Summer			
S13.000	S17	960 Winter	100	+40%	100/15 Summer			
S1.005	S18	1440 Summer	100	+40%				
S14.000	S19	1440 Summer	100	+40%	100/120 Summer			
S15.000	S20	15 Winter	100	+40%	30/15 Summer			
S16.000	S21	15 Winter	100	+40%				
S16.001	S22	15 Winter	100	+40%				
S16.002	S23	15 Winter	100	+40%				
S16.003	S24	480 Winter	100	+40%				

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	24.159	-0.141	0.000	0.55		37.9	OK	
S1.001	S2	23.709	-1.092	0.000	0.03		93.4	OK	
S2.000	S2	23.900	0.000	0.000	1.77		99.2	SURCHARGED*	
S3.000	S3	23.838	-0.162	0.000	0.44		31.1	OK	
S4.000	S4	24.570	0.570	0.000	2.16		153.8	SURCHARGED	
S1.002	S6	23.652	-1.149	0.000	0.03		86.7	OK	
S5.000	S7	23.829	-0.221	0.000	0.16		15.9	OK	
S6.000	S8	24.460	0.410	0.000	1.53		154.2	SURCHARGED	
S7.000	S9	23.887	-0.163	0.000	0.43		53.2	OK	
S1.003	S10	23.743	-0.958	0.000	0.05		111.3	OK	
S8.000	S11	23.768	0.018	0.000	0.11		6.6	SURCHARGED	
S9.000	S12	24.214	0.464	0.000	2.36		136.7	SURCHARGED	
S10.000	S13	24.591	0.741	0.000	2.15		120.2	SURCHARGED	
S1.004	S14	23.794	-0.807	0.000	0.07		154.7	OK	
S11.000	S15	23.795	0.145	0.000	0.13		7.4	SURCHARGED	
S12.000	S16	24.376	0.726	0.000	2.85		165.3	SURCHARGED	
S13.000	S17	23.793	0.093	0.000	0.07		4.0	SURCHARGED	
S1.005	S18	23.853	-0.648	0.000	0.02		58.0	OK	
S14.000	S19	23.836	0.236	0.000	0.06		3.7	SURCHARGED	
S15.000	S20	23.916	0.316	0.000	2.05		118.9	SURCHARGED	
S16.000	S21	24.002	-0.799	0.000	0.01		12.0	OK	
S16.001	S22	23.806	-0.995	0.000	0.01		36.0	OK	
S16.002	S23	23.725	-1.076	0.000	0.06		123.0	OK	
S16.003	S24	23.642	-1.159	0.000	0.01		42.7	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S16.004	S25	360 Winter	100	+40%					23.736
S17.000	S26	30 Winter	100	+40%					24.781
S17.001	S27	720 Winter	100	+40%					24.361
S1.006	S28	1440 Summer	100	+40%					23.885
S1.007	S29	240 Winter	100	+40%	10/15 Winter				23.941
S18.000	S30	360 Winter	100	+40%					24.000

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S16.004	S25	-1.065	0.000	0.10		277.2	OK	
S17.000	S26	-0.169	0.000	0.71		131.4	FLOOD RISK	
S17.001	S27	-0.089	0.000	0.35		8.6	OK	
S1.006	S28	-0.566	0.000	0.02		53.9	OK	
S1.007	S29	0.691	0.000	0.51		29.5	SURCHARGED	
S18.000	S30	-0.150	0.000	0.00		0.0	OK	

Discharge Wizard Results for Storm

Summary

Discharge Rates Check - Pass

Discharge Volumes Check - Fail

Minimal Discharge Check - Not Run

Discharge Rates Check

PN	RP(yrs)/ CC(%)	Pre-development Discharge Rate (l/s)	Post-development Discharge Rate (l/s)	Pass/Fail
1.007	10yr +0%	30.0	27.8	Pass
1.007	30yr +0%	30.0	28.8	Pass
1.007	100yr +40%	30.0	29.8	Pass
18.000	10yr +0%	11.0	0.0	Pass
18.000	30yr +0%	11.0	0.0	Pass
18.000	100yr +40%	11.0	0.0	Pass

Discharge Volumes Check

PN	Volume Calculation Method	Pre-development Volume (m^3)	Post-development Volume (m^3)	Pass/Fail
1.007	Greenfield	138.816	1879.396	Fail

(Pre-development runoff volume (except those marked with '*') for the 100 year, 360 minutes, Winter storm)

(Post-development runoff volume for the 100 year, 360 minutes, Winter storm with 0% climate change)

Warning - The network was still discharging at the end of the discharge volume test and so it is unlikely the system has fully drained down. It is advisable you rerun the simulation using a longer analysis time to allow the system to fully drain down.

3. MicroDrainage printout for existing drainage system - 100year +40% rainfall event

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	20.000	0.200	100.0	0.027	4.00	0.0	0.600	o	150	Pipe/Conduit	
S2.000	20.000	0.550	36.4	0.036	4.00	0.0	0.600	o	150	Pipe/Conduit	
S3.000	20.000	0.550	36.4	0.075	4.00	0.0	0.600	o	150	Pipe/Conduit	
S1.001	20.000	0.300	66.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	75.00	4.33	23.650	0.027	0.0	0.0	0.0	1.00	17.8	5.5
S2.000	75.00	4.20	24.000	0.036	0.0	0.0	0.0	1.67	29.6	7.3
S3.000	75.00	4.20	24.000	0.075	0.0	0.0	0.0	1.67	29.6	15.2
S1.001	75.00	4.54	23.450	0.138	0.0	0.0	0.0	1.60	63.8	28.0

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	24.900	1.250	Open Manhole	1200	S1.000	23.650	150				
S2	24.900	0.900	Open Manhole	1200	S2.000	24.000	150				
S3	25.000	1.000	Open Manhole	1200	S3.000	24.000	150				
S3	24.500	1.050	Open Manhole	1200	S1.001	23.450	225	S1.000	23.450	150	
								S2.000	23.450	150	
								S3.000	23.450	150	
S	24.400	1.250	Open Manhole	0		OUTFALL		S1.001	23.150	225	

No coordinates have been specified, layout information cannot be produced.

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	150	S1	24.900	23.650	1.100	Open Manhole	1200
S2.000	o	150	S2	24.900	24.000	0.750	Open Manhole	1200
S3.000	o	150	S3	25.000	24.000	0.850	Open Manhole	1200
S1.001	o	225	S3	24.500	23.450	0.825	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	20.000	100.0	S3	24.500	23.450	0.900	Open Manhole	1200
S2.000	20.000	36.4	S3	24.500	23.450	0.900	Open Manhole	1200
S3.000	20.000	36.4	S3	24.500	23.450	0.900	Open Manhole	1200
S1.001	20.000	66.7	S	24.400	23.150	1.025	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.001	S	24.400	23.150	0.000	0	0

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Volumetric Runoff Coeff	0.750	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100, 101
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Summer	1	+0%	100/15 Summer			
S2.000	S2	15 Summer	1	+0%	101/15 Summer			
S3.000	S3	15 Summer	1	+0%	30/15 Summer	101/15 Summer		
S1.001	S3	15 Summer	1	+0%	100/15 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	23.705	-0.095	0.000	0.29		4.8	OK	
S2.000	S2	24.049	-0.101	0.000	0.23		6.4	OK	
S3.000	S3	24.073	-0.077	0.000	0.48		13.4	OK	3
S1.001	S3	23.553	-0.122	0.000	0.43		24.7	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Volumetric Runoff Coeff	0.750	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100, 101
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Summer	30	+0%	100/15 Summer			
S2.000	S2	15 Summer	30	+0%	101/15 Summer			
S3.000	S3	15 Summer	30	+0%	30/15 Summer	101/15 Summer		
S1.001	S3	15 Summer	30	+0%	100/15 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	23.744	-0.056	0.000	0.71		11.8	OK	
S2.000	S2	24.081	-0.069	0.000	0.57		15.8	OK	
S3.000	S3	24.294	0.144	0.000	1.08		30.2	SURCHARGED	3
S1.001	S3	23.630	-0.045	0.000	0.98		56.7	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Volumetric Runoff Coeff	0.750	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100, 101
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Summer	100	+0%	100/15 Summer			
S2.000	S2	15 Summer	100	+0%	101/15 Summer			
S3.000	S3	15 Summer	100	+0%	30/15 Summer	101/15 Summer		
S1.001	S3	15 Summer	100	+0%	100/15 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	23.905	0.105	0.000	0.80		13.4	SURCHARGED	
S2.000	S2	24.096	-0.054	0.000	0.74		20.5	OK	
S3.000	S3	24.662	0.512	0.000	1.27		35.3	SURCHARGED	3
S1.001	S3	23.770	0.095	0.000	1.16		67.1	SURCHARGED	

101 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Volumetric Runoff Coeff	0.750	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100, 101
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Summer	101	+40%	100/15 Summer			
S2.000	S2	15 Summer	101	+40%	101/15 Summer			
S3.000	S3	15 Summer	101	+40%	30/15 Summer	101/15 Summer		
S1.001	S3	15 Summer	101	+40%	100/15 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	24.203	0.403	0.000	1.10		18.4	SURCHARGED	
S2.000	S2	24.391	0.241	0.000	0.88		24.6	SURCHARGED	
S3.000	S3	25.002	0.852	1.932	1.44		40.0	FLOOD	3
S1.001	S3	23.956	0.281	0.000	1.40		80.7	SURCHARGED	

Discharge Wizard Results for Storm

Summary

Discharge Rates Check - Fail

Discharge Volumes Check - Not Run

Minimal Discharge Check - Not Run

Discharge Rates Check

PN	RP(yrs)/ CC(%)	Pre-development Discharge Rate (l/s)	Post-development Discharge Rate (l/s)	Pass/Fail
1.001	1yr +0%	1.0	24.7	Fail
1.001	30yr +0%	1.0	56.7	Fail
1.001	100yr +0%	1.0	67.1	Fail
1.001	101yr +40%	1.0	80.7	Fail

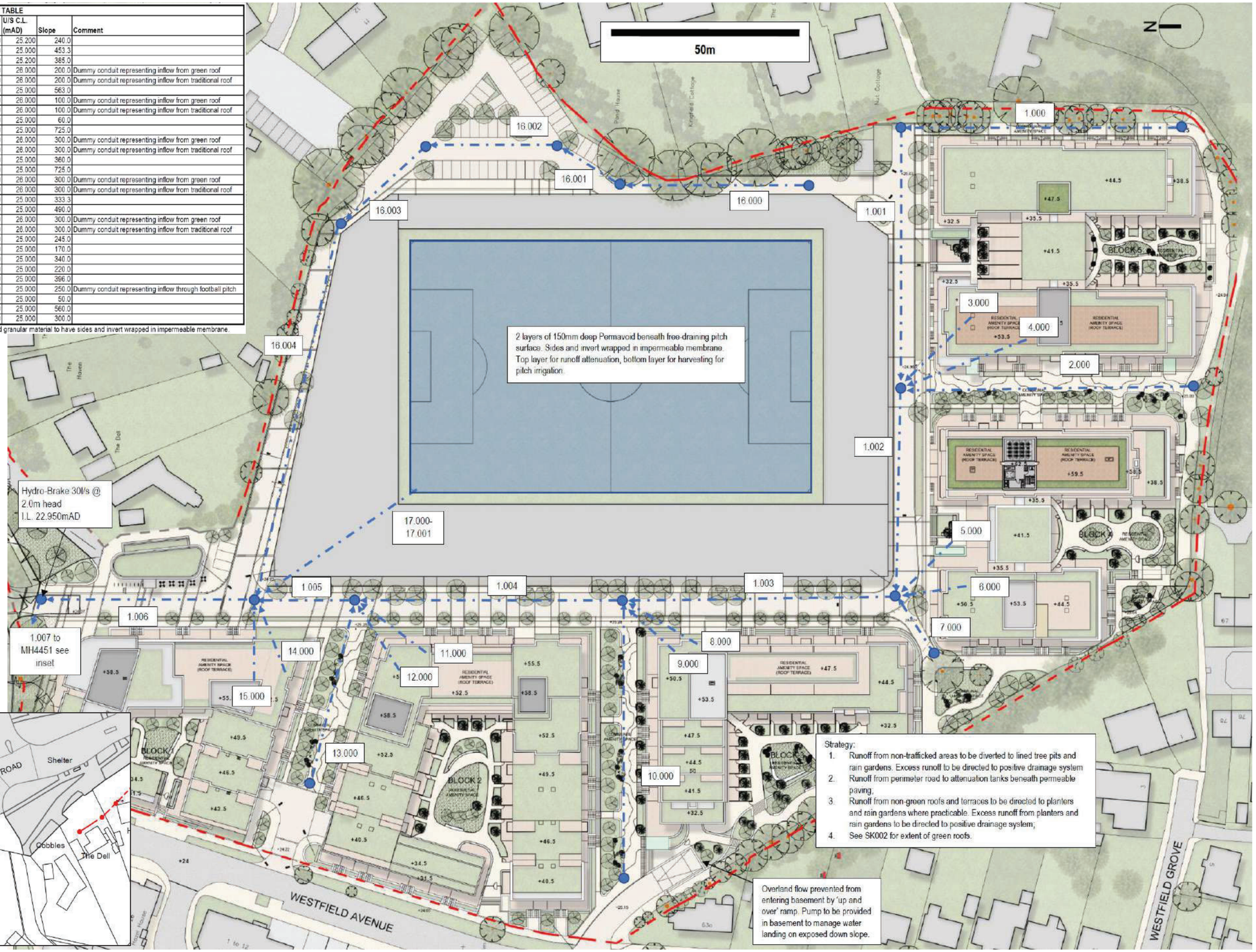
APPENDIX B
DRAWINGS

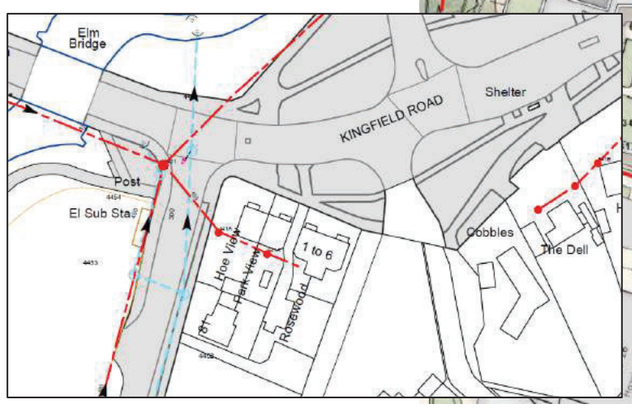
SK001 Surface Water Layout
SK002 Surface Water – Area Take-Off
SK003 Existing Site Drainage

CONDUIT TABLE

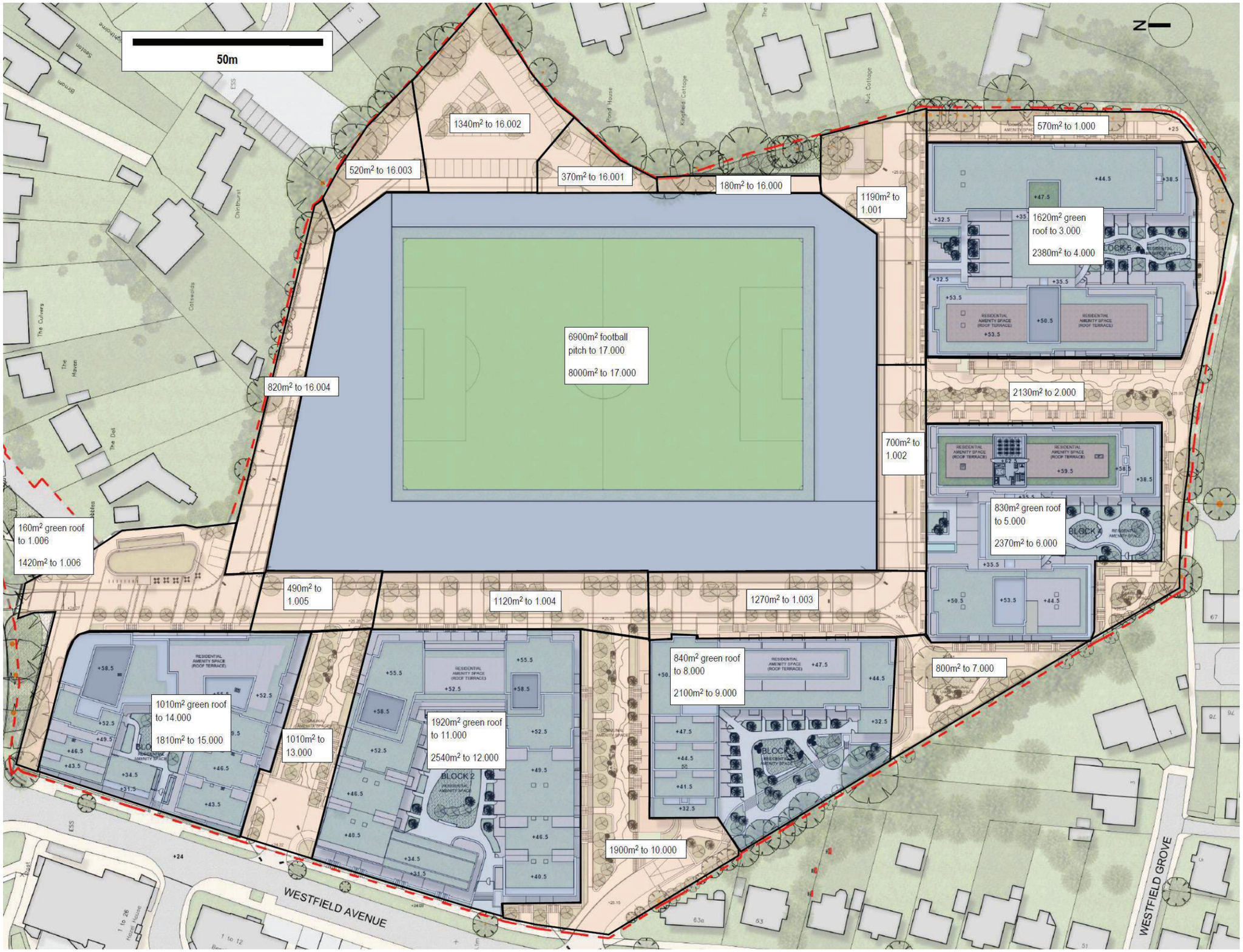
Ref	Length (m)	Form	U/S I.L. (mAD)	U/S C.L. (mAD)	Slope	Comment
1.000	72.0	300mm dia. pipe	24.000	25.200	240.0	
1.001	68.0	300mm high x 5000mm wide geocellular conduit	23.700	25.000	453.3	
2.000	77.0	300mm dia. pipe	23.600	25.200	385.0	
3.000	30.0	300mm dia. pipe	23.700	26.000	200.0	Dummy conduit representing inflow from green roof
4.000	30.0	300mm dia. pipe	23.700	26.000	200.0	Dummy conduit representing inflow from traditional roof
1.002	56.3	400mm high x 5000mm wide geocellular conduit	23.400	25.000	563.0	
5.000	30.0	300mm dia. pipe	23.750	26.000	100.0	Dummy conduit representing inflow from green roof
6.000	30.0	300mm dia. pipe	23.750	26.000	100.0	Dummy conduit representing inflow from traditional roof
7.000	18.0	300mm dia. pipe	23.750	25.000	60.0	
1.003	72.5	400mm high x 5000mm wide geocellular conduit	23.300	25.000	725.0	
8.000	30.0	300mm dia. pipe	23.450	26.000	300.0	Dummy conduit representing inflow from green roof
9.000	30.0	300mm dia. pipe	23.450	26.000	300.0	Dummy conduit representing inflow from traditional roof
10.000	72.0	300mm dia. pipe	23.550	25.000	360.0	
1.004	72.5	400mm high x 5000mm wide geocellular conduit	23.200	25.000	725.0	
11.000	30.0	300mm dia. pipe	23.350	26.000	300.0	Dummy conduit representing inflow from green roof
12.000	30.0	300mm dia. pipe	23.350	26.000	300.0	Dummy conduit representing inflow from traditional roof
13.000	50.0	300mm dia. pipe	23.400	25.000	333.3	
1.005	24.5	400mm high x 5000mm wide geocellular conduit	23.100	25.000	490.0	
14.000	30.0	300mm dia. pipe	23.300	26.000	300.0	Dummy conduit representing inflow from green roof
15.000	30.0	300mm dia. pipe	23.300	26.000	300.0	Dummy conduit representing inflow from traditional roof
16.000	49.0	300mm high x 5000mm wide geocellular conduit	24.000	25.000	245.0	
16.001	17.0	300mm high x 5000mm wide geocellular conduit	23.800	25.000	170.0	
16.002	34.0	300mm high x 5000mm wide geocellular conduit	23.700	25.000	340.0	
16.003	33.0	300mm high x 5000mm wide geocellular conduit	23.600	25.000	220.0	
16.004	99.0	300mm high x 5000mm wide geocellular conduit	23.450	25.000	396.0	
17.000	50.0	450mm dia. pipe	24.000	25.000	250.0	Dummy conduit representing inflow through football pitch
17.001	50.0	150mm dia. pipe	23.850	25.000	50.0	
1.006	56.0	400mm high x 3000mm wide geocellular conduit	23.050	25.000	560.0	
1.007	30.0	300mm dia. pipe	22.950	25.000	300.0	

All geocellular conduits to have granular reinstatement with 30% void content - tank and granular material to have sides and invert wrapped in impermeable membrane.





Revisions A 15.10.2019 – Initial Issue	Project Nr 0394 Drg Nr/Rev SK001/A Status Planning Issue	CLIENT Goldev PROJECT Woking Football Club DRG TITLE **Surface Water Drainage Layout** SCALE As shown	SOUTH LODGE OLD DAWLISH ROAD EXMINSTER DEVON EX6 8AT Telephone: +44(0)1392 824616 Email: admin@pitmanassociates.com pitmanassociates.com



Revisions A 15.10.2019 – Initial Issue	Project Nr Drg Nr/Rev Status	0394 SK002/A Planning Issue	CLIENT PROJECT DRG TITLE SCALE	Goldev Woking Football Club **Surface Water Drainage – Area Take-off** As shown	SOUTH LODGE OLD DAWLISH ROAD EXMINSTER DEVON EX6 8AT Telephone: +44(0)1392 824616 Email: admin@pitmanassociates.com pitmanassociates.com

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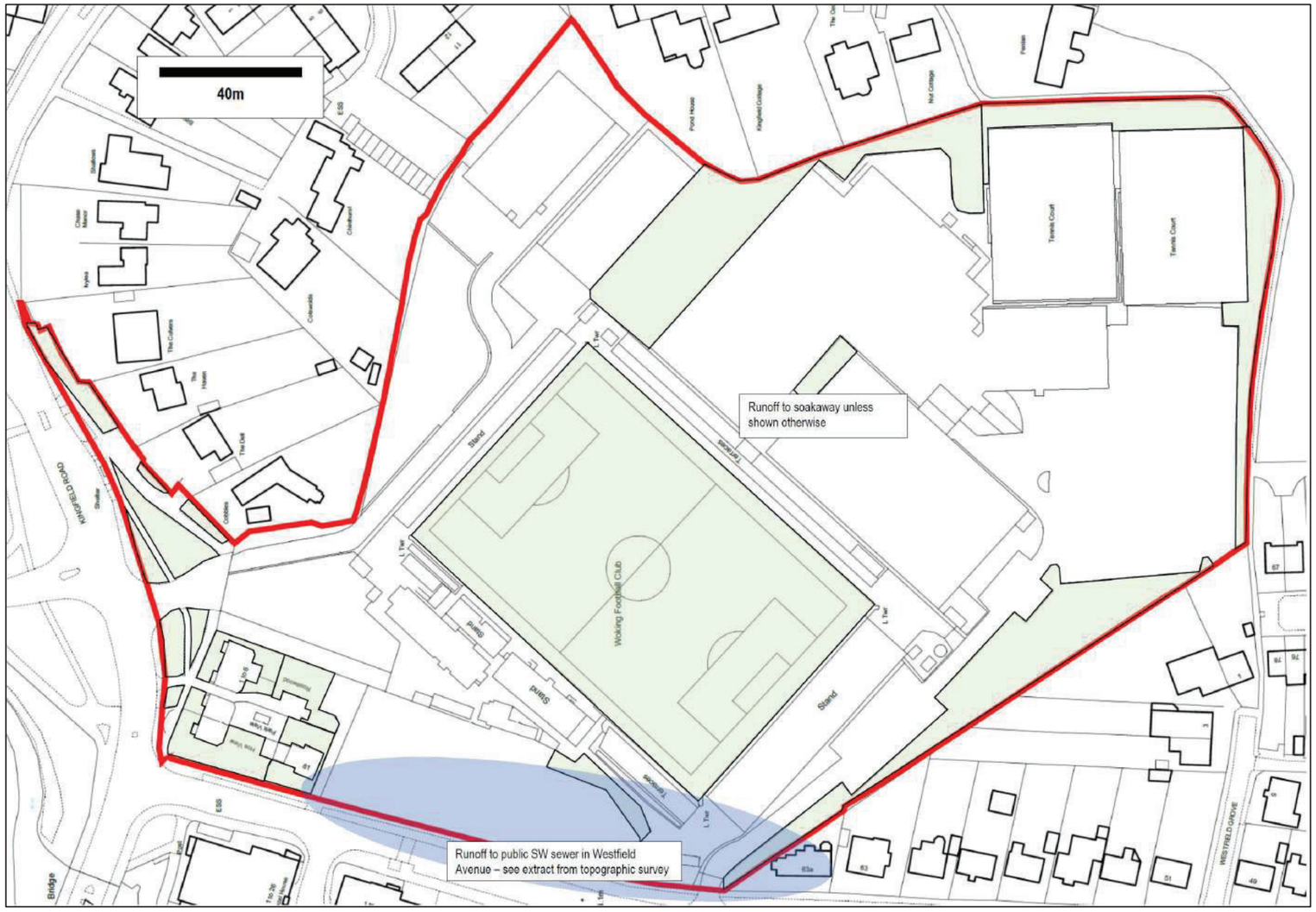

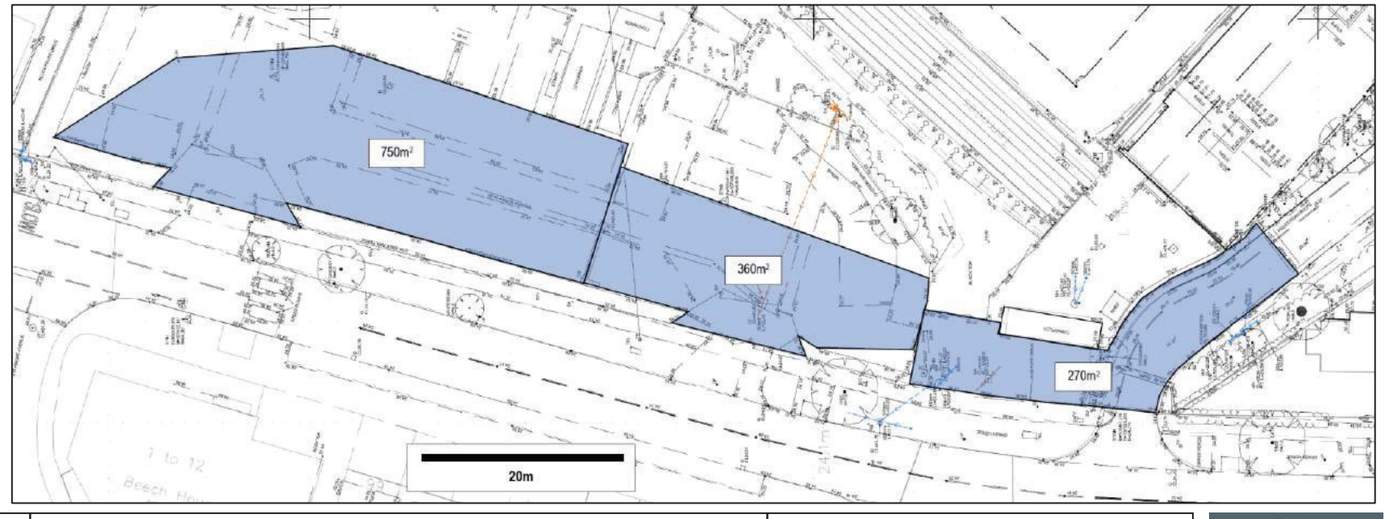

Revisions A 30.08.2019 – Planning Issue	Project Nr 0394 Drg Nr/Rev SK003/A Status Planning Issue	CLIENT Goldev PROJECT Woking Football Club DRG TITLE **Existing Surface Water Drainage Arrangements** SCALE As shown	SOUTH LODGE OLD DAWLISH ROAD EXMINSTER DEVON EX6 8AT Telephone: +44(0)1392 824616 Email: admin@pitmanassociates.com pitmanassociates.com

Wayne Gold
Goldev Woking Ltd

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P1381J1460/PSw

02/07/2019

Dear Wayne,

WOKING FOOTBALL CLUB, KINGFIELD ROAD, WOKING, SURREY, GU22 9AA: SOIL INFILTRATION TESTING

Jomas attended the above-mentioned site under instruction by Goldev Woking Ltd on 21st June 2019 to carry out falling head permeability tests within the boreholes previously installed on the site.

A full list of previous reports undertaken for the site by Jomas are detailed in Table 1 below:

Table 1: Previous Reports - Jomas

Title	Author	Reference	Date
Desk Study / Preliminary Risk Assessment Report For Woking Football Club, Laithwaite Community Stadium, Kingfield Road, Kingfield, Woking, GU22 9AA	Jomas Associates Ltd	P1381J1460/AM Final V1.0	17 August 2018
Woking Football Club, Laithwaite Community Stadium, Kingfield Road, Woking, GU22 9AA Geo-Environmental Scoping Letter	Jomas Associates Ltd	P1381j1460/Amm	18 April 2019
Geo-Environmental & Geotechnical Assessment (Ground Investigation) Report, Woking Football Club, Laithwaite Community Stadium, Kingfield Road, Woking, GU22 9AA	Jomas Associates Ltd	P1381J1460/AMM Final V1.0	30 April 2019

This phase of work did not involve any further intrusive investigation works.

Ground Conditions

Full logs of the ground conditions observed on site are included in Appendix 2 of the ground investigation report, however, a summary of the ground conditions is provided below:

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Table 2: Ground Conditions Previously Encountered

Stratum and Description	Encountered from (m bgl)	Base of strata (m bgl)	Thickness range (m)
Asphalt. (MADE GROUND)	0.0	0.05 – 0.20	0.05 – 0.20
Brown sandy gravelly clay with rootlets. Sand is fine. Gravel consists of flint, concrete, brick and asphalt fragments. (MADE GROUND – Topsoil) Encountered in WS4 and WS5 only	0.0	0.30 – 0.50	0.30 – 0.50
Black to brown slightly clayey sandy gravel. Sand is fine to medium. Gravel consists of flint, brick, concrete, asphalt, glass and ceramic fragments. (MADE GROUND)	0.05 – 0.30	0.30 – 1.10	0.18 – 1.15
Black to brown clayey gravelly sand. Sand is medium. Gravel consists of fine to coarse flint and asphalt fragments. (MADE GROUND)	0.30 – 1.10	0.70 – 1.40	0.25 – 0.90
Loose to very dense orange to grey silty clayey very gravelly SAND. Sand is fine. Gravel consists of flint. (KEMPTON PARK GRAVEL)	0.30 – 1.40	2.00 – 4.15	0.70 – 3.20
Medium to very dense grey silty SAND. Sand is medium to coarse. (BAGSHOT FORMATION)	2.00 – 3.60	3.75 – 25.00	0.85 – 22.30

Falling Head Permeability Tests

The determination of permeability of the underlying ground was undertaken by carrying out insitu falling head tests. These were carried out to conform with the methodology for falling head permeability test formerly outlined in BS: 5930 (1999) and recently in BS EN ISO 22282-2.

Copies of the results and calculations are appended to this letter.

Falling head permeability tests were carried out in 2no. historically installed boreholes. Jomas has not been provided with details of these installs. It is assumed that the hole had been drilled with 150mm casing. Similarly, the installation is assumed to be 1m of plain pipe with slotted to the base of the well at 4.3m (HBH2) and 5.9m (HBH4)

1No test lasting for approximately 1hour was undertaken in each location, the results of these tests are summarised below with the full calculation and result sheets appended to this letter.

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Hole ID	Calculated Permeability (m/s)	Indicative Permeability*	Indicative Drainage Conditions*
HBH2	4.05×10^{-5}	Low	Good
HBH4	2.15×10^{-4}	Medium	Good
WS2	2.66×10^{-6}	Low	Poor
WS7	6.11×10^{-7}	Very Low	Poor
WS10	9.84×10^{-7}	Very Low	Poor
BH2	9.31×10^{-7}	Very Low	Poor
BH3	1.32×10^{-5}	Low	Good

*After Casagrande and Fadum (1940)

We trust that this is satisfactory for your current needs, however please do not hesitate to contact the udnersigned if we can be of further assistance on either this or any other project.

Yours sincerely,

Peter Swettenham BSc (Hons) MSc PgCert CEnv MIEnvSc

Principal Geotechnical Engineer

Enc.

Appendix 1 – Figures

Appendix 2 – Infiltration Rates – Results and Calculations

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APPENDIX 1 – FIGURES

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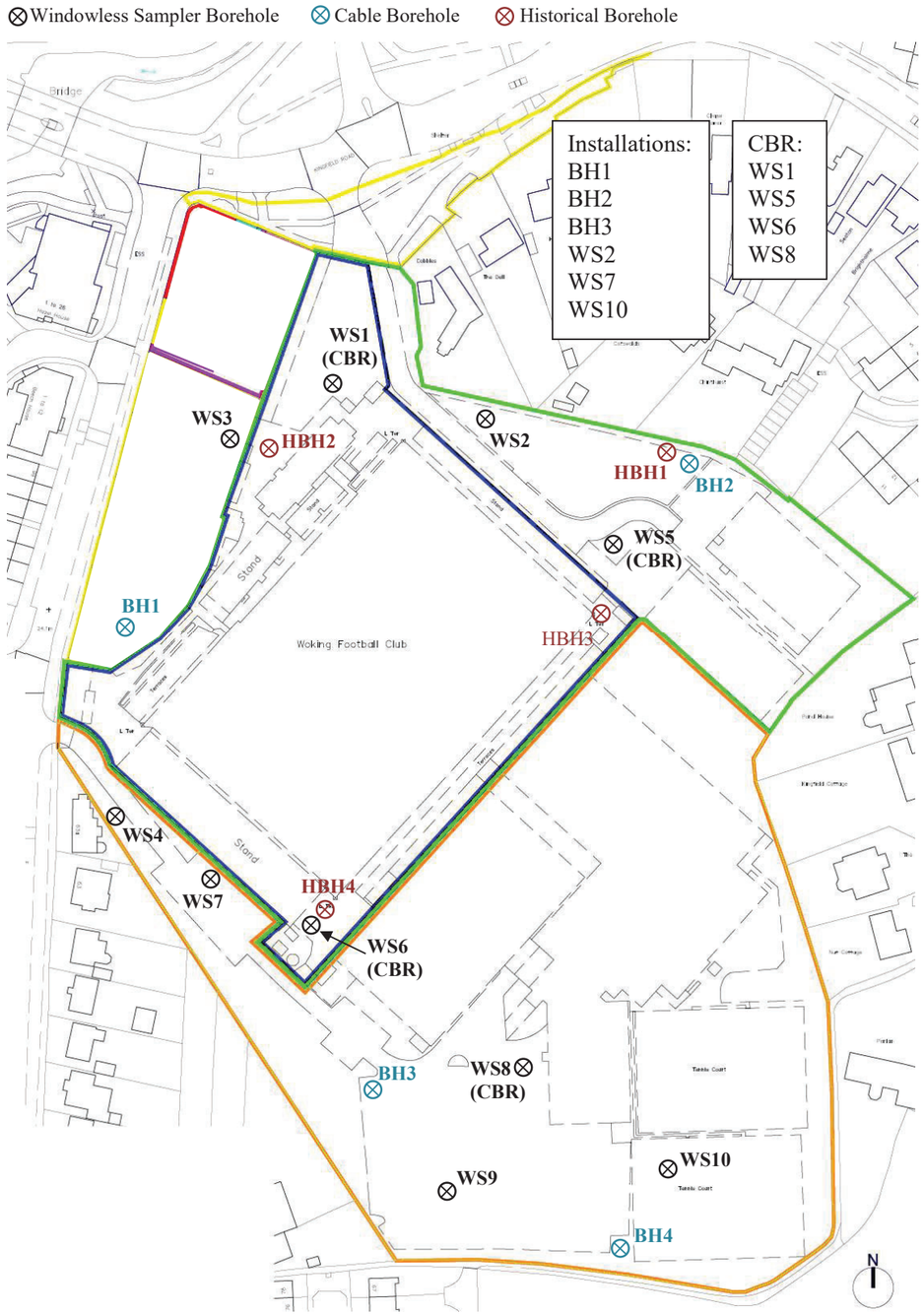
JOMAS ASSOCIATES LTD
T: 0843 289 2187

Project Name	Kingfield Road, Woking	**Client**	Goldev Woking Ltd
Project No.	P1381J1460	**Date**	March 2019
Title	Exploratory Holes	**Prepared By**	JLW



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APPENDIX 2 – INFILTRATION RATES – RESULTS AND CALCULATIONS

FALLING HEAD TEST RECORD

Client	Wayne Gold	**Ground Level**		**Hole Nr**	HBH2
Site	Kingsfield Road, Woking	**Nat Grid Co-ordinates**		**Project Nr**	P1381J1460
Date	21/06/2019	**Engineer**	JPB		

Borehole Dimensions

Borehole Diameter (m)	
Standpipe Diameter (m)	0.150
Length of Slotted Pipe (m)	3.30
F (Intake Factor)	Type D
	6.55E+00
A (Cross-sectional Area)	0.0177

Well Installation Details (mbgl)

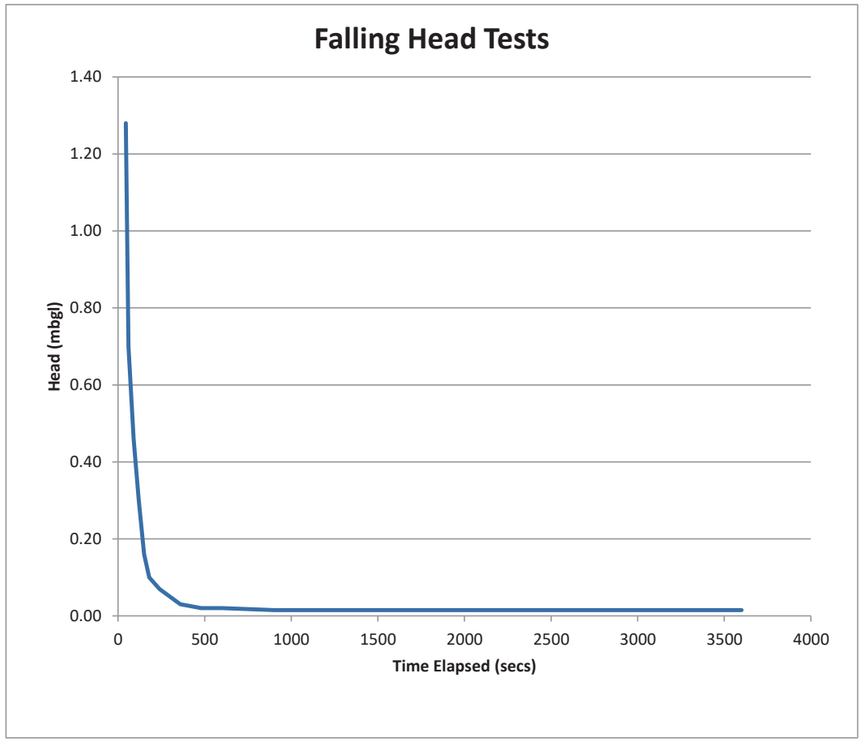
Hole assumed to have been drilled with 150mm casing
Installation assumed to be 1m of plain pipe with slotted to the base of the well at 4.3m

Ground Conditions

Standing Water Level (mbgl): 2.28

	TEST 1		TEST 2		TEST 3	
Elapsed time	**Depth to Water**	**Head**	**Depth to Water**	**Head**	**Depth to Water**	**Head**
secs	**mbgl**	**m**	**mbgl**	**m**	**(Dw) mbgl**	**(Dg) m**
0	1.00	1.28				
30	1.58	0.70				
45	1.82	0.46				
60	1.98	0.30				
90	2.12	0.16				
120	2.18	0.10				
150	2.21	0.07				
180	2.23	0.05				
240	2.25	0.03				
300	2.26	0.02				
360	2.26	0.02				
420	2.26	0.02				
480	2.26	0.02				
540	2.27	0.01				
600	2.27	0.01				
900	2.27	0.01				
1200	2.27	0.01				
1800	2.27	0.01				
2400	2.27	0.01				
3000	2.27	0.01				
3600	2.27	0.01				

	TEST 1	TEST 2	TEST 3
t1 (sec)	30		
t2 (sec)	240		
t2-t1 (sec)	210		
h1 (m)	0.7		
h2 (m)	0.03		
Permeability -k - (m/sec)	**4.05E-05**		



Remarks:

Approved By: PSw

FALLING HEAD TEST RECORD

Client	Wayne Gold	**Ground Level**		**Hole Nr**	HBH4
Site	Kingsfield Road, Woking	**Nat Grid Co-ordinates**		**Project Nr**	P1381J1460
Date	02/11/2015	**Engineer**	JPB		

Borehole Dimensions

Borehole Diameter (m)	
Standpipe Diameter (m)	0.150
Length of Slotted Pipe (m)	6.00
F (Intake Factor)	Type A 3.00E-01
A (Cross-sectional Area)	0.0177

Well Installation Details (mbgl)

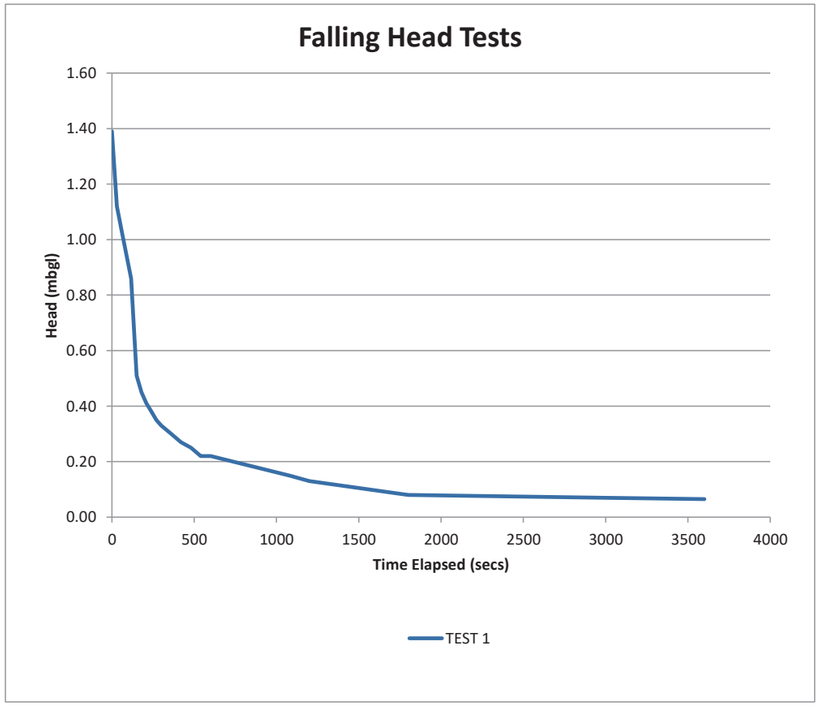
Hole assumed to have been drilled with 150mm casing
Installation assumed to be 1m of plain pipe with slotted to the base of the well at 4.3m

Ground Conditions

Standing Water Level (mbgl): 2.02

	TEST 1		TEST 2		TEST 3	
Elapsed time	**Depth to Water**	**Head**	**Depth to Water**	**Head**	**Depth to Water**	**Head**
secs	**mbgl**	**m**	**mbgl**	**m**	**(Dw) mbgl**	**(Dg) m**
0	0.63	1.39				
30	0.90	1.12				
60	0.99	1.03				
117	1.16	0.86				
150	1.51	0.51				
180	1.57	0.45				
210	1.61	0.41				
240	1.64	0.38				
270	1.67	0.35				
300	1.69	0.33				
360	1.72	0.30				
420	1.75	0.27				
480	1.77	0.25				
540	1.80	0.22				
600	1.80	0.22				
1080	1.87	0.15				
1200	1.89	0.13				
1800	1.94	0.08				
2400	1.95	0.08				
3000	1.95	0.07				
3600	1.96	0.06				

	TEST 1	TEST 2	TEST 3
t1 (sec)	30		
t2 (sec)	420		
t2-t1 (sec)	390		
h1 (m)	1.1		
h2 (m)	0.27		
Permeability -k - (m/sec)	**2.15E-04**		



Remarks:

Approved By: PSw

FALLING HEAD TEST RECORD

Client	Wayne Gold	**Ground Level**		**Hole Nr**	WS2
Site	Kingsfield Road, Woking	**Nat Grid Co-ordinates**		**Project Nr**	P1381J1460
Date	21/06/2019	**Engineer**	JPB		

Borehole Dimensions

Borehole Diameter (m)	
Standpipe Diameter (m)	0.100
Length of Slotted Pipe (m)	2.00
F (Intake Factor)	Type D 4.13E+00
A (Cross-sectional Area)	0.0079

Well Installation Details (mbgl)

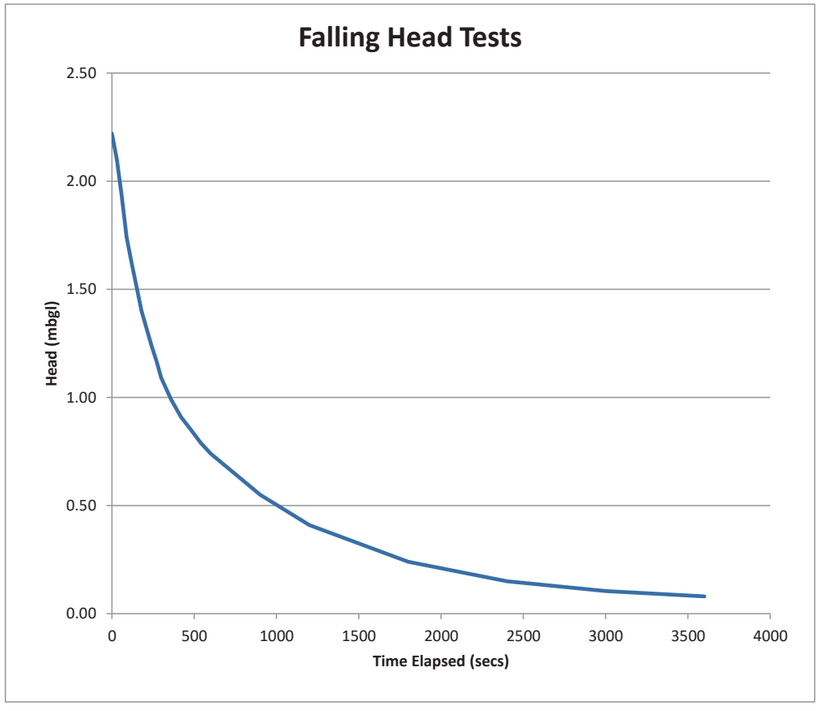
0 - 1m Plain pipe with bentonite surround
1m - 3m slotted with gravel surround
3.0m - 4.45m backfilled with arisisngs

Ground Conditions

Standing Water Level (mbgl): 2.87

	TEST 1		TEST 2		TEST 3	
Elapsed time	**Depth to Water**	**Head**	**Depth to Water**	**Head**	**Depth to Water**	**Head**
secs	**mbgl**	**m**	**mbgl**	**m**	**(Dw) mbgl**	**(Dg) m**
0	0.65	2.22				
30	0.77	2.10				
60	0.94	1.93				
90	1.13	1.74				
120	1.25	1.62				
150	1.36	1.51				
180	1.47	1.40				
240	1.63	1.24				
270	1.70	1.17				
300	1.78	1.09				
360	1.88	0.99				
420	1.96	0.91				
480	2.02	0.85				
540	2.08	0.79				
600	2.13	0.74				
900	2.32	0.55				
1200	2.46	0.41				
1800	2.63	0.24				
2400	2.72	0.15				
3000	2.77	0.11				
3600	2.79	0.08				

	TEST 1	TEST 2	TEST 3
t1 (sec)	30		120
t2 (sec)	1200		
t2-t1 (sec)	1170		
h1 (m)	2.1		
h2 (m)	0.41		
Permeability -k - (m/sec)	**2.66E-06**		



Remarks:

Approved By: PSw

FALLING HEAD TEST RECORD

Client	Wayne Gold	**Ground Level**		**Hole Nr**	WS7
Site	Kingsfield Road, Woking	**Nat Grid Co-ordinates**		**Project Nr**	P1381J1460
Date	21/06/2019	**Engineer**	JPB		

Borehole Dimensions

Borehole Diameter (m)	
Standpipe Diameter (m)	0.100
Length of Slotted Pipe (m)	3.15
F (Intake Factor)	Type D 5.66E+00
A (Cross-sectional Area)	0.0079

Well Installation Details (mbgl)

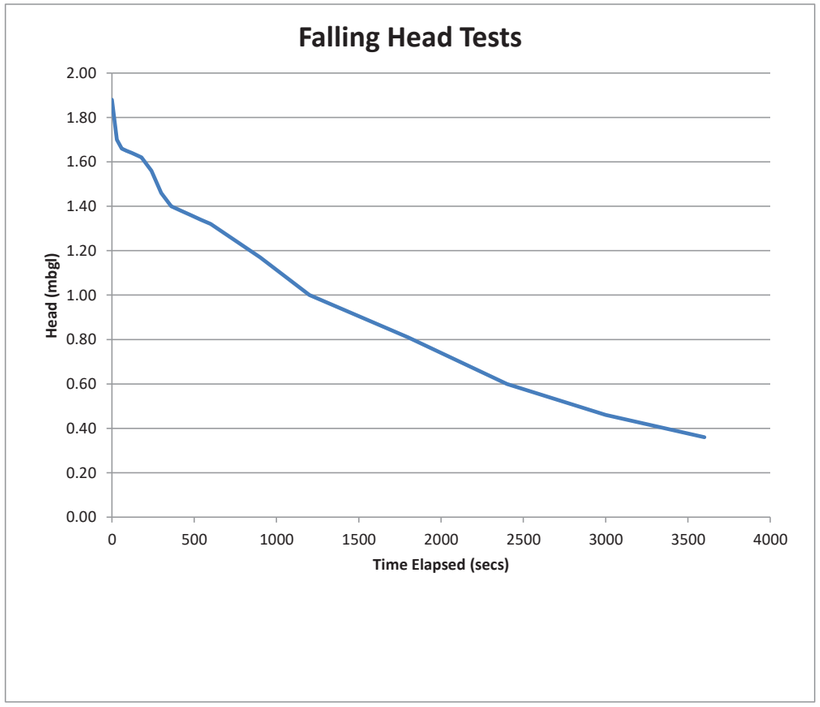
0 - 1m Plain pipe with bentonite surround
1m - 4.15m slotted with gravel surround

Ground Conditions

Standing Water Level (mbgl): 2.12

	TEST 1		TEST 2		TEST 3	
Elapsed time	**Depth to Water**	**Head**	**Depth to Water**	**Head**	**Depth to Water**	**Head**
secs	**mbgl**	**m**	**mbgl**	**m**	**(Dw) mbgl**	**(Dg) m**
0	0.24	1.88				
30	0.42	1.70				
60	0.44	1.68				
90	0.46	1.66				
120	0.47	1.65				
150	0.48	1.64				
180	0.49	1.63				
210	0.50	1.62				
240	0.56	1.56				
270	0.66	1.46				
300	0.72	1.40				
360	0.74	1.38				
420	0.76	1.36				
480	0.78	1.34				
600	0.80	1.32				
900	0.95	1.17				
1200	1.12	1.00				
1800	1.31	0.81				
2400	1.52	0.60				
3000	1.66	0.46				
3600	1.76	0.36				

	TEST 1	TEST 2	TEST 3
t1 (sec)	30		
t2 (sec)	3000		
t2-t1 (sec)	2970		
h1 (m)	1.7		
h2 (m)	0.46		
Permeability -k - (m/sec)	**6.11E-07**		



Remarks:

Approved By: PSw

FALLING HEAD TEST RECORD

Client	Wayne Gold	**Ground Level**		**Hole Nr**	WS10
Site	Kingsfield Road, Woking	**Nat Grid Co-ordinates**		**Project Nr**	P1381J1460
Date	21/06/2019	**Engineer**	JPB		

Borehole Dimensions

Borehole Diameter (m)	
Standpipe Diameter (m)	0.100
Length of Slotted Pipe (m)	2.95
F (Intake Factor)	Type D 5.40E+00
A (Cross-sectional Area)	0.0079

Well Installation Details (mbgl)

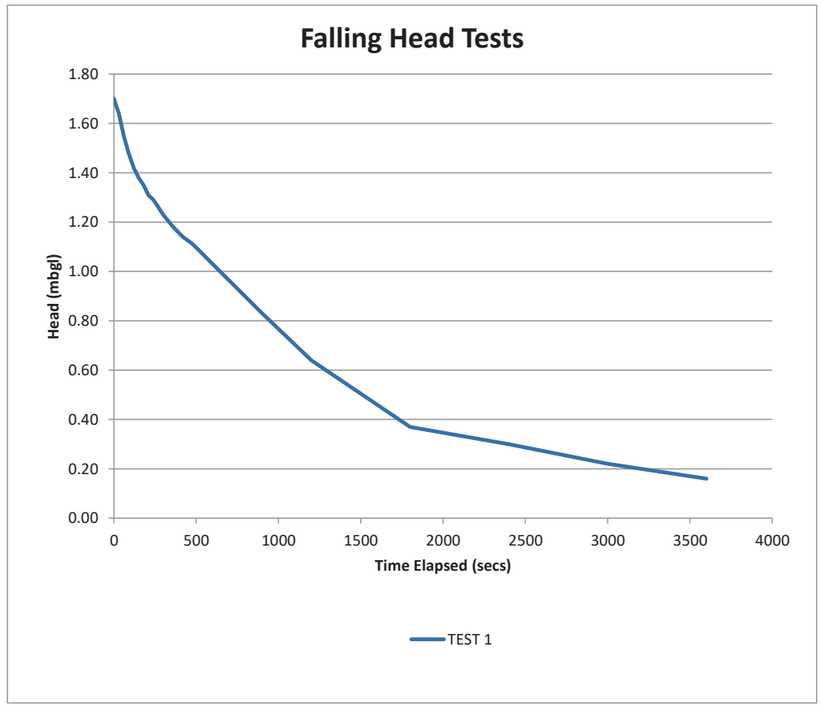
0 - 1m Plain pipe with bentonite surround
1m - 3.95m slotted with gravel surround

Ground Conditions

Standing Water Level (mbgl): 1.98

	TEST 1		TEST 2		TEST 3	
Elapsed time	**Depth to Water**	**Head**	**Depth to Water**	**Head**	**Depth to Water**	**Head**
secs	**mbgl**	**m**	**mbgl**	**m**	**(Dw) mbgl**	**(Dg) m**
0	0.28	1.70				
30	0.34	1.64				
60	0.43	1.55				
90	0.50	1.48				
120	0.56	1.42				
150	0.60	1.38				
180	0.63	1.35				
210	0.67	1.31				
240	0.69	1.29				
270	0.72	1.26				
300	0.75	1.23				
360	0.80	1.18				
420	0.84	1.14				
480	0.87	1.11				
600	0.95	1.03				
900	1.15	0.83				
1200	1.34	0.64				
1800	1.61	0.37				
2400	1.68	0.30				
3000	1.76	0.22				
3600	1.82	0.16				

	TEST 1	TEST 2	TEST 3
t1 (sec)	30		
t2 (sec)	3000		
t2-t1 (sec)	2970		
h1 (m)	1.6		
h2 (m)	0.22		
Permeability -k - (m/sec)	**9.84E-07**		



Remarks:

Approved By: PSw

FALLING HEAD TEST RECORD

Client	Wayne Gold	**Ground Level**		**Hole Nr**	BH2
Site	Kingsfield Road, Woking	**Nat Grid Co-ordinates**		**Project Nr**	P1381J1460
Date	21/06/2019	**Engineer**	JPB		

Borehole Dimensions

Borehole Diameter (m)	
Standpipe Diameter (m)	0.150
Length of Slotted Pipe (m)	5.00
F (Intake Factor)	Type D 8.78E+00
A (Cross-sectional Area)	0.0177

Well Installation Details (mbgl)

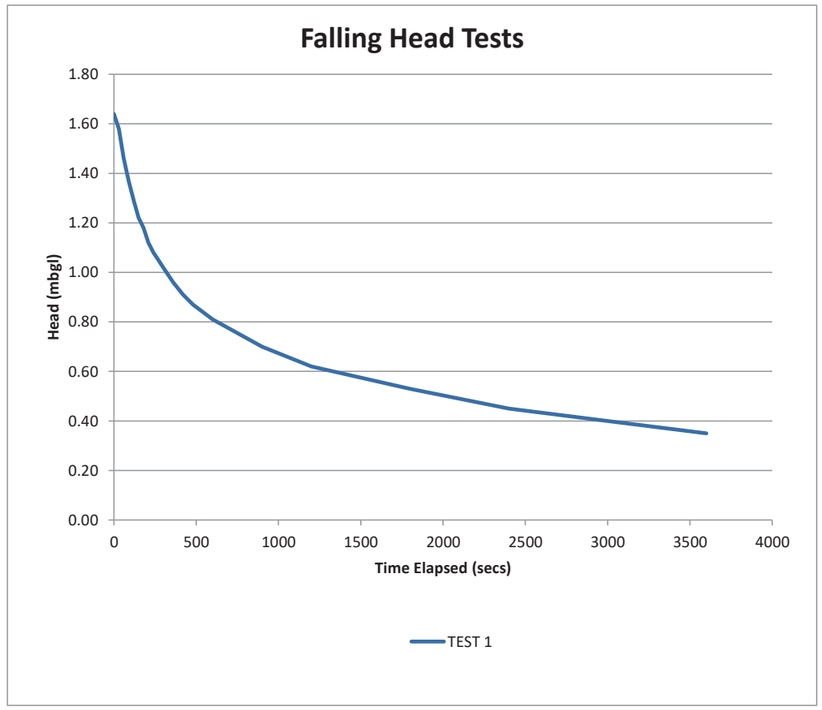
0 - 1m Plain pipe with bentonite surround
1m - 6m slotted with gravel surround
6.0m - 25m backfilled with arisisngs

Ground Conditions

Standing Water Level (mbgl): 2.29

	TEST 1		TEST 2		TEST 3	
Elapsed time	**Depth to Water**	**Head**	**Depth to Water**	**Head**	**Depth to Water**	**Head**
secs	**mbgl**	**m**	**mbgl**	**m**	**(Dw) mbgl**	**(Dg) m**
0	0.65	1.64				
30	0.71	1.58				
60	0.83	1.46				
90	0.92	1.37				
120	1.00	1.29				
150	1.07	1.22				
180	1.11	1.18				
210	1.17	1.12				
240	1.21	1.08				
270	1.24	1.05				
300	1.27	1.02				
360	1.33	0.96				
420	1.38	0.91				
480	1.42	0.87				
600	1.48	0.81				
900	1.59	0.70				
1200	1.67	0.62				
1800	1.76	0.53				
2400	1.84	0.45				
3000	1.89	0.40				
3600	1.94	0.35				

	TEST 1	TEST 2	TEST 3
t1 (sec)	30		
t2 (sec)	3000		
t2-t1 (sec)	2970		
h1 (m)	1.58		
h2 (m)	0.40		
Permeability -k - (m/sec)	**9.31E-07**		



Remarks:

Approved By: PSw

FALLING HEAD TEST RECORD

Client	Wayne Gold	**Ground Level**		**Hole Nr**	BH3
Site	Kingsfield Road, Woking	**Nat Grid Co-ordinates**		**Project Nr**	P1381J1460
Date	21/06/2019	**Engineer**	JPB		

Borehole Dimensions

Borehole Diameter (m)	
Standpipe Diameter (m)	0.150
Length of Slotted Pipe (m)	4.00
F (Intake Factor)	Type D 7.49E+00
A (Cross-sectional Area)	0.0177

Well Installation Details (mbgl)

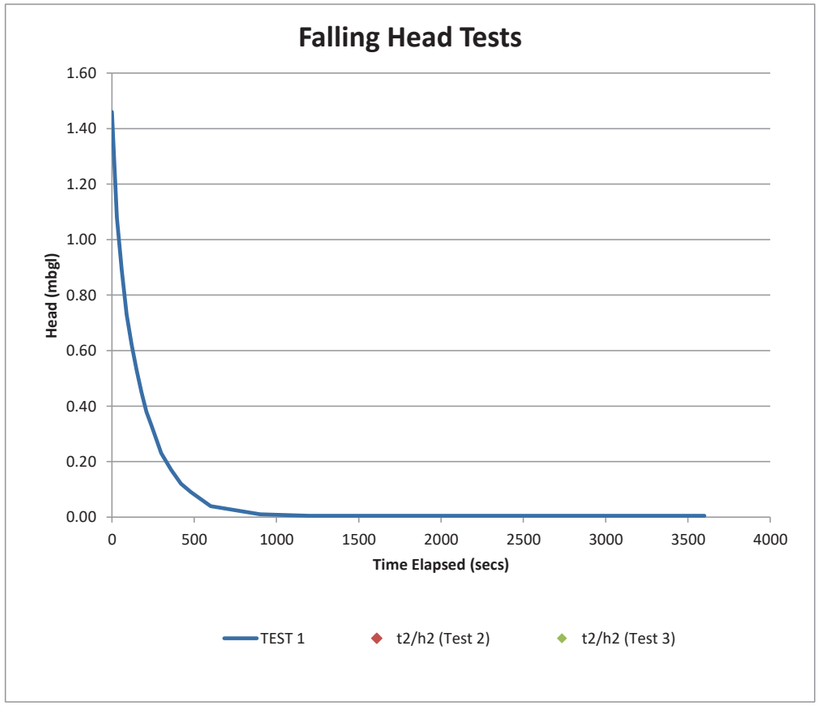
0 - 1m Plain pipe with bentonite surround
1m - 5m slotted with gravel surround
5.0m - 25m backfilled with arisisngs

Ground Conditions

Standing Water Level (mbgl): 1.7

	TEST 1		TEST 2		TEST 3	
Elapsed time	**Depth to Water**	**Head**	**Depth to Water**	**Head**	**Depth to Water**	**Head**
secs	**mbgl**	**m**	**mbgl**	**m**	**(Dw) mbgl**	**(Dg) m**
0	0.24	1.46				
30	0.62	1.08				
60	0.81	0.89				
90	0.97	0.73				
120	1.08	0.62				
150	1.17	0.53				
180	1.25	0.45				
210	1.32	0.38				
240	1.37	0.33				
270	1.42	0.28				
300	1.47	0.23				
360	1.53	0.17				
420	1.58	0.12				
480	1.61	0.09				
600	1.66	0.04				
900	1.69	0.01				
1200	1.70	0.00				
1800	1.70	0.00				
2400	1.70	0.00				
3000	1.70	0.00				
3600	1.70	0.00				

	TEST 1	TEST 2	TEST 3
t1 (sec)	30		
t2 (sec)	360		
t2-t1 (sec)	330		
h1 (m)	1.08		
h2 (m)	0.17		
Permeability -k - (m/sec)	**1.32E-05**		



Remarks:

Approved By: PSw

Appendix E: Thames Water Sewer Records

Melissa Seymour
RMA Environmental Ltd
Suite 4 Swallow Court
Devonshire Gate
Tiverton
Devon
EX16 7EJ

Ref DS6062108

31 May 2019

Pre-planning enquiry: Capacity concerns

Dear Melissa

Thank you for providing information on your development at Woking Football Club comprising up to 1200 residential units with 25,000 sq ft of retail.

We have completed an initial assessment of the foul water flows based on the information submitted in your application and have concluded that our sewerage network will not have enough capacity to meet the needs of your development at this time.

To ensure we make the appropriate upgrades or 'off-site reinforcement' to serve your development, we'll need to carry out modelling work, design a solution and build the necessary improvements. This work would be at our cost.

Once we've begun modelling, we may need to contact you to discuss the point of connection to the sewer. Please note that we'll pay the cost of covering any extra distance if the connection needs to be made at a point further away than the nearest practicable point of at least the same diameter.

How long could modelling and reinforcement take?

Typical timescales for a development of your size are:

Modelling: 8 months
Design: 6 months
Construction: 10 months
Total: 24 months

If the time you're likely to take from planning and construction through to first occupancy is longer than this, we'll be able to carry out the necessary upgrades in time for your development. If it's shorter, please contact me on the number below to discuss the timing of our activities.

What do you need to tell us before we start modelling?

We're responsible for funding any modelling and reinforcement work.
We need, though, to spend our customers' money wisely, so we'll only carry out modelling once we're confident that your development will proceed.

To have this confidence, we'll need to know that you **own the land and have either outline or full planning permission**. Please email this information to us as soon as you have it.

If you'd like us to start modelling work ahead of this assurance, we can do this if you agree to underwrite the cost of modelling and design. That means we'll fund the work, but you agree to pay the cost if you don't achieve first occupancy within five years.

I've attached an example of our underwriting agreement. Please call me on the number below if you'd like to discuss this or want to request a copy of the agreement to complete.

If the modelling shows we need to carry out reinforcement work, then before we start construction we'll need you to supply us with notification that you've confirmed your F10 – Notification of construction project - submission to the Health and Safety Executive.

Surface Water

Please note that discharging surface water to the public sewer network should only be considered after all other methods of disposal have been investigated and proven to not be viable. In accordance with the Building Act 2000 Clause H3.3, positive connection to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable. The disposal hierarchy being: 1st Soakaways; 2nd Watercourses; 3rd Sewers.

Only when it can be proven that soakage into the ground or a connection into an adjacent watercourse is not possible would we consider a restricted discharge into the public surface water/combined sewer network.

In considering your surface water needs, we support the use of sustainable drainage on development sites. You'll need to show the local authority and/or lead local flood authority how you've considered the surface water hierarchy that we've included.

If we haven't heard from you by the end of July, we'll contact you, so you can confirm whether you can provide the confidence we need. If so, we'll be able to start modelling if you still need it but we won't do so until you've confirmed that you need it. If you've any further questions, please contact me on 02035779224.

Yours sincerely

L Cooper

Lance Cooper

Thames Water Developer Services

Asset location search

Property Searches

Groundwise Searches Ltd
Suite 8 Chichester House
45Chichester Road
SOUTHEND ON SEA
SS1 2JU

Search address supplied Woking Football Club
Woking
GU22 9PF

Your reference 23397DM

Our reference ALS/ALS Standard/2019_3949961

Search date 8 February 2019

Keeping you up-to-date

Notification of Price Changes

From 1 September 2018 Thames Water Property Searches will be increasing the price of its Asset Location Search in line with RPI at 3.23%.

For further details on the price increase please visit our website: www.thameswater-propertysearches.co.uk
Please note that any orders received with a higher payment prior to the 1 September 2018 will be non-refundable.

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0845 070 9148

Asset location search

Property Searches

Search address supplied: Woking Football Club, Woking, GU22 9PF

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This searchprovides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0845 070 9148, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk
Web: www.thameswater-propertysearches.co.uk

Asset location search

Property Searches

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an ‘as constructed’ record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

With regard to the fresh water supply, this site falls within the boundary of another water company. For more information, please redirect your enquiry to the following address:

Affinity Water Ltd
Tamblin Way
Hatfield
AL10 9EZ
Tel: 0845 7823333

Asset location search

Property Searches

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Asset location search

Thames Water Property Searches

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

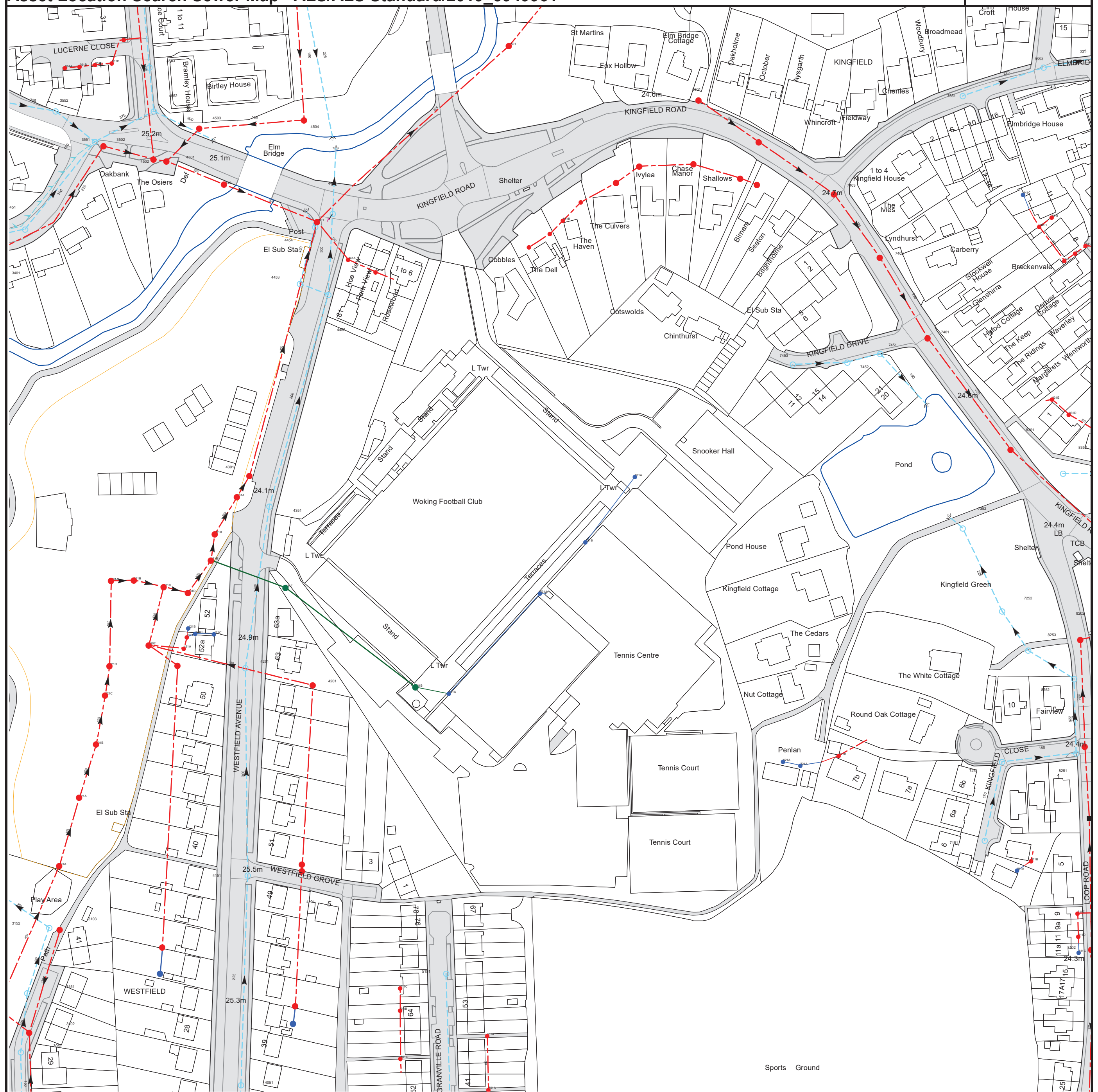
Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2019_3949961



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 500591,157325

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
621A	n/a	n/a
7453	25.11	24.33
721A	n/a	n/a
721B	n/a	n/a
7452	24.98	24.22
7451	24.85	24.15
7402	24.82	23.15
7401	24.66	23.04
7352	24	23.54
7252	24.11	23.55
7251	24.61	24.14
8301	24.49	n/a
8253	24.32	23.6
831E	n/a	n/a
8352	24.24	23.27
841E	n/a	n/a
831D	n/a	n/a
8252	24.57	23.71
8251	24.49	23.81
8202	24.66	n/a
8203	24.43	n/a
831C	n/a	n/a
841F	n/a	n/a
841G	n/a	n/a
841D	n/a	n/a
841I	n/a	n/a
841C	n/a	n/a
7403	24.83	23.26
6405	n/a	n/a
6404	n/a	n/a
6502	n/a	n/a
651A	n/a	n/a
6501	24.57	23.99
7551	n/a	n/a
8553	24.14	22.79
431E	25.526	21.147
421C	n/a	n/a
431B	24.798	21.127
441B	n/a	n/a
431A	24.52	21.12
4301	24.37	21.17
4351	24.31	23.14
431F	n/a	n/a
4453	24.31	22.84
4504	n/a	n/a
4454	n/a	n/a
4401	24.87	21.345
4452	24.29	22.87
4451	24.58	22.72
441A	n/a	n/a
541A	n/a	n/a
5501	24.4	20.81
5401	n/a	n/a
531A	n/a	n/a
5402	n/a	n/a
541B	n/a	n/a
6401	n/a	n/a
631B	n/a	n/a
6402	n/a	n/a
631A	n/a	n/a
6403	n/a	n/a
321B	25.567	21.377
4202	25.73	21.15
421E	n/a	n/a
421D	n/a	n/a
421B	n/a	n/a
431D	25.347	21.175
431C	25.554	21.205
331A	25.963	21.268
331B	25.824	21.247
3451	26.55	24.36
4501	25.27	21.96
4502	25.44	22.05
3502	25.45	22.3
3551	25.46	22.96
4503	25.35	22.68
3552	26.05	n/a
4552	25.45	22.42
351A	n/a	n/a
4553	26.1	23.13
351B	n/a	n/a
351C	n/a	n/a
351D	n/a	n/a
351E	n/a	n/a
3051	21.79	20.74
3151	n/a	n/a
3102	24.76	23.29
3152	22.86	21.6
311A	25.774	21.473
3103	24.62	23.88
8101	24.35	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
811C	n/a	n/a
8102	24.37	23.13
811D	n/a	n/a
811E	n/a	n/a
811A	44.85	44.115
811B	n/a	n/a
7151	24.89	24.41
501A	n/a	n/a
4051	25.53	24.23
511A	n/a	n/a
41ZS	n/a	n/a
511B	n/a	n/a
41ZR	n/a	n/a
511C	n/a	n/a
5151	25.77	24.83
41ZW	n/a	n/a
41ZV	n/a	n/a
4151	25.43	n/a
4101	25.33	23.81
41ZT	n/a	n/a
321A	25.914	21.421
321C	25.643	21.341
521A	n/a	n/a
521B	n/a	n/a
4201	n/a	n/a
4251	24.98	23.4
321D	25.738	21.32
42ZY	n/a	n/a
421A	n/a	n/a

ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

Air Valve

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

Control Valve

Drop Pipe

Ancillary

Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

Outfall

Undefined End

Inlet

Other Symbols

Symbols used on maps which do not fall under other general categories

Public/Private Pumping Station

Change of characteristic indicator (C.O.C.I.)

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

Proposed

Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plans are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole level indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL`s terms and conditions shall apply.
6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800

If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	**BACS Payment**	**Telephone Banking**	**Cheque**
Call **0845 070 9148** quoting your invoice number starting CBA or ADS / OSS	Account number **90478703** Sort code **60-00-01** A remittance advice must be sent to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW.** or email **ps.billing@thameswater.co.uk**	By calling your bank and quoting: Account number **90478703** Sort code **60-00-01** and your invoice number	Made payable to '**Thames Water Utilities Ltd**' Write your Thames Water account number on the back. Send to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW** or by DX to **151280 Slough 13**

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.

Terms and Conditions

Search Code

searchcode

IMPORTANT CONSUMER PROTECTION INFORMATION

This search has been produced by Thames Water Property Searches, Clearwater Court, Vastern Road, Reading RG1 8DB, which is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

The Search Code:

- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom
- sets out minimum standards which firms compiling and selling search reports have to meet
- promotes the best practise and quality standards within the industry for the benefit of consumers and property professionals
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.

By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

The Code's core principles
Firms which subscribe to the Search Code will:

- display the Search Code logo prominently on their search reports
- act with integrity and carry out work with due skill, care and diligence
- at all times maintain adequate and appropriate insurance to protect consumers
- conduct business in an honest, fair and professional manner
- handle complaints speedily and fairly
- ensure that products and services comply with industry registration rules and standards and relevant laws
- monitor their compliance with the Code

Complaints
If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award compensation of up to £5,000 to you if the Ombudsman finds that you have suffered actual loss and/or aggravation, distress or inconvenience as a result of your search provider failing to keep to the code.

Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.

TPOs Contact Details
The Property Ombudsman scheme
Milford House
43-55 Milford Street
Salisbury
Wiltshire SP1 2BP
Tel: 01722 333306
Fax: 01722 332296
Web site: www.tpos.co.uk
Email: admin@tpos.co.uk

You can get more information about the PCCB from www.propertycodes.org.uk

PLEASE ASK YOUR SEARCH PROVIDER IF YOU WOULD LIKE A COPY OF THE SEARCH CODE

Annex 3: Geo-Environmental and Geotechnical Assessment (Ground Investigation) Report

WE LISTEN, WE PLAN, WE DELIVER

Geotechnical Engineering and Environmental Services across the UK.

GEO-ENVIRONMENTAL & GEOTECHNICAL ASSESSMENT (GROUND INVESTIGATION) REPORT

WOKING FOOTBALL CLUB, LAITHWAITE COMMUNITY STADIUM, KINGFIELD ROAD, WOKING, GU22 9AA

JOMAS ASSOCIATES LTD
6-9 The Square, Stockley Park, Uxbridge, UB11 1FW
www.jomasassociates.com 0843-289-2187 info@jomasassociates.com

WE LISTEN, WE PLAN, WE DELIVER

Geotechnical Engineering and Environmental Services across the UK.

Report Title:	**Geo-environmental & Geotechnical Assessment Ground Investigation Report for Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA**
Report Status:	**Final v1.2**
Job No:	**P1381J1460/AMM**
Date:	**21st November 2019**

QUALITY CONTROL – PREVIOUS RELEASE

Version	Date	Issued By
Final v1.1	12th November 2019	AM
Final v1.0	30th April 2019	AM

Prepared by: JOMAS ASSOCIATES LTD **For:** WOKING FOOTBALL CLUB

Prepared by	Reviewed by	Approved by
Shaw Carter BSc (Hons), FGS	Peter Swettenham BSc (Hons) MSc PgCert CEnv MIEnvSc	Suneel Law BSc (Hons), MSc, FGS
Geotechnical Engineer	Principal Geotechnical Engineer	Principal Geo-environmental Engineer
.....	.....	.....

Should you have any queries relating to this report, please contact

JOMAS ASSOCIATES LTD

www.jomasassociates.com

0843 289 2187 info@jomasassociates.com

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Geotechnical Engineering and Environmental Services across the UK.

EXECUTIVE SUMMARY

Woking Football Club commissioned Jomas Associates Ltd to undertake a Geo-environmental and Geotechnical ground investigation at the site Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA

The principle objectives of the study were as follows:

- To determine the nature and where possible, the extent of contaminants potentially present at the site;
- To establish the presence of significant pollutant linkages, in accordance with the procedures set out within the Environment Agency (EA) report R&D CLR11 and relevant guidance within the National Planning Policy Framework (NPPF);
- To assess whether the site is safe and suitable for the purpose for which it is intended, or can be made so by remedial action; and,
- To obtain geotechnical parameters to inform preliminary foundation design.

It should be noted that the table below is an executive summary of the findings of this report and is for briefing purposes only. Reference should be made to the main report for detailed information and analysis.

Site History and Ground Investigation	
Current Site Use	Commercial football ground with other leisure facilities.
Proposed Site Use	Mixed use residential and commercial development comprising residential flats surrounding a new football ground.
Desk Study Overview	A Desk Study report has been produced for the site and issued separately (Jomas, August 2018). A brief overview of the desk study findings is presented below. Reference should be made to the full report for detailed information. A review of earliest available (1871) historical maps indicates that the site comprised undeveloped and/or agricultural land. From the 1934 plan development is noted on site as consisting of a sports ground, including tennis courts towards the south and pavilions. Areas of worked ground are noted on this plan. Residential building development is noted within the northern part of the site in 1966. Large building developments are noted on the plan 1992 comprising a tennis centre, gymnasium and snooker hall. The site vicinity on the earliest available plan comprised predominately undeveloped and/or agricultural land. A large pond is located directly east of site, an inland river is also located towards the north of site. The site vicinity shows consistent building development noted as detached residential buildings. No significant changes to the site vicinity are noted from 1966 to the most recent historical map 2014. A historic landfill site is recorded 41m west of the site. The British Geological Survey indicates that the site is mainly directly underlain by superficial deposits of Kempton Park Gravel Member with deposits of Alluvium reported to encroach over the northern boundary of site. These superficial deposits are underlain by solid deposits of the Bagshot Formation; deposits of the London Clay Formation are reported to encroach onto site along the south eastern boundary. The London Clay Formation underlies the Bagshot Formation. Given the identified site history a thickness of Made Ground should be expected. The superficial deposits directly underlying the site, and the Bagshot Formation are identified as a Secondary A Aquifer. The London Clay Formation is identified as Unproductive.

Site History and Ground Investigation	
	A review of the EnviroInsight Report indicates that there are no source protection zones within 500m of the site. There are no groundwater, surface water or potable water abstractions reported within 1km of the site. The nearest detailed river entry is reported 39m north of the site, identified as How Stream. The nearest surface water entry is located 9m east, identified as a pond. The nearest reported Environment Agency Zone 2 floodplains is reported 16m north of site. The nearest Zone 3 floodplain is located 26m north of site.
Intrusive Investigation	The ground investigation was undertaken on 4th, 5th, 6th, 19th & 20th March 2019, and consisted of the following: • 10No. window sampling boreholes, drilled up to 4.45m below ground level (bgl), with associated in situ testing and sampling; • 4No. cable percussive boreholes, drilled up to 25mbgl, with associated in situ testing and sampling; • California Bearing Ratio tests conducted within 4No. of the boreholes; • Laboratory analysis for chemical and geotechnical purposes; • 4No. return visits to monitor ground gas concentrations and groundwater levels have been completed.
Ground Conditions	The results of the ground investigation revealed a ground profile comprising Made Ground up to 1.4mbgl; overlying Kempton Park Gravel Member up to 4.15mbgl; overlying Bagshot Formation to the base of the deepest borehole at 25.00mbgl. During the investigation groundwater was reported within Window Sample boreholes WS1, WS2, WS6, WS7, WS8, WS9 and WS10 at depths of between 1.1m and 3.0m bgl depth. Groundwater was also reported as being struck at 2.9m and 3.4m bgl within cable percussive boreholes BH3 and BH4 respectively. Groundwater was not reported within the remaining boreholes. During return monitoring groundwater was reported at depths of between 1.21m and 2.59m bgl.
Environmental Considerations	Following generic risk assessments and statistical analysis, elevated concentrations of lead, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(ah)anthracene were detected in soils in excess of generic assessment criteria for the protection of human health within a residential without plant uptake end-use scenario. Asbestos in the form of amosite, chrysotile and crocidolite (both loose fibres and hard/cement type material) was detected in 2No. samples analysed in the laboratory. Any visual asbestos materials may be removed by hand, with extensive dust control measures required during the soil screening operations for the protection of site workers and nearby residents. It should be noted that asbestos fibres will not be visible to the naked eye. Where hardstanding or building cover is provided, no formal remedial measures are considered necessary in terms of human health, as the hard surfacing is considered to effectively encapsulate the made ground.. The remaining communal soft landscaping areas should have the Made Ground replaced with approximately 600mm of imported clean soil, placed on a membrane. Further investigation, soil sampling and assessment, including those areas which have not been accessed for ground investigation purposes, may allow areas requiring encapsulation under clean cover to be zoned and refined.

Site History and Ground Investigation	
	Figure 6 in Appendix 1 shows the areas of site that require investigation and which parts of site can be classed as 'residential without plant uptake' and 'commercial'. A pollutant linkage to human health via vapour inhalation are not considered to exist. A pollutant linkage to controlled waters is not considered to exist. Calculating the Gas Screening Value using results considered to be representative of the site indicate the site should be classified as Characteristic Situation 1. Therefore, no formal gas protection measures are considered necessary. Buildings to have basement car parks built in accordance with Building Regulations (2000), Approved Document F are considered to be sufficiently protected anyway. Material selection for potable water supply pipes should be confirmed with the relevant service provider. A remedial strategy will be required for the proposed development. As with any ground investigation, the presence of further hotspots between sampling points cannot be ruled out. Should any contamination be encountered, a suitably qualified environmental consultant should be informed immediately, so that adequate measures may be recommended.
Geotechnical Considerations	Based on the findings of this investigation, it is considered that traditional strip footings of 1m breadth formed at a depth in the order of 1.5mbgl within the underlying sand and gravel could be designed with an allowable bearing capacity of 80kPa. Alternatively, traditional square pads of 2m by 2m formed at a depth in the order of 2mbgl within the underlying sand and gravel could be designed with an allowable bearing capacity of 100kPa. Basements are proposed under each residential block. It is considered likely that an excavation circa 3m deep would be required to form the basement. In view of the results obtained to date, it is considered that cast in-situ cantilever retaining walls formed at a depth of 3mbgl could be designed with a conservative allowable bearing capacity of 150kPa. Indicative pile capacities are provided in Table 9.2. Where a basement is not proposed, a suspended floor slab is recommended as Made Ground in excess of 600mm thickness has been reported. Where there is to be a basement formed using cantilever retaining walls, a ground bearing floor slab could be used. Subject to seasonal variations, any groundwater or surface water/rainfall ingress encountered during site works could be readily dealt with by conventional pumping from a sump used to collate waters. Groundwater exclusion in the form of sheet piling or secant piled walls could also be an option It is recommended that the stability of all excavations should be assessed during construction. Attention is also drawn to the provisions of the Health and Safety at Work Regulations, which state that the sides of any excavations greater than 1.2m depth, into which personnel are required to enter, should be fully supported or battered back to a safe angle. Based on the results of chemical testing, the required concrete class for Made Ground at the site is DS-2 assuming an Aggressive Chemical Environment for Concrete classification of AC-2 in accordance with the procedures outlined in BRE Special Digest 1. Concrete classes of DS1 and AC-1 can be adopted for natural soils.

Site History and Ground Investigation	
	Interim Advice Note 73/06 Revision 1 Design Guidance for Road Pavement Foundations, suggest that a minimum permitted design CBR of 3.3% is used. Where a subgrade has a lower CBR, it is considered unsuitable support for a pavement foundation. It must therefore be permanently improved.

1 INTRODUCTION

1.1 Terms of Reference

1.1.1 Woking Football Club ("The Client") has commissioned Jomas Associates Ltd, to assess the risk of contamination posed by the ground conditions at a site referred to as Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA and to provide indicative recommendations for foundation design prior to the redevelopment of the site.

1.1.2 To this end a Desk Study has been produced for the site and issued separately (Jomas, August 2018), followed by an intrusive investigation (detailed in this report).

1.1.3 This previous report undertaken for the site by Jomas is detailed in the table below:

Table 1.1: Previous Reports - Jomas

Title	Author	Reference	Date
Desk Study/Preliminary Risk Assessment Report for Woking Football Club, Laithwaite Community Stadium, Kingfield Road, Kingfield, Woking, GU22 9AA	Jomas Associates Ltd	P1381J1460/AM	17 August 2018

1.1.4 The intrusive investigation was undertaken in accordance with Jomas proposal dated 8th February 2019.

1.2 Proposed Development

1.2.1 The proposed development comprises the following:

'Redevelopment of the site, following the demolition of all existing buildings and structures, to provide a replacement stadium with ancillary facilities, including flexible retail, hospitality and community spaces, independent retail floorspace (Classes A1/A2/A3), a medical centre (Class D1) and vehicle parking, plus residential accommodation comprising of 1,048 dwellings (Class C3) within 5 buildings of varying heights of between 3 and 10 storeys (and under croft and part basement levels) on the south and west sides of the site, together with provision of new accesses from Westfield Avenue to car parking, associated landscaping and the provision of a detached residential concierge building.'

1.2.2 A plan of the proposed development is included in Appendix 1.

1.2.3 For the purposes of the contamination risk assessment, the proposed development is classified as 'Residential without plant uptake'.

1.2.4 For the purpose of geotechnical assessment, it is considered that the project could be classified as a Geotechnical Category (GC) 2 site in accordance with BS EN 1997. GC 2 projects are defined as involving:

- Conventional structures.
- Quantitative investigation and analysis.

- Normal risk.
- No difficult soil and site conditions.
- No difficult loading conditions.
- Routine design and construction methods.

1.3 Objectives

1.3.1 The objectives of Jomas' investigation were as follows:

- To conduct an intrusive investigation, to determine the nature and extent of contaminants potentially present at the site;
- To establish the presence of significant pollutant linkages, in accordance with the procedures set out within Part IIA of the Environmental Protection Act 1990, associated statutory guidance and current best practice including the EA report R&D CLR 11; and,
- To obtain geotechnical parameters to inform preliminary foundation design.

1.4 Scope of Works

1.4.1 The following tasks were undertaken to achieve the objectives listed above:

- Intrusive ground investigation to determine shallow ground conditions, and potential for contamination at the site;
- Undertaking of laboratory chemical and geotechnical testing upon samples obtained;
- The compilation of this report, which collects and discusses the above data, and presents an assessment of the site conditions, conclusions and recommendations.

1.5 Limitations

1.5.1 Jomas Associates Ltd has prepared this report for the sole use of Woking Football Club, in accordance with the generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon by any other party without the explicit written agreement of Jomas Associates Limited. No other third party warranty, expressed or implied, is made as to the professional advice included in this report. This report must be used in its entirety.

1.5.2 The records search was limited to information available from public sources; this information is changing continually and frequently incomplete. Unless Jomas Associates Limited has actual knowledge to the contrary, information obtained from public sources or provided to Jomas Associates Limited by site personnel and other information sources, have been assumed to be correct. Jomas Associates Limited does not assume any liability for the misinterpretation of information or for items not visible, accessible or present on the subject property at the time of this study.

1.5.3 Whilst every effort has been made to ensure the accuracy of the data supplied, and any analysis derived from it, there may be conditions at the site that have not been disclosed by the investigation, and could not therefore be taken into account. As with any site, there may be differences in soil conditions between exploratory hole positions. Furthermore, it should be noted that groundwater conditions may vary due to seasonal and other effects and may at times be significantly different from those measured by the investigation. No liability can be accepted for any such variations in these conditions.

1.5.4 Any reports provided to Jomas Associates Limited have been reviewed in good faith. Jomas Associates Limited cannot be held liable for any errors or omissions in these reports, or for any incorrect interpretation contained within them.

1.5.5 This investigation and report has been carried out in accordance with the relevant standards and guidance in place at the time of the works. Future changes to these may require a re-assessment of the recommendations made within this report.

1.5.6 ***This report is not an engineering design and the figures and calculations contained in the report should be used by the Structural Engineer, taking note that variations may apply, depending on variations in design loading, in techniques used, and in site conditions. Our recommendations should therefore not supersede the Engineer's design.***

2 SITE SETTING

2.1 Site Information

2.1.1 The site location plan is appended to this report in Appendix 1.

Table 2.1: Site Information

Name of Site	Woking Football Club
Address of Site	Laithwaite Community Stadium Kingfield Road Kingfield Woking GU22 9AA
Approx. National Grid Ref.	500569 157301
Site Area (Approx)	5ha
Site Occupation	Mixed commercial and residential
Local Authority	Woking Borough Council

2.2 Desk Study Overview

2.2.1 A Desk Study report has been produced for the site and issued separately (Jomas, August 2018). A brief overview of the desk study findings is presented below. Reference should be made to the full report for detailed information.

2.2.2 A review of earliest available (1871) historical maps indicates that the site comprised undeveloped and/or agricultural land. From the 1934 plan development is noted on site as consisting of a sports ground, including a tennis courts and pavilions towards the south. Areas of worked ground are noted on this plan. Residential building development is noted within the northern part of the site in 1966. Large building developments are noted on the plan 1992 comprising a tennis centre, gymnasium and snooker hall.

2.2.3 The site vicinity on the earliest available plan comprised predominately undeveloped and/or agricultural land. A large pond is located directly east of site, an inland river is also located towards the north of site. The site vicinity shows consistent building development noted as detached residential buildings. No significant changes to the site vicinity are noted from 1966 to the most recent historical map 2014.

2.2.4 A historic landfill site is recorded 41m west of the site.

2.2.5 Information provided by the British Geological Survey indicates that the site is directly underlain by superficial deposits of Kempton Park Gravel Member with deposits of alluvium reported to encroach over the northern boundary of site. These superficial deposits are underlain by solid deposits of the Bagshot Formation; deposits of the London Clay Formation are reported to encroach onto site along the south eastern boundary. The London Clay Formation underlies the Bagshot Formation.

2.2.6 Given the identified site history a thickness of Made Ground should be expected.

2.2.7 The superficial deposits directly underlying the site, and the Bagshot Formation are identified as a Secondary A Aquifer. The London Clay Formation is identified as Unproductive.

2.2.8 A review of the EnviroInsight Report indicates that there are no source protection zones within 500m of the site.

2.2.9 There are no groundwater, surface water or potable water abstractions reported within 1km of the site.

2.2.10 The nearest detailed river entry is reported 39m north of the site, identified as How Stream. The nearest surface water entry is located 9m east, identified as a pond.

2.2.11 The nearest reported Environment Agency Zone 2 floodplains is reported 16m north of site. The nearest Zone 3 floodplain is located 26m north of site.

2.2.12 It was recommended that an intrusive investigation be undertaken to clarify potential risks to the identified receptors. The investigation should assess the thickness of any made ground, and allow samples of made ground and natural soils to be taken for laboratory analysis.

2.2.13 It was also recommended that in accordance with BS 5930 (2015) the preliminary investigation should be combined with the geotechnical investigation.

2.2.14 Due to the presence of a historic landfill 41m west of site, soil gas monitoring was recommended.

2.2.15 The conceptual site model is reproduced in Table 2.2 overleaf.

Table 2.2: Preliminary Risk Assessment for the Site

Sources	Pathways (P)	Receptors	Consequence of Impact	Probability of Impact	Risk Estimation	Hazard Assessment
• Potential for Made Ground associated with previous development operations – on site (S1) • Potential asbestos containing materials within existing buildings – on site (S2) • Potential ground gas generation from nearby landfill site (S3)	• Ingestion and dermal contact with contaminated soil (P1) • Inhalation or contact with potentially contaminated dust and vapours (P2) • Permeation of water pipes and attack on concrete foundations by aggressive soil conditions (P6)	• Construction workers (R1) • Maintenance workers (R2) • Neighbouring site users (R3) • Future site users (R4) • Building foundations and on site buried services (water mains, electricity and sewer) (R5)	Medium	Low	Moderate	GI – Ground Investigation
			Severe for Asbestos	Low	Moderate	
	• Accumulation and migration of soil gases (P5)		Severe	Low	Moderate	
	• Leaching through permeable soils, migration within the vadose zone (i.e., unsaturated soil above the water table) and/or lateral migration within surface water, as a result of cracked hardstanding or via service pipe/corridors and surface water runoff. (P3) • Horizontal and vertical migration of contaminants within groundwater (P4)	• Neighbouring site users (R3) • Building foundations and on site buried services (water mains, electricity and sewer) (R5) • Controlled waters - secondary (A) aquifer (R6) • Surface water – pond located east of site, Hoe Stream 39m north (R7)	Medium	Unlikely	Low	

3 GROUND INVESTIGATION

3.1 Rationale for Ground Investigation

3.1.1 The site investigation has been undertaken generally in accordance with Contaminated Land Report 11, BS10175, NHBC Standards Chapter 4.1, and other associated Statutory Guidance. If required, further targeted investigations and remedial option appraisal would be dependent on the findings of this site investigation.

3.1.2 The soil sampling rationale for the site investigation was developed with reference to EA guidance 'Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination' (Technical Report P5-066/TR).

3.1.3 The sampling proposal was designed in order to gather data representative of the site conditions.

3.2 Scope of Ground Investigation

3.2.1 The ground investigation was undertaken on 4th, 5th, 6th, 19th & 20th March 2019.

3.2.2 The work was undertaken in accordance with BS5930 'Code of Practice for Site Investigation' and BS10175 'Investigation of Potentially Contaminated Sites'. All works were completed without incident.

3.2.3 The investigation focused on collecting data on the following:

- Quality of Made Ground/ natural ground within the site boundaries;
- Presence of groundwater beneath the site (if any), perched or otherwise;
- Determination of the presence or absence of hazardous ground gases;
- Obtaining geotechnical parameters to allow initial design to take place.

3.2.4 A summary of the fieldwork carried out at the site, with justifications for exploratory hole positions, are offered in Table 3.1 below.

Table 3.1: Scope of Intrusive Investigation

Investigation Type	Number of Exploratory Holes Achieved	Exploratory Hole Designation	Depth Achieved (m BGL)	Justification
Window Sample Boreholes	10	WS1 – WS10	Up to 4.45mbgl	Obtain shallow samples for laboratory contamination and geotechnical testing. To allow in-situ geotechnical testing. WS7 was positioned to target a former ground working feature.
Cable Percussion Boreholes	4	BH1 – BH4	Up to 25.00mbgl	Obtain deeper samples for laboratory contamination and geotechnical testing.

Investigation Type	Number of Exploratory Holes Achieved	Exploratory Hole Designation	Depth Achieved (m BGL)	Justification
				To allow in-situ geotechnical testing.
Monitoring Wells	6	BH1, BH2, BH3, WS2, WS7, WS10	Up to 5.00mbgl	Combined soil gas and groundwater monitoring wells, targeted response zones within sand deposits.
California Bearing Ratio Tests	4	CBR1, CBR5, CBR6, CBR8	Up to 1.00mbgl	To inform roadway design.

3.2.5 The exploratory holes were completed to allow soil samples to be taken in the areas of interest identified in Table 3.1 above. In all cases, all holes were logged in accordance with BS5930:2015.

3.2.6 Exploratory hole positions were located approximately with reference to known features on site as shown in the exploratory hole location plan presented in Appendix 1. The exploratory hole records are included in Appendix 2.

3.2.7 Where monitoring well installations were not installed, the exploratory holes were backfilled with the arisings (in the reverse order in which they were drilled) and the ground surface was reinstated so that no depression was left.

3.3 In-situ Geotechnical Testing

3.3.1 In-situ geotechnical testing included Standard Penetration Tests. The determined 'N' values have been used to determine the relative density of granular materials and have been used with standard correlations to infer various other derived geotechnical parameters including the undrained shear strength of the cohesive strata. The results of the individual tests are on the appropriate exploratory hole logs in Appendix 2.

3.3.2 In-situ California Bearing Ratio (CBRs) were determined across the site using the dynamic probe methodology using a Perth Penetrometer Probe and the methodology laid out in IAN 73/06. Copies of the results and calculations are provided in Appendix 6.

3.4 Sampling Rationale

3.4.1 Our soil sampling rationale for the site investigation was developed with reference to EA guidance 'Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination' (Technical Report P5-066/TR).

3.4.2 The exploratory holes were positioned by applying a combined non-targeted sampling strategy, as well as sample locations positioned with reference to sources identified from the desk study.

3.4.3 Soil samples were taken from across the site at various depths as shown in the exploratory hole logs.

3.4.4 Jomas Associates Limited's engineers normally collect samples at appropriate depths based on field observations such as:

- appearance, colour and odour of the strata and other materials, and changes in these;
- the presence or otherwise of sub-surface features such as pipework, tanks, foundations and walls; and,
- areas of obvious damage, e.g. to the building fabric.

3.4.5 A number of the samples were taken from the top 0-1m to aid in the assessment of the pollutant linkages identified at the site. In addition, some deeper samples were taken to aid in the interpretation of fate and transport of any contamination identified.

3.4.6 Soil samples were taken from across the site at various depths as shown in the exploratory hole logs (copies of which are provided in Appendix 2). The methodology used and type of samples taken were chosen to allow the Sampling category to be A or B according to EN ISO 22475-1. This in turn allows suitable geotechnical testing to be carried out.

3.4.7 Groundwater strikes noted during drilling, are recorded within the exploratory hole records in Appendix 2.

3.4.8 Samples were stored in cool boxes (<4°C) and preserved in accordance with laboratory guidance.

3.5 Sampling Limitations

3.5.1 A large part of the site could not be accessed for the investigation. This was due to the eastern part of site being occupied by an active leisure centre which the tenants did not allow access for intrusive works. The centre of site is occupied by an in-use football stadium and therefore could not be accessed for intrusive works.

3.5.2 WS4 was terminated at 0.50mbgl to the presence of a suspected buried service.

3.5.3 The remaining windowless sampler boreholes refused on very dense sand and gravel between depths of 2.45m and 4.45m bgl.

3.5.4 The cable percussive boreholes were drilled to their proposed depths at their proposed locations.

3.6 Laboratory Analysis

3.6.1 A programme of laboratory testing, scheduled by Jomas Associates Limited, was carried out on selected samples of Made Ground and natural strata.

<u>Chemical Testing</u>

3.6.2 Soil samples were submitted to i2 Analytical (a UKAS and MCerts accredited laboratory), for analysis.

3.6.3 The samples were analysed for a wide range of contaminants as shown in Table 3.2 below:

Table 3.2: Chemical Tests Scheduled

Test Suite	No. of tests	
	Made Ground / Topsoil	Natural
Basic Suite S3	11	0
Total Organic Carbon	8	0
Asbestos Screen & ID	12	0
Hydrocarbon Suite	5	0
Basic Suite S5	5	0
Water Soluble Sulphate	16*	8

**Tested for as part of Basic Suites S3 and S5*

3.6.4 The determinands contained in the Basic Suite S3 are as detailed in Table 3.3 below:

Table 3.3: Basic Suite of Determinands

DETERMINAND	LIMIT OF DETECTION (mg/kg)	UKAS ACCREDITATION	TECHNIQUE
Arsenic	1	Y (MCERTS)	ICPMS
Cadmium	0.2	Y (MCERTS)	ICPMS
Chromium	1	Y (MCERTS)	ICPMS
Chromium (Hexavalent)	4	Y (MCERTS)	Colorimetry
Lead	1	Y (MCERTS)	ICPMS
Mercury	0.3	Y (MCERTS)	ICPMS
Nickel	1	Y (MCERTS)	ICPMS
Selenium	1	Y (MCERTS)	ICPMS
Copper	1	Y (MCERTS)	ICPMS
Zinc	1	Y (MCERTS)	ICPMS
Boron (Water Soluble)	0.2	Y (MCERTS)	ICPMS
pH Value	0.1 units	Y (MCERTS)	Electrometric
Sulphate (Water Soluble)	0.0125g/l	Y (MCERTS)	Ion Chromatography
Total Cyanide	1	Y (MCERTS)	Colorimetry
Speciated/Total PAH	0.05/0.80	Y (MCERTS)	GCFID
Phenols	1	Y (MCERTS)	HPLC
Total Petroleum Hydrocarbons (banded)	-	N Y (MCERTS)	Gas Chromatography

3.6.5 To support the selection of appropriate tier 1 screening values, 8No. samples were analysed for total organic carbon.

3.6.6 Laboratory test results are summarised in Section 6, with raw laboratory data included in Appendix 3.

Geotechnical Laboratory Testing

3.6.7 In addition to the contamination assessment, soil samples were submitted to the UKAS Accredited laboratory of i2 Analytical Ltd. for a series of analyses.

3.6.8 This testing was specifically designed to:

- to classify the samples; and
- to obtain parameters (either directly or sufficient to allow relevant correlations to be used) relevant to the technical objectives of the investigation.

3.6.9 The following laboratory geotechnical testing (as summarised in Table 3.4) was carried out:

Table 3.4 Laboratory Geotechnical Analysis

BS 1377 (1990) Test Number	Test Description	Number of tests
Part 2		
9.2 and 9.3	Particle Size Distribution - Sieving	15

3.6.10 The water soluble sulphate and pH results obtained as part of the chemical analysis was used in combination with BRE Special Digest 1 to allow buried concrete to be classified.

3.6.11 The results of the geotechnical laboratory testing are presented as Appendix 4 and discussed in Section 9 of this report.

4 GROUND CONDITIONS

4.1 Soil

4.1.1 Ground conditions were logged in accordance with the requirements of BS5930:2015. Detailed exploratory hole logs are provided in Appendix 2. The ground conditions encountered are summarised in Table 4.1 below, based on the strata observed during the investigation.

Table 4.1: Ground Conditions Encountered

Stratum and Description	Encountered from (m bgl)	Base of strata (m bgl)	Thickness range (m)
Asphalt. (MADE GROUND)	0.0	0.05 – 0.20	0.05 – 0.20
Brown sandy gravelly clay with rootlets. Sand is fine. Gravel consists of flint, concrete, brick and asphalt fragments. (MADE GROUND – Topsoil) Encountered in WS4 and WS5 only	0.0	0.30 – 0.50	0.30 – 0.50
Black to brown slightly clayey sandy gravel. Sand is fine to medium. Gravel consists of flint, brick, concrete, asphalt, glass and ceramic fragments. (MADE GROUND)	0.05 – 0.30	0.30 – 1.10	0.18 – 1.15
Black to brown clayey gravelly sand. Sand is medium. Gravel consists of fine to coarse flint and asphalt fragments. (MADE GROUND)	0.30 – 1.10	0.70 – 1.40	0.25 – 0.90
Loose to very dense orange to grey silty clayey very gravelly SAND. Sand is fine. Gravel consists of flint. (KEMPTON PARK GRAVEL)	0.30 – 1.40	2.00 – 4.15	0.70 – 3.20
Medium to very dense grey silty SAND. Sand is medium to coarse. (BAGSHOT FORMATION)	2.00 – 3.60	3.75 – 25.00	0.85 – 22.30

4.1.2 Given the likely ground strata profile identified in the Desk Study and the BGS descriptions of the materials given in Section 3 of the Desk Study it is considered that the encountered strata represents Made Ground up to 1.4mbgl; overlying Kempton Park Gravel Member up to 4.15mbgl; overlying Bagshot Formation to the base of the deepest borehole at 25.00mbgl.

4.1.3 Given the BGS descriptions given for the strata, it has been difficult to differentiate the Kempton Park Gravel Member and Bagshot Formation.

4.1.4 No materials considered to represent the Alluvium or London Clay Formation that was noted in Section 3 of the Desk Study as likely to lie beneath the site were encountered.

4.2 Hydrogeology

4.2.1 Groundwater strikes and groundwater monitoring are summarised below.

Table 4.2: Groundwater Strikes During Drilling

Exploratory Hole ID	Depth Encountered (mbgl)	Depth After 20mins (mbgl)	Stratum
WS1	3.0	-	Bagshot Formation
WS2	3.0	-	Kempton Park Gravel Member
WS3	-	-	-
WS4	-	-	-
WS5	-	-	-
WS6	2.1	-	Kempton Park Gravel Member
WS7	2.7	-	Kempton Park Gravel Member
WS8	1.1	1.6	Kempton Park Gravel Member
WS9	1.5	-	Kempton Park Gravel Member
WS10	3.0	-	Bagshot Formation
BH1	-	-	-
BH2	-	-	-
BH3	2.9	2.7	Bagshot Formation
BH4	3.4	2.9	Bagshot Formation

4.2.2 4No. return groundwater monitoring visits were undertaken between 14th March and 2nd April 2019. The results are summarised below.

Table 4.3: Groundwater Monitoring Records

Exploratory Hole ID	Depth Encountered (m bgl)	Depth to Base of Well (m bgl)	Strata targeted by response zone
WS2	2.45 - 2.59	3.04 - 3.06	Made Ground Kempton Park Gravel Member
WS7	1.81 - 2.28	3.04 - 3.07	Made Ground Kempton Park Gravel Member
WS10	1.69 - 1.95	2.87 - 2.95	Kempton Park Gravel Member Bagshot Formation
BH1	1.75 - 2.07	4.87 - 4.97	Made Ground Kempton Park Gravel Member Bagshot Formation
BH2	1.82 - 2.07	3.10 - 3.15	Bagshot Formation
BH3	1.21 - 1.49	4.52 - 4.54	Kempton Park Gravel Member Bagshot Formation
HBH2	2.45 - 2.59	3.04 - 3.06	Unknown
HBH4	1.81 - 2.28	3.04 - 3.07	Unknown

4.2.3 The water encountered generally decreased slightly on each monitoring visit. This is likely a result in the change in volume of rainfall through March to April.

4.2.4 HBH2 and HBH4 are both historic boreholes. Jomas has not been provided with the logs or any testing for these holes. Consequently, the installation details are not known and the strata within which the standing water was observed cannot be accurately determined. However, given the depths of the recorded groundwater levels it is considered likely to be as per the other locations.

4.3 Physical and Olfactory Evidence of Contamination

4.3.1 Asphalt was reported in the Made Ground of WS1, WS2, WS3, WS4, WS6, WS7, WS8, WS9 and WS10.

4.3.2 Ash was reported in the Made Ground of WS2.

5 RISK ASSESSMENT – ANALYTICAL FRAMEWORK

5.1 Context and Objectives

5.1.1 This section seeks to evaluate the level of risk pertaining to human health and the environment which may result from both the existing use and proposed future use of the site. It makes use of the site investigation findings, as described in the previous sections, to evaluate further the potential pollutant linkages identified in the desk study. A combination of qualitative and quantitative techniques is used, as described below.

5.1.2 The purpose of generic quantitative risk assessment is to compare concentrations of contaminants found on site against screening level generic assessment criteria (GAC) to establish whether there are actual or potential unacceptable risks. It also determines whether further detailed assessment is required. The approaches detailed all broadly fit within a tiered assessment structure in line with the framework set out in the Department of Environment, Food and Rural Affairs (DEFRA), EA and Institute for Environment and Health Publication, Guidelines for Environmental Risk Assessment and Management.

5.1.3 It should be noted that the statistical tests carried out in this report in accordance with CL:AIRE and CIEH (2008) recommendations, are for guidance purposes only and the conclusions of this report should be approved by the local authority prior to any redevelopment works being undertaken.

5.2 Analytical Framework – Soils

5.2.1 There is no single methodology that covers all the various aspects of the assessment of potentially contaminated land and groundwater. Therefore, the analytical framework adopted for this investigation is made up of a number of procedures, which are outlined below. All of these are based on a Risk Assessment methodology centred on the identification and analysis of Source – Pathway – Receptor linkages.

5.2.2 The CLEA model provides a methodology for quantitative assessment of the long term risks posed to human health by exposure to contaminated soils. Toxicological data have been used to calculate Soil Guideline Values (SGV) for individual contaminants, based on the proposed site use; these represent minimal risk concentrations and may be used as screening values.

5.2.3 In the absence of any published SGVs for certain substances, or where the assumptions made in generating the SGVs do not apply to the site, Jomas Associates Limited have obtained Tier 1 screening values for initial assessment of the soil, based on available current UK guidance including the LQM/CIEH S4ULs and DEFRA C4SL. Site-specific assessments are undertaken wherever possible and/or applicable. All assessments are carried out in accordance with the CLEA protocol.

5.2.4 CLEA requires a statistical treatment of the test results to take into account the normal variations in concentration of potential contaminants in the soil and allow comparisons to be made with published guidance.

5.2.5 The assessment criteria used for the screening of determinands within soils are identified within Table 5.1.

Table 5.1: Selected Assessment Criteria – Contaminants in Soils

Substance Group	Determinand(s)	Assessment Criteria Selected
Organic Substances		
Non-halogenated Hydrocarbons	Total Petroleum Hydrocarbons (TPHCWG banded)	S4UL
	Total Phenols	S4UL
Polycyclic Aromatic Hydrocarbons (PAH-16)	Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenzo(a,h)anthracene, Benzo(ghi)perylene	S4UL
Volatile Organic Compounds (VOCs/sVOCs).	Toluene, Ethylbenzene, Benzene, Xylenes	S4UL
Inorganic Substances		
Heavy Metals and Metalloids	Arsenic, Cadmium, Chromium, Lead, Mercury, Nickel, Selenium, Copper, Zinc	S4UL
	Copper, Zinc, Nickel	BS: 3882 (2015).
Cyanides	Free Cyanide	CLEA v1.06
Sulphates	Water Soluble Sulphate	BRE Special Digest 1:2005

5.2.6 As the published reports only offer the option of selecting a SOM value of 1%, 2.5% or 6%, a SOM value of 1% has been used for the selection of generic assessment criteria, as 1.225% was the mean value obtained from laboratory analysis.

5.2.7 It is understood that the site is to be redeveloped to provide residential units with associated communal soft landscaping. As a result, the site has been assessed with regards to a residential without plant uptake end use scenario.

5.3 BRE

5.3.1 The BRE Special Digest 1:2005, 'Concrete in Aggressive Ground' is used with soluble sulphate and pH results to assess the aggressive chemical environment of future underground concrete structures at the site.

6 GENERIC QUANTITATIVE RISK ASSESSMENT

6.1 Screening of Soil Chemical Analysis Results – Human Health Risk Assessment

6.1.1 Laboratory analysis for soils are summarised in Tables 6.1 to 6.3. Raw laboratory data is included in Appendix 3.

Table 6.1: Soil Laboratory Analysis Results – Metals, Metalloids, Phenol, Cyanide

Determinand	Unit	No. samples tested	Screening Criteria		Min	Max	No. Exceeding
Arsenic	mg/kg	16	S4UL	40	5.0	40	0
Cadmium	mg/kg	16	S4UL	85	<0.2	1.4	0
Chromium	mg/kg	16	S4UL	910	7.3	23	0
Lead	mg/kg	16	C4SL	310	9.3	930	1No exceedance: WS1 (0.50m)
Mercury	mg/kg	16	S4UL	56	<0.3	3.0	0
Nickel	mg/kg	16	S4UL	180	3.7	33	0
Copper	mg/kg	16	S4UL	7100	7.3	140	0
Zinc	mg/kg	16	S4UL	40000	18	380	0
Total Cyanide [A]	mg/kg	16	CLEA v 1.06	33	<1	<1	0
Selenium	mg/kg	16	S4UL	430	<1.0	<1.0	0
Boron Water Soluble	mg/kg	16	S4UL	11000	0.3	11	0
Phenols	mg/kg	16	S4UL	440	<1.0	<1.0	0

Notes: [A] Generic assessment criteria derived for free inorganic cyanide.

Table 6.2: Soil Laboratory Analysis Results – Polycyclic Aromatic Hydrocarbons (PAHs)

Determinand	Unit	No. Samples Tested	Screening Criteria		Min	Max	No. Exceeding
Naphthalene	mg/kg	16	S4UL	2.3	<0.05	<0.05	0
Acenaphthylene	mg/kg	16	S4UL	2900	<0.05	0.77	0
Acenaphthene	mg/kg	16	S4UL	3000	<0.05	2.1	0
Fluorene	mg/kg	16	S4UL	2800	<0.05	1.8	0
Phenanthrene	mg/kg	16	S4UL	1300	<0.05	33	0
Anthracene	mg/kg	16	S4UL	2300	<0.05	10	0
Fluoranthene	mg/kg	16	S4UL	1500	<0.05	45	0
Pyrene	mg/kg	16	S4UL	3700	<0.05	37	0
Benzo(a)anthracene	mg/kg	16	S4UL	11	<0.05	21	1No exceedance: WS2 (0.50m)

Determinand	Unit	No. Samples Tested	Screening Criteria		Min	Max	No. Exceeding
Chrysene	mg/kg	16	S4UL	30	<0.05	17	0
Benzo(b)fluoranthene	mg/kg	16	S4UL	3.9	<0.05	21	1No exceedance: WS2 (0.50m)
Benzo(k)fluoranthene	mg/kg	16	S4UL	110	<0.05	8.7	0
Benzo(a)pyrene	mg/kg	16	S4UL	3.2	<0.05	18	1No exceedance: WS2 (0.50m)
Indeno(123-cd)pyrene	mg/kg	16	S4UL	45	<0.05	7.9	0
Dibenzo(ah)anthracene	mg/kg	16	S4UL	0.31	<0.05	2.6	3No exceedances: WS1 (0.50m) WS2 (0.50m) WS9 (0.20m)
Benzo(ghi)perylene	mg/kg	16	S4UL	360	<0.05	9.0	0
Total PAH	mg/kg	16	-	-	<0.80	234	-

Table 6.3: Soil Laboratory Analysis Results – Total Petroleum Hydrocarbons (TPH)

TPH Band	Unit	No. Samples Tested	Screening Criteria		Min	Max	No. Exceeding
C_8-C_{10}	mg/kg	11	S4UL	27	<0.1	<0.1	0
>C_{10}-C_{12}	mg/kg	11	S4UL	130	<2.0	<2.0	0
>C_{12}-C_{16}	mg/kg	11	S4UL	1100	<4.0	20	0
>C_{16}-C_{21}	mg/kg	11	S4UL	1900	<1.0	270	0
>C_{21}-C_{35}	mg/kg	11	S4UL	1900	<10	1200	0
Total TPH	mg/kg	11	-	-	<17.1	1490.1	-

Note: *The lower value of guidelines for Aromatic/Aliphatics has been selected

Table 6.4: Soil Laboratory Analysis Results – Total Petroleum Hydrocarbons (TPHCWG)

TPH Band	Unit	No. Samples Tested	Screening Criteria		Min	Max	No. Exceeding
>C_5-C_6 Aliphatic	mg/kg	5	S4UL	42	<0.001	<0.001	0
>C_6-C_8 Aliphatic	mg/kg	5	S4UL	100	<0.001	<0.001	0
>C_8-C_{10} Aliphatic	mg/kg	5	S4UL	27	<0.001	<0.001	0
>C_{10}-C_{12} Aliphatic	mg/kg	5	S4UL	130	<1.0	<1.0	0
>C_{12}-C_{16} Aliphatic	mg/kg	5	S4UL	1100	<2.0	<2.0	0
>C_{16}-C_{35} Aliphatic	mg/kg	5	S4UL	65000	<16.0	20	0
>C_5-C_7 Aromatic	mg/kg	5	S4UL	370	<0.001	<0.001	0

TPH Band	Unit	No. Samples Tested	Screening Criteria		Min	Max	No. Exceeding
>C_7-C_8 Aromatic	mg/kg	5	S4UL	860	<0.001	<0.001	0
>C_8-C_{10} Aromatic	mg/kg	5	S4UL	47	<0.001	<0.001	0
>C_{10}-C_{12} Aromatic	mg/kg	5	S4UL	250	<1.0	<1.0	0
>C_{12}-C_{16} Aromatic	mg/kg	5	S4UL	1800	<2.0	<2.0	0
>C_{16}-C_{21} Aromatic	mg/kg	5	S4UL	1900	<10	<10	0
>C_{21}-C_{35} Aromatic	mg/kg	5	S4UL	1900	<10	20	0
Total TPH (Ali/Aro)	mg/kg	5	-	-	<20	37	-

6.2 Volatile Organic Compounds

6.2.1 In addition to the suites outlined previously, 5No samples were tested for the presence of volatile organic compounds including BTEX compounds (benzene, toluene, ethylbenzene, xylene).

6.2.2 No VOCs were reported above the laboratory detection limit within any tested sample.

6.3 Vapour Risk Assessment from a Soil Source

6.3.1 As outlined in Table 6.2, a number of polyaromatic hydrocarbons have been found in excess of their generic screening criteria for the protection of human health within a 'residential without plant uptake' end-use scenario. The generic screening criteria considers all possible pathways between the source and the receptor. In order to assess potential risks from inhalation of vapour, each organic compound that has been found in excess of its GAC will be assessed in terms of the contribution to total exposure from vapour inhalation inside a structure as reported within the LQM/CIEH S4UL document. Where a significant proportion of the total exposure is reported from vapour inhalation, there could be a potential risk from vapour inhalation.

Table 6.5: Soil Laboratory Analysis Results – Contribution to Total Exposure from Vapour Inhalation (Indoor)

Compound	Contribution of Vapour Inhalation to Total Exposure (%)	Screening Criteria (mg/kg)	Maximum recorded value (mg/kg)	Potential Vapour Risk?
Benzo(b)fluoranthene	<0.1	3.9	21	X
Benzo(a)pyrene	0.0	3.2	18	X
Dibenzo(ah)anthracene	<0.1	0.31	2.6	X

6.3.2 As shown in the table above, all of the PAHs detected in soils in excess of generic assessment criteria have a negligible contribution to total exposure via inhalation pathway (less or equal to 0.1%).

6.3.3 Therefore, it is considered that there is a negligible risk to end users of the proposed development associated with vapour risk inhalation from soils.

6.4 Asbestos in Soil

6.4.1 12No samples of the Made Ground were screened in the laboratory for the presence of asbestos. The analysis is summarised below in Table 6.6 below

Table 6.6: Asbestos Analysis – Summary

Sample	Screening result.	Quantification result (%)	Comments
WS1 (0.50m)	None Detected	N/A	N/A
WS2 (0.50m)	None Detected	N/A	N/A
WS3 (0.40m)	Detected	<0.001	Amosite (Loose fibres)
WS4 (0.25m)	None Detected	N/A	N/A
WS5 (0.25m)	None Detected	N/A	N/A
WS6 (0.30m)	None Detected	N/A	N/A
WS7 (0.50m)	None Detected	N/A	N/A
WS7 (1.00m)	None Detected	N/A	N/A
WS8 (0.30m)	None Detected	N/A	N/A
WS9 (0.20m)	None Detected	N/A	N/A
WS10 (0.25m)	None Detected	N/A	N/A
BH1 (0.20m)	Detected	0.013	Chrysotile and Crocidolite (Hard/Cement Type Material and Loose Fibres)

6.4.2 The results reported an asbestos content of below 0.1%, the fibre content at which arisings are considered hazardous for the purpose of disposal.

6.4.3 It should be noted that for the purposes of human health assessment there is no level of asbestos below which it is deemed the materials are considered suitable for use without risk mitigation.

6.5 Controlled Groundwater Risk Assessment

6.5.1 As outlined in the Table 6.2 above, a number of polyaromatic hydrocarbons have been found in excess of their generic screening criteria for the protection of human health within a 'residential without plant uptake' end-use scenario. The generic screening criteria considers all possible pathways between the source and the receptor.

6.5.2 The only PAHs with stated "moderate" or "high" mobility rankings in groundwater (as per CL:AIRE, 2017) are naphthalene, acenaphthylene, and acenaphthene. Of these compounds, only naphthalene has a statutory water quality standard. As naphthalene was not found to exceed its screening criteria, the levels of PAHs in water are not considered to pose a risk to sensitive receptors.

6.5.3 Furthermore, given that the site does not lie within a Source Protection Zone, and there are no potable, ground water or surface water abstractions within 1km of the site, a pollutant linkage is not considered to exist in this regard.

6.5.4 Although the Hoe Stream is located 39m north of the site, given the levels of contaminants detected in soils, and the lack of evidence of any potentially mobile contamination, a pollutant linkage is not considered to exist with regards this receptor.

6.6 Screening of Soil Chemical Analysis Results – Potential Risks to Plant Growth

6.6.1 Zinc, copper and nickel are phytotoxins and could therefore inhibit plant growth in soft landscaped areas. Concentrations measured in soil for these determinands have been compared with the pH dependent values given in BS: 3882 (2015).

6.6.2 Adopting a pH value of greater than 7, as indicated by the results of the laboratory analysis, the following is noted;

Table 6.7: Soil Laboratory Analysis Results – Phytotoxic Determinands

Determinand	Threshold level (mg/kg)	Min (mg/kg)	Max (mg/kg)	No. Exceeding
Zinc	300	18	380	1No exceedance: WS1 (0.50m)
Copper	200	7.3	140	0
Nickel	110	3.7	33	0

6.7 Screening for Water Pipes

6.7.1 The results of the analysis have been assessed for potential impact upon water supply pipes. Table 6.8 below summarises the findings of the assessment:

Table 6.8: Screening Guide for Water Pipes

Determinand	No. of tests	Threshold adopted for PE (mg/kg)	Value for site data (mg/kg)		No of Exceedances
			Min	Max	
Total VOCs	5	0.5	<0.056*	<0.056*	0
BTEX	5	0.1	<0.005*	<0.005*	0
MTBE	5	0.1	<0.001*	<0.001*	0
EC5-EC10	16	1	<0.006*	<0.1*	0
EC10-EC16	16	10	<6.0*	22.0	1No exceedance: WS2 (0.50m)
EC16-EC40	16	500	<11.0*	1470	4No exceedances: WS2 (0.50m) WS3 (0.40m) WS6 (0.30m) WS9 (0.20m)
Naphthalene	16	5	<0.05*	<0.05*	0
Phenols	16	2	<1.0*	<1.0*	0

*Laboratory detection limit

6.7.3 The above suggests that upgraded pipe work may be required.

6.7.4 Alternatively, it may be possible to utilise other protection methods including (but not limited to):

- diversion of the pipe,
- localised remediation
- embedding the pipe in a sufficient thickness of clean granular material

6.7.5 The water supply pipe requirements for this site should be discussed at an early stage with the relevant Utility provider.

6.8 Waste Disposal

6.8.1 The classification of materials for waste disposal purposes was outside the scope of this report. Should quantities of material require off-site disposal, Waste Acceptance Criteria testing will be required.

7 SOIL GAS RISK ASSESSMENT

7.1 Soil Gas Results

7.1.1 Four return monitoring visits have been undertaken from 14th March to 2nd April 2019, to monitor wells installed within boreholes at the site for soil gas concentrations and groundwater levels.

7.1.2 During these visits atmospheric pressure ranged between 1000mb and 1035mb. During these visits pressure trends observed were static and falling.

7.1.3 The results of the monitoring undertaken are summarised in Table 7.1 below, with the monitoring records presented in Appendix 5.

Table 7.1: Summary of Gas Monitoring Data

Hole No.	CH_4 (%)	CO_2 (%)	O_2 (%)	H_2S (ppm)	VOCs (ppm)	Steady Flow Rate (l/hr)	Peak Flow Rate (l/hr)	Depth to water (m bgl)	Depth of installation (m bgl)
WS2	0.0	3.0 – 7.2	8.3 – 15.9	0	<1.0	0.0 – 0.1	0.0 – 0.1	2.45 - 2.59	3.04 - 3.06
WS7	0.0	0.3 – 1.5	16.9 – 19.2	0	<1.0	0.0 – 0.1	0.0 – 0.1	1.81 - 2.28	3.04 - 3.07
WS10	0.0 – 0.4	2.0 – 5.7	1.5 – 14.7	0	<1.0	0.0 – 0.1	0.0 – 0.1	1.69 - 1.95	2.87 - 2.95
BH1	0.0	3.1 – 4.5	13.6 – 15.3	0	<1.0	0.0 – 0.1	0.0 – 0.1	1.75 - 2.07	4.87 - 4.97
BH2	0.0	3.3 – 4.9	3.5 – 6.5	0	1.0 - 3.8	0.2 – 0.2	0.2	1.82 - 2.07	3.10 - 3.15
BH3	0.0	0.0 – 0.1	19.4 – 19.8	0 – 1	2.0 - 2.3	-3.7 – -3.8	-18.6	1.21 - 1.49	4.52 - 4.54
HBH2*	0.0 – 1.3	0.2 – 5.7	5.5 – 15.3	0	0.4	0.0	-0.1 - +0.9	2.45 - 2.59	3.04 - 3.06
HBH4*	0.0	1.4 – 2.5	13.5 – 19.2	0	0.4	0.0	0.0	1.81 - 2.28	3.04 - 3.07

**Historic third-party borehole*

7.1.4 On the final visit (02 April 2019) BH3 could not be monitored due to a car parked over the well. Steps were taken to locate the owner but no-one came to move the vehicle whilst the Jomas engineer was on site.

7.1.5 It should be noted that HBH2 and HBH4 are boreholes installed by a third-party. Dates, logs and installation details are unknown and as such the data obtained from these positions should be treated with caution.

7.2 Screening of Results

7.2.1 As shown in Table 7.1, methane has been reported to a maximum concentration of 0.4% v/v. Carbon dioxide has been reported to a maximum concentration of 7.2% v/v. Screening of the monitoring well headspaces with a photo-ionisation detector (PID) has detected Volatile Organic Compounds (VOC) to a maximum concentration of 3.8ppm.

7.2.2 A maximum flow rate of -18.6l/hr has been reported within BH3. However, this result is considered to be uncharacteristically high and the steady flow rate of -3.8l/hr has been adopted instead.

7.2.3 In the assessment of risks posed by hazardous ground gases and selection of appropriate mitigation measures, BS8485 (2015) identifies four types of development, termed Type A to Type D.

7.2.4 Type B buildings are defined as:

> *"…private or commercial property with central building management control of any alterations to the building or its uses but limited or no central building management control of the maintenance of the building, including the gas protection measures. Multiple occupancy. Small to medium size rooms with passive ventilation of rooms and other internal spaces throughout ground floor and basement areas. May be conventional building or civil engineering construction. Examples include managed apartments, multiple occupancy offices, some retail premises and parts of some public buildings (such as schools, hospitals, leisure centres) and parts of hotels."*

7.2.5 Type B has been adopted as the relevant category for the proposed residential development. It is has been initially adopted for the whole site as this would also cover things like offices, retail units etc that form part of the stadium. However, this would need to be confirmed on receipt of a design for the stadium

7.2.6 The soil gas assessment method is based on that proposed by Wilson & Card (1999), which was a development of a method proposed in CIRIA publication R149 (CIRIA, 1995). The method uses both gas concentrations and borehole flow rates to define a characteristic situation based on the limiting borehole gas volume flow for methane and carbon dioxide. In both these methods, the limiting borehole gas volume flow is renamed as the Gas Screening Value (GSV).

7.2.7 The Gas Screening Value (litres of gas per hour) is calculated by using the following equation

GSV = (Concentration/100) X Flow rate

Where concentration is measured in percent (%)
and flow rate is measured in litres per hour (l/hr)

7.2.8 The Characteristic Situation is then determined from Table 8.5 of CIRIA C665.

7.2.9 A worst case flow rate of 3.8l/hr (maximum reported) will be used in the calculation of GSVs for the site. The Characteristic Situation is then determined from Table 8.5 of CIRIA C665.

7.2.10 To accord with C665, worst case conditions are used in the calculation of GSVs for the site. These have been summarised below in Table 7.2

Table 7.2: Summary of Gas Monitoring Data - Peak Flow Rate

Gas	Concentration (v/v %)	Peak Flow Rate (l/hr)	GSV (l/hr)	Characteristic Situation (after CIRIA C665)
CO_2	7.2	3.8	0.2736	**2**
CH_4	1.3	3.8	0.0494	**1**

7.2.11 The methodology set out in BS 8485 (2015) has been used for determining the required gas protection measures. For a Type B development on a CS2 site, the gas protection measures must provide a minimum of 3.5 points.

7.2.12 Although the site is classed as CS2 using worst-case results, this is not considered to be representative of the site as a whole. The maximum flow rate and maximum concentration of CO_2 were detected at opposite ends of the site (BH3 in south and WS2 in north). BH3 detected CH_4 and CO_2 at concentrations ≤0.1l/hr and even using the maximum flow rate of -18.6l/hr would result in a classification of CS1.

7.2.13 The high negative flow rates in BH3 can may be attributed to a 'piston' effect caused by high water level in the standpipe. It is evident form the data set these flow rate is not charachterisitc of the site as a whole. The next highest flow rate (excluding BH3) was +0.9l/hr. This flow rate has been adopted as the *characteristic* flow rate of the site, and is considered conservative as in all other wells flow rates have not exceeded 0.2 l/hr.

Table 7.3: Summary of Gas Monitoring Data - Characteristic Flow Rate

Gas	Concentration (v/v %)	Characteristic Flow Rate (l/hr)	GSV (l/hr)	Characteristic Situation (after CIRIA C665)
CO_2	7.2	0.9	0.0648	**1**
CH_4	1.3	0.9	0.117	**1**

7.2.14 For any development on a CS1 site, no formal gas protection measures are considered necessary.

7.2.15 Nevertheless, it is understood that approximately half the site (including where BH3 is located) will be redeveloped into residential blocks with basement car parks. It is assumed that these will be formed in accordance with Building Regulations (2000), Approved Document F. Therefore, due to the basement car park being well ventilated this will provide a score of '4' in accordance with BS: 8485. Parts of the basement which are not fully ventilated will still provide scores of 2.0 or 2.5 if the basement floors and walls conform to BS 8102:2009, Grade 2 waterproofing or Grade 3 waterproofing respectively. These measures will provide extra protection against any residual gas risk that may remain. Therefore the CS1 classification, for which no additional gas protection measures are required, is considered appropriate.

7.3 Carbon Monoxide and Volatile Organic Compounds.

7.3.1 BS 8576:2013 has been used to derived threshold levels for carbon monoxide and volatile organic compounds.

7.3.2 Using the 8576:2013 and the HSE document EH40 "work place exposure limits" it is noted that the main sources of this gas are burning with a restricted oxygen supply.

7.3.3 The 8 hour long term exposure level is given at 20ppm and the short term (15min) 100ppm.

7.3.4 It should be noted that the well BH3 recorded concentrations of carbon monoxide that ranged from 481ppm on the first visit to 20ppm on the third visit. This well could not be accessed on the fourth visit.

7.3.5 Given the recorded levels and the protection measures that will be installed as part of the construction of the basement it is not considered that additional protection measures need to be incorporated to protect end users from the recorded carbon monoxide concentrations. However, the Made Ground is likely to be removed as part of the basement construction and additional monitoring for CO during/post -construction may mitigate the need for additional protection measures.

7.3.6 PID screening of the monitoring well headspace has revealed maximum concentrations of VOCs of 3.8ppm. No source of VOCs was identified by the Desk Study, and no VOCs were detected in soil samples analysed in the laboratory. Therefore, it is considered that the PID screening of monitoring well confirms the assessment that risks to human health receptors via vapour inhalation pathways are low.

8 SUMMARY OF RESULTS

8.1 Land Quality Impact Summary

8.1.1 Following the ground investigation, the following is noted:

- The proposed development comprises the following:

  'Redevelopment of the site, following the demolition of all existing buildings and structures, to provide a replacement stadium with ancillary facilities, including flexible retail, hospitality and community spaces, independent retail floorspace (Classes A1/A2/A3), a medical centre (Class D1) and vehicle parking, plus residential accommodation comprising of 1,048 dwellings (Class C3) within 5 buildings of varying heights of between 3 and 10 storeys (and under croft and part basement levels) on the south and west sides of the site, together with provision of new accesses from Westfield Avenue to car parking, associated landscaping and the provision of a detached residential concierge building.'

- Following generic risk assessments and statistical analysis, elevated concentrations of lead, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(ah)anthracene were detected in soils in excess of generic assessment criteria for the protection of human health within a residential without plant uptake end-use scenario.

- Asbestos in the form of amosite, chrysotile and crocidolite (both loose fibres and hard/cement type material) was detected in 2No. samples analysed in the laboratory.

- Any visual asbestos materials may be removed by hand, with extensive dust control measures required during the soil screening operations for the protection of site workers and nearby residents. It should be noted that asbestos fibres will not be visible to the naked eye.

- Where hardstanding or building cover is provided, no formal remedial measures are considered necessary in terms of human health, as the hard surfacing is considered to effectively encapsulate the made ground.. The remaining communal soft landscaping areas should have the Made Ground replaced with approximately 600mm of imported clean soil, placed on a membrane.

- Further investigation, soil sampling and assessment, including those areas which have not been accessed for ground investigation purposes, may allow areas requiring encapsulation under clean cover to be zoned and refined.

- Figure 6 in Appendix 1 shows the areas of site that require investigation and which parts of site can be classed as 'residential without plant uptake' and 'commercial'.

- A pollutant linkage to human health via vapour inhalation are not considered to exist.

- A pollutant linkage to controlled waters is not considered to exist.

- Calculating the Gas Screening Value using results considered to be representative of the site indicate the site should be classified as Characteristic Situation 1. Therefore, no formal gas protection measures are considered necessary. Buildings to have

basement car parks built in accordance with Building Regulations (2000), Approved Document F are considered to be sufficiently protected anyway.

- Material selection for potable water supply pipes should be confirmed with the relevant service provider.

- A remedial strategy will be required for the proposed development.

- As with any ground investigation, the presence of further hotspots between sampling points cannot be ruled out. Should any contamination be encountered, a suitably qualified environmental consultant should be informed immediately, so that adequate measures may be recommended.

8.1.2 The above conclusions are made subject to approval by the statutory regulatory bodies.

8.2 Review of Pollutant Linkages Following Site Investigation

8.2.1 The site CSM has been revised and updated from that suggested in the desk study in view of the ground investigation data, including soil laboratory analysis results. Table 8.1 highlights whether pollutant linkages identified in the original CSM are still relevant following the risk assessment, or whether pollutant linkages, not previously identified, exist.

Table 8.1: Plausible Pollutants Linkages Summary (Pre-Remediation)

Potential Source (from desk study)	Pathway	Receptor	Relevant Pollutant Linkage?	Comment
• Potential for Made Ground associated with previous development operations – on site (S1) • Potential asbestos containing materials within existing buildings – on site (S2) • Potential ground gas generation from nearby landfill site (S3)	• Ingestion and dermal contact with contaminated soil (P1) • Inhalation or contact with potentially contaminated dust and vapours (P2) • Permeation of water pipes and attack on concrete foundations by aggressive soil conditions (P6)	• Construction workers (R1) • Maintenance workers (R2) • Neighbouring site users (R3) • Future site users (R4) • Building foundations and on site buried services (water mains, electricity and sewer) (R5)	✓	see 8.1 above for remedial measures. The findings of this report should be included in the construction health and safety file, with adequate measures put in place for the protection of construction and maintenance workers.
	• Accumulation and migration of soil gases (P5)		✓	Gas Protection measures required
	• Leaching through permeable soils, migration within the vadose zone (i.e., unsaturated soil above the water table) and/or lateral migration within surface water, as a result of cracked hardstanding or via service pipe/corridors and surface water runoff. (P3) • Horizontal and vertical migration of contaminants within groundwater (P4)	• Neighbouring site users (R3) • Building foundations and on site buried services (water mains, electricity and sewer) (R5) • Controlled waters - secondary (A) aquifer (R6) • Surface water – pond located east of site, Hoe Stream 39m north (R7)	✓	Contact should be made with relevant utility providers to confirm if upgraded materials are required. A pollutant linkage to controlled waters is not considered to exist.

9 GEOTECHNICAL ENGINEERING RECOMMENDATIONS

9.1 Ground Investigation Summary

9.1.1 No detailed structural engineering design information, with respect to the type of construction and associated structural loadings, was provided at the time of preparing this report. Consequently, a detailed discussion of all the problems that may arise during the proposed redevelopment scheme is beyond the scope of this report.

9.1.2 Practical solutions to the difficulties encountered, both prior to, and during construction, are frequently decided by structural constraints or economic factors. For these reasons, this discussion is predominantly confined to remarks of a general nature, which are based on site conditions encountered during the intrusive investigations.

9.1.3 The proposed development comprises the following:

'Redevelopment of the site, following the demolition of all existing buildings and structures, to provide a replacement stadium with ancillary facilities, including flexible retail, hospitality and community spaces, independent retail floorspace (Classes A1/A2/A3), a medical centre (Class D1) and vehicle parking, plus residential accommodation comprising of 1,048 dwellings (Class C3) within 5 buildings of varying heights of between 3 and 10 storeys (and under croft and part basement levels) on the south and west sides of the site, together with provision of new accesses from Westfield Avenue to car parking, associated landscaping and the provision of a detached residential concierge building.'

9.2 Geotechnical Classification

9.2.1 At the Desk Study stage this development was deemed to be a GC2 development in accordance with BS: 1997.

9.2.2 The findings of the investigation undertaken and discussed previously do not change this assessment.

9.3 Data Summary

9.3.1 The results of the ground investigation revealed a ground profile comprising a variable thickness of Made Ground (up to 1.4m bgl depth), overlying Kempton Park Gravel Member up to 4.15mbgl; overlying Bagshot Formation to the base of the deepest borehole at 25.00mbgl.

9.3.2 A summary of ground conditions obtained from the ground investigation and the derived geotechnical parameters, is provided in Table 9.1 below.

Table 9.1: Ground Conditions and Derived Geotechnical Parameters

Strata	Depth Encountered (from-to) (mbgl)	SPT 'N' Value	Particle Size Distribution (%)		
			Fines (<0.063mm)	Sand	Gravel
MADE GROUND	0.00 to 0.30 - 1.40	10 - 12	-	-	-
Loose to very dense orange to grey silty clayey very gravelly SAND. Sand is fine. Gravel consists of flint. (KEMPTON PARK GRAVEL)	0.30 – 1.40 to 2.00 – 4.15	4 - 77*	5.7 - 11.2	22.4 - 67.4	26.9 - 70.8
Medium to very dense grey silty SAND. Sand is medium to coarse. (BAGSHOT FORMATION)	2.00 – 3.60 to 3.75 – 25.00	15 - 789*	2.4 - 39.1	58.6 - 97.3	0.0 - 18.2

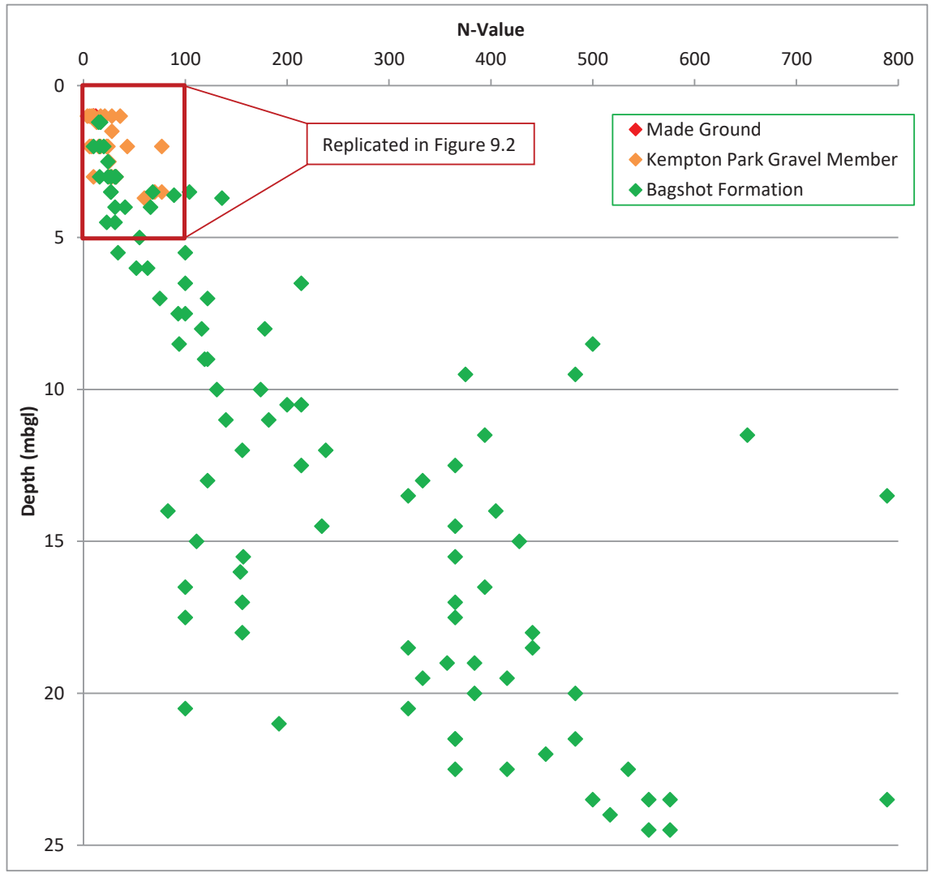
9.4 Standard Penetration Tests

9.4.1 Standard Penetration Tests were undertaken at regular intervals throughout the window sampler holes and cable percussive boreholes. The results of the SPTs are plotted against depth in the figures below.

9.4.2 The strata have been grouped into "Made Ground", "Kempton Park Gravel Member" and "Bagshot Formation".

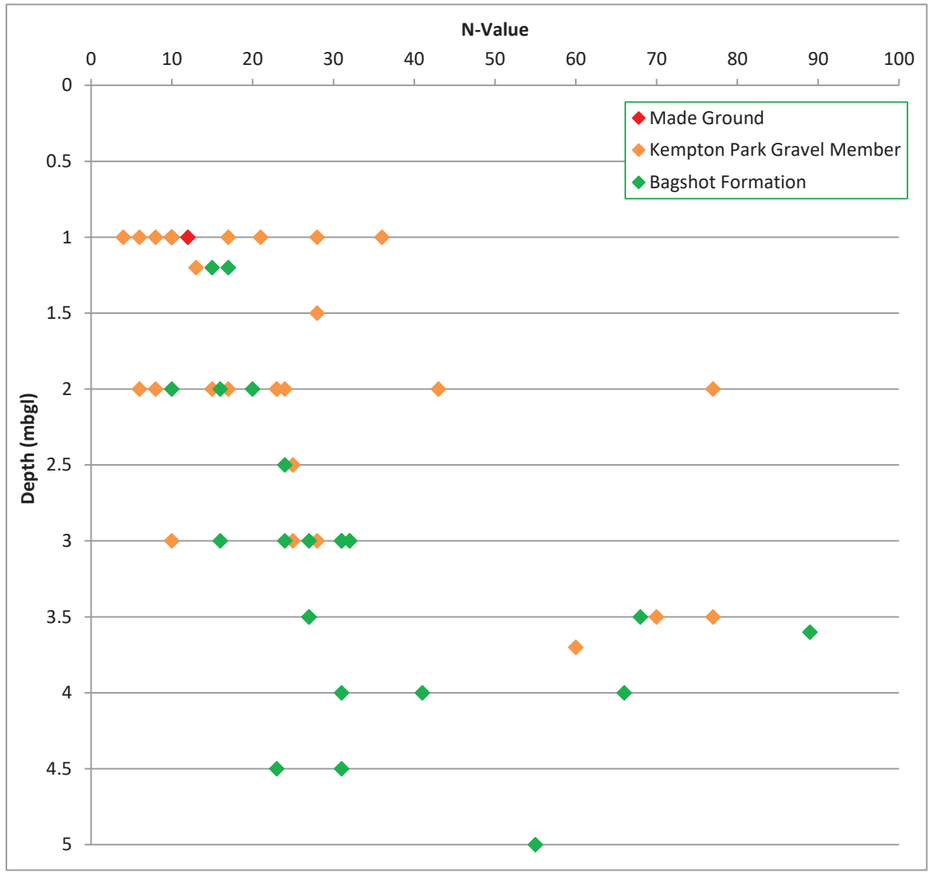
9.4.3 N_{equi} results have been calculated for both strata where the SPT crossed strata boundaries or where the full 300mm of penetration could not be achieved for 50 or fewer blows.

Figure 9.1: SPT 'N' Value v Depth (0m-25m bgl)



9.4.4 As shown above the SPT N values generally increase with depth. Many of the values shown are calculated N_{equi} and as such the graph has been restricted to an N value of 800, even though some results exceeded this value. The range in values is likely due to varying gravel content within the strata, as well as many deeper values being N_{equi}'s. For clarity of shallow geotechnical conditions, Figure 9.2 below show the upper 5m of geotechnical data.

Figure 9.2: SPT 'N' Value v Depth (0m-5m bgl)



9.4.5 As with the previous graph above, the SPT N values show in Figure 9.2 generally increase with depth. The range in values is likely due to varying gravel content throughout the strata.

9.5 Building Near Trees

9.5.1 The underlying soil conditions have been shown to be of a granular nature and as such will not exhibit any significant volume change potential.

9.5.2 As Made Ground has been encountered to a maximum depth of 1.4m then a minimum founding depth of 1.5mbgl is recommended. Where basements are proposed, this minimum founding depth will be exceeded.

9.6 Foundations

General Comments

9.6.1 Foundations should not be formed in either the Made Ground or Topsoil due to the unacceptable risk of total and differential settlement.

9.6.2 It should be noted that the demolition and removal of existing structures, foundations and services may increase the depth of Made Ground on the site.

9.6.3 It is recommended that excavations to form the foundations should be undertaken using a toothless bucket to reduce the potential for disturbance of the underlying granular strata.

9.6.4 Foundations should not be formed in the granular materials until the granular materials have been proof compacted. Given the depth and likely size of these foundations it is considered that this could be undertaken using a hydraulic "elephants foot" or if the whole founding layer is compacted at the same time a vibrating roller or "whacker plate" if the machinery can be easily taken into the excavation and the stability of the excavation / safety of any workers entering the excavation can be assured.

9.6.5 The comments below are indicative only based on limited ground investigation data. Foundations should be designed by a suitably qualified Engineer. Once structural loads have been fully determined a full design check in accordance with BS EN 1997 should be undertaken to confirm suitability of foundation choice.

Stadium and Ancillary Buildings

9.6.6 Based on the findings of this investigation, it is considered that traditional square pads of 2m by 2m formed at a depth in the order of 2mbgl within the underlying sand and gravel could be designed with an allowable bearing capacity of 100kPa. This may be sufficient for the stadium which is assumed to be of a lightweight steel framework.

9.6.7 Likewise, this founding solution may be appropriate for the smaller buildings associated with the football club. Alternatively, traditional strip footings of 1m breadth formed at a depth in the order of 1.5mbgl within the underlying sand and gravel could be designed with an allowable bearing capacity of 80kPa.

9.6.8 It should be noted that this will need to be reassessed on receipt of drawings / plans of the stadium as features normally traditionally associated with a football stadium such as floodlighting pylons may require a different founding solution due to the potential of overturning moments formed from wind loading etc.

9.6.9 Foundations formed in suitably compacted granular materials do not generally experience any consolidation settlements.

Residential Blocks

9.6.10 Basements are proposed under each residential block. It is considered likely that an excavation circa 3m deep would be required to form the basement.

9.6.11 In view of the results obtained to date, it is considered that cast in-situ cantilever retaining walls formed at a depth of 3mbgl could be designed with a conservative allowable bearing capacity of 150kPa.

9.6.12 The exact allowable bearing capacity that could be achieved would need to be reviewed on receipt of initial foundation design. This would include a check against sliding failure would need to be made to the retaining wall design.

9.6.13 Given that the residential blocks are to be between 5 and 9 storeys, a greater allowable bearing capacity is likely to be required and a piled foundation solution within the underlying Bagshot Formation should be considered.

9.6.14 The piled foundations will carry their working load in a combination of skin friction along the sides of the pile and end bearing at the base of the pile. The piles should be designed by a suitably qualified and experienced piling specialist using a suitable factor of safety with the settlement at working load specified to meet any structural requirements. Table 9.2 provides some indicative capacities for a single pile for the diameter and depths shown.

Table 9.2: Indicative Piles Capacities (kN)

Pile toe depth (m bgl)	Pile diameter (m)					
	0.30	0.45	0.60	0.75	0.90	1.20
	Indicative Gross Allowable Pile Capacity (kN)					
9	515	930	1455	2085	2820	4615
10	650	1160	1790	2545	3420	5545
11	800	1410	2155	3040	4065	6525
12	965	1680	2550	3575	4750	7570
13	1145	1975	2975	4145	5485	8670
14	1340	2295	3430	4750	6260	9835
15	1555	2630	3915	5395	7085	11060
16	1780	2995	4430	6080	7950	12345
17	2020	3380	4975	6800	8865	13690
18	2275	3785	5550	7560	9820	15095
19	2545	4215	6155	8355	10825	16560
20	2830	4670	6790	9190	11875	18085

9.6.15 It should be noted that the above indicative gross allowable carrying capacities assume the following

- They do not take into account the self weight of the pile.
- In addition the above assumes both skin friction and end bearing.
- They assume a bored piling system. Other methods of piling and equipment may provide different results.
- The above are estimates based on single compression load bearing piles. Groups of piles would require the application of a pile efficiency factor. This would be dependent on the number and layout of the piles in each group.

9.6.16 For specific parts of the stadium specialist piles may have to be designed to undertake specific roles. These may include tension piles to anchor items such as flood light pylons to prevent overturning caused by wind loading etc.

9.6.17 The use of a piling foundation solution will require the emplacement of an engineered granular piling mat to support the piling rig and prevent overturning. This should be designed and constructed in accordance with BRE 470.

9.6.18 It should be noted that the intrusive investigation proved soils to a depth of 25mbgl. It would be normal practice, in line with BS EN 1997 and guidance from the Federation of Piling Specialists that the ground conditions are proven to at least 5m below the toe of the pile.

9.6.19 As an alternative to cantilever retaining walls, a fully embedded retaining wall comprising a contiguous or secant piled box could be utilised.

9.6.20 The contiguous/secant piles forming the pile box would need to act as retaining walls as well as carry the structural loadings. The piles should be designed to withstand the earth pressures, and still meet the required structural requirements regarding issues such as deflection, deformation and bending.

9.6.21 To provide sufficient support for the excavation, it is recommended that un-propped or fully embedded piles are formed to at least 9m bgl within the Bagshot Formation. This depth may not be sufficient to carry the required loading and so deeper piles may be needed.

9.7 Retaining Walls

9.7.1 At the current time, it is not known how the retaining walls to the basement will be constructed. But it is assumed that the retaining walls will be of the cast in-situ cantilever type. These should be formed in short sections to help stability of the basement excavation.

9.7.2 These walls would need to be designed to both withstand the earth pressures and to be able to transfer the above loading successfully i.e. the retaining wall should be designed to act as a foundation for the structure.

9.7.3 A check against sliding failure would need to be made to the retaining wall design. This may alter the above recommendations regarding allowable bearing capacities.

9.7.4 At the current time, insufficient structural information is available to allow details of the retaining wall to be determined. Given the obtained information it is considered that a friction angle for the materials could be as low as <30° in the superficial granular materials (especially if saturated) (After Meyerhof (1956)).

9.7.5 Through the solid Bagshot Formation these sands could have a friction angle of 45° or higher.

9.7.6 Given the granular nature of the underlying ground conditions, it is considered that heave precautions will not be required.

9.8 Ground Floor Slabs

<u>Stadium and Ancillary Buildings</u>

9.8.1 Where a basement is not proposed, the Made Ground was generally noted to be less that 1m thick (although locally it was noted to exceed this) and generally consisted of a granular

material. Following lifting and simple sorting and processing these materials could be re-engineered to allow a ground bearing floor slab to be used.

9.8.2 If a piled solution is used then a suspended floor slab will be required.

9.8.3 The void formed as part of the suspended floor slab could be used as part of the gas protection measures. The protection provided by such a ventilated void would depend on the efficiency of the ventilation. As a minimum the void and ventilation should be capable of having a complete volume chance of air every 24hours, in accordance with CIRIA C665. If it does not meet this requirement the void may be classed as a pressure relief pathway.

9.8.4 Similarly under a ground bearing floor slab gas drains could be emplaced within the engineered granular material or within granular filled trenches.

9.8.5 The loadings from the suspended floor slab will need to be carried by the foundations, which will need to be designed to not only carry the structural loadings but the additional floor loadings.

Residential Blocks

9.8.6 Where there is to be a basement formed, it is expected that the finished floor level would be approximately 3.0m – 3.5m below current ground level.

9.8.7 If a cantilever retaining wall is utilised then a ground bearing floor slab could be used. In which case formations of the structures should be inspected by a competent person. Any loose or soft material should be removed and replaced with well-graded, properly compacted granular fill or lean mix concrete. The formation should be blinded if left exposed for more than a few hours or if inclement weather is experienced.

9.8.8 The floor slab would also need to be suitably reinforced, not only to distribute the structural loading but also to ensure that the floor slab can prop the retaining walls and does not buckle from the lateral pressures imposed by the cantilever retaining walls.

9.8.9 The floor slab (and basement walls) would need to be constructed to conform to BS: 8102 (2009).

9.8.10 If a contiguous or secant piled option is used to form the building foundations and basement box then a reinforced suspended floor slab would be required. This could then prop the walls, Combined with using the floor slab at ground level as a prop it may allow the piles to be designed to a shallower depth.

9.9 Concrete in the Ground

9.9.1 Sulphate attack on building foundations occurs where sulphate solutions react with the various products of hydration in Ordinary Portland Cement (OPC) or converted High-Alumina Cement (HAC). The reaction is expansive, and therefore disruptive, not only due to the formation of minute cracks, but also due to loss of cohesion in the matrix.

9.9.2 In accordance with BRE Special Digest 1, where there are more than 10 results available in the datasets the assessment has been undertaken against the average of the highest 20% of values. Where there are less than 10 results in the data set the highest value has been taken.

9.9.3 Table 9.3 summarises the analysis of the aggressive nature of the ground for each of the strata encountered within the ground investigation.

Table 9.3: Concrete in the Ground Classes

Stratum	No. Samples	pH range	Ave of top 20% WS Sulphate (mg/l)	Highest WS Sulphate (mg/l)	Design Sulphate Class	ACEC Class
Made Ground	16	7.7 - 11.7	1403	-	DS-2	AC-2
Natural	8	7.2 - 9.0	-	89	DS-1	AC-1

9.10 Excavations

9.10.1 It is likely that some shallow excavations will be required at the site for services etc, in addition to larger excavations during the remediation and construction works. These are anticipated to remain stable for the short term only.

9.10.2 The stability of all excavations should be assessed during construction. The sides of any excavations into which personnel are required to enter, should be assessed and where necessary fully supported or battered back to a safe angle.

9.10.3 The use of battering should take int account the effect of ground water and surface water / rainfall in reducing the likely safe angle that could be achieved.

9.10.4 Any vertically sided excavations require support to provide safe man access and to support the sides of the excavation. Supports should be installed as excavation proceeds. For service excavations, overlapping trench sheets could be used as close support in the Made Ground deposits to minimise ground loss. Alternatively, consideration could be given to the use of trench boxes provided excavations take place within the boxes.

9.10.5 Attention is also drawn to the provisions of the Health and Safety at Work Regulations, which state that the sides of any excavations greater than 1.2m depth, into which personnel are required to enter, should be fully supported or battered back to a safe angle.

9.10.6 If a contiguous or secant piled solution is utilised, then it is recommended that the piles are installed first to provide stability to the excavation. Such a design is may require propping prior to and during excavation.

9.10.7 Given the noted ground gas conditions, protective precautions and monitoring of the gas levels within excavations of 1.2m or deeper should be carried out prior to persons entering the excavations.

9.11 Groundwater Control

9.11.1 During the investigation groundwater was reported within Window Sample boreholes WS1, WS2, WS6, WS7, WS8, WS9 and WS10 at depths of between 1.1m and 3.0m bgl depth. Groundwater was also reported as being struck at 2.9m and 3.4m bgl within cable percussive boreholes BH3 and BH4 respectively. Groundwater was not reported within the remaining boreholes.

9.11.2 During return monitoring groundwater was reported at depths of between 1.21m and 2.59m bgl.

9.11.3 Subject to seasonal variations, any groundwater encountered during site works could be readily dealt with by conventional pumping from a sump used to collate waters.

9.11.4 Given the size of the excavations it is considered that dewatering . groundwater lowering may be required. if such a scheme is proposed then it would be advised that a groundwater treatment facility is installed on site to allow for the treatment of the water to remove suspended solids. This may then mean that an application for a temporary discharge consent to a nearby sewer r water course could be considered.

9.11.5 Surface water or rainfall ingress could be similarly dealt with.

9.11.6 Groundwater exclusion in the form of sheet piling or secant piled walls could also be an option.

9.12 In Situ CBR Measurements

9.12.1 California Bearing Ratio tests were undertaken using a Dynamic Cone Penetrometer at 4No. positions across the site as shown on a plan in Appendix 1.

9.12.2 The results have then been used to calculate CBR values using the methodology outlined in Interim Advice Notice 73/06.

9.12.3 The recorded penetration and the calculated CBR values from each position are provided in Appendix 6.

9.12.4 The results are summarised in the table below:

Table 9.3 – CBR Results

Position	Initial-Final Depth (mm bgl)	CBR (%)
CBR1	150 - 400	33.2
	400 - 500	12.7
	500 - 1000	7.9
CBR5	150 - 200	12.5
	200 - 350	3.3
	350 - 800	12.5
	800 - 1000	25.0
CBR6	200 - 300	142.1
	300 - 1000	11.2
CBR8	250 - 350	32.1
	350 - 650	79.6
	650 - 1000	30.5

9.12.5 It is recommended that a value of 3.3% is adopted for the purpose of road design. However, proof rolling / compaction of any granular materials may provide a greater result.

9.12.6 Following compaction, further CBR testing should be undertaken to confirm that suitable improvement was achieved.

10 REFERENCES

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British Standards Institution (2013) BS 8576:2013 *Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOC's),* Milton Keynes: BSI

APPENDICES

Woking Football Club, Kingfield Road, GU22 9AA
Geo-environmental and Geotechnical Assessment
P1381J1460 – November 2019
Prepared by Jomas Associates Ltd
On behalf of Woking Football Club

APPENDIX 1 – FIGURES

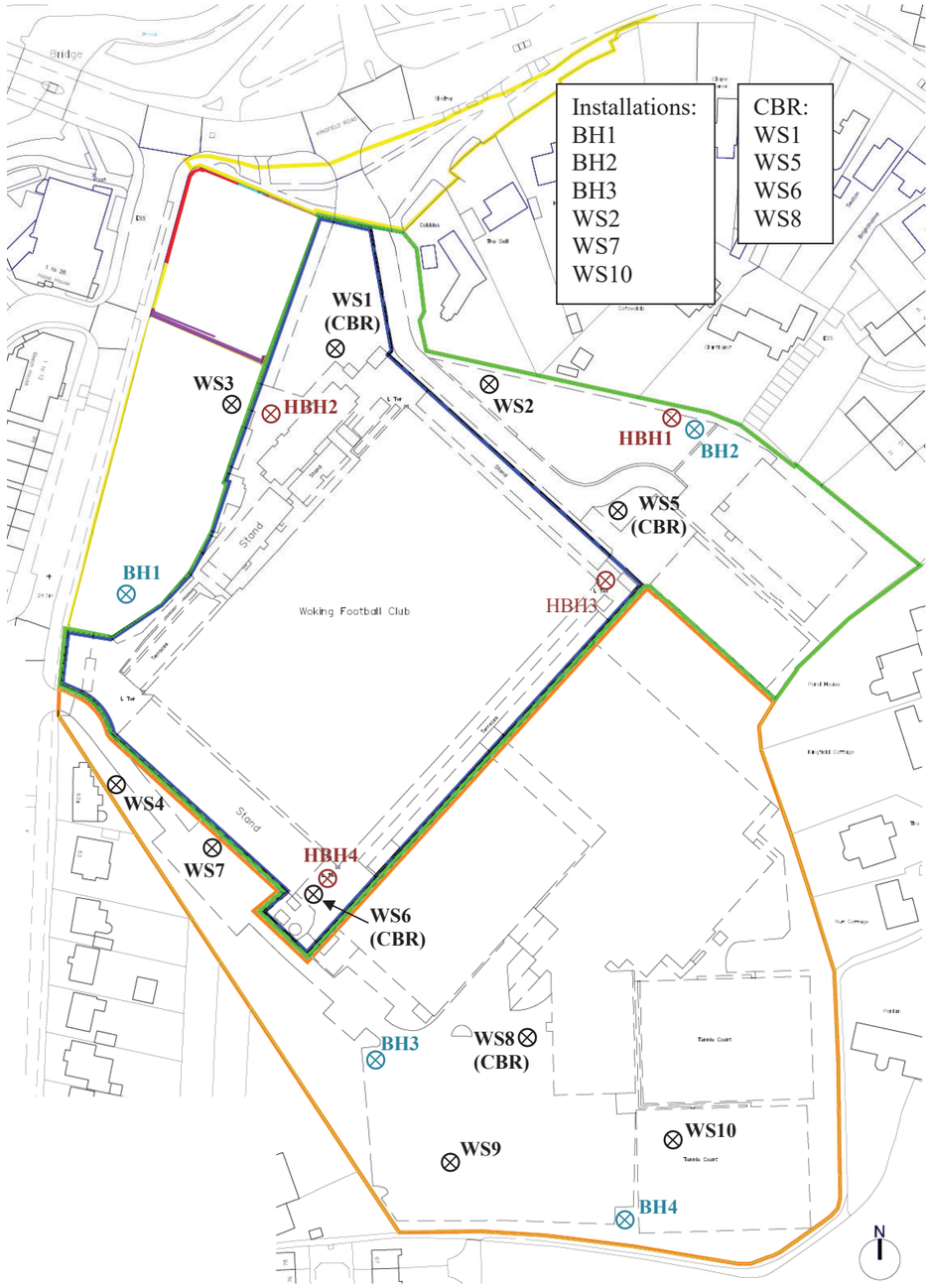
JOMAS ASSOCIATES LTD
T: 0843 289 2187

Project Name	Kingfield Road, Woking	**Client**	Woking Football Club
Project No.	P1381J1460	**Date**	16/08/2018
Title	Site Location Plan	**Prepared By**	AM

JOMAS ASSOCIATES LTD
T: 0843 289 2187

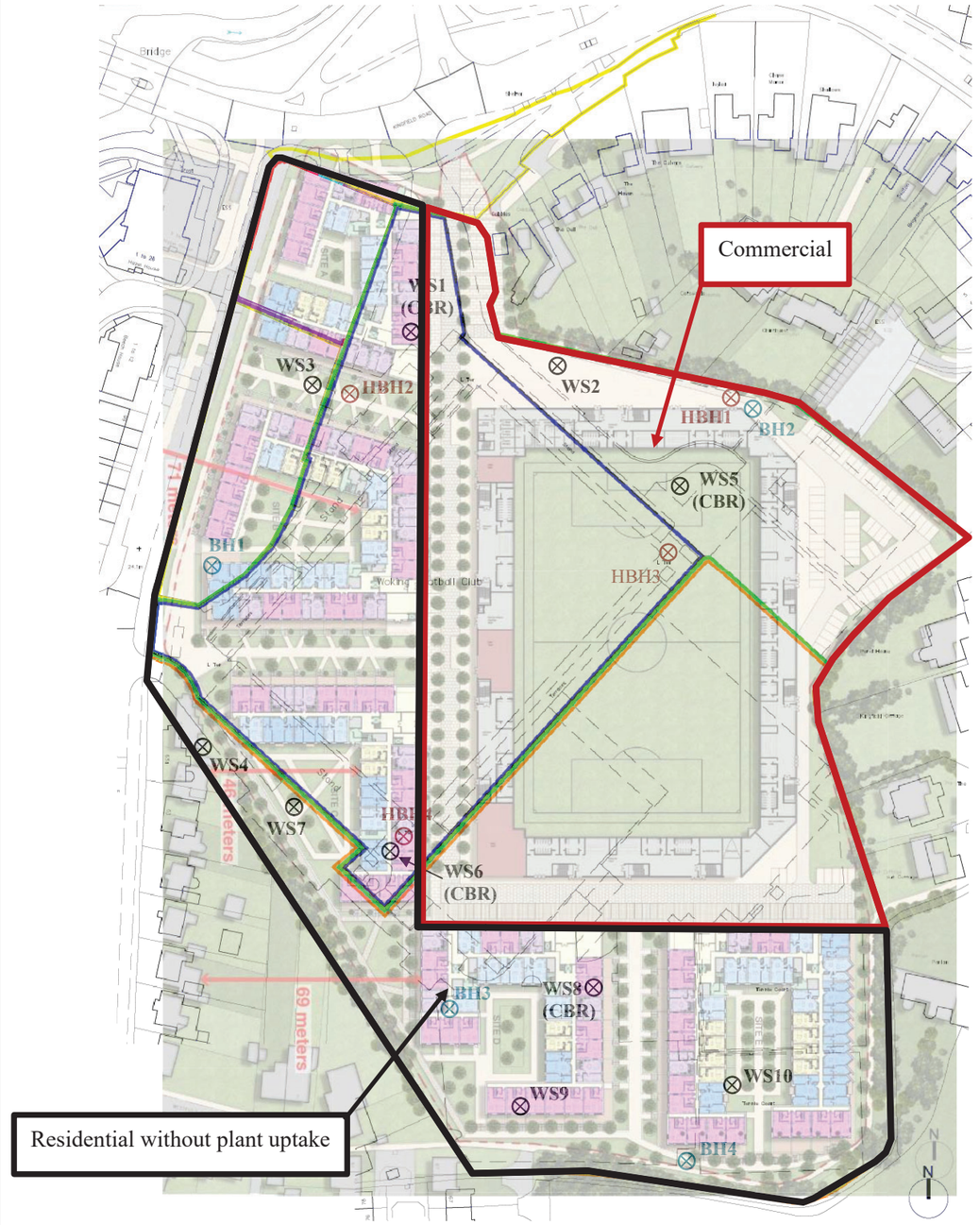
Project Name	Kingfield Road, Woking	**Client**	Woking Football Club
Project No.	P1381J1460	**Date**	March 2019
Title	Exploratory Holes	**Prepared By**	JLW

⊗ Windowless Sampler Borehole ⊗ Cable Borehole ⊗ Historical Borehole



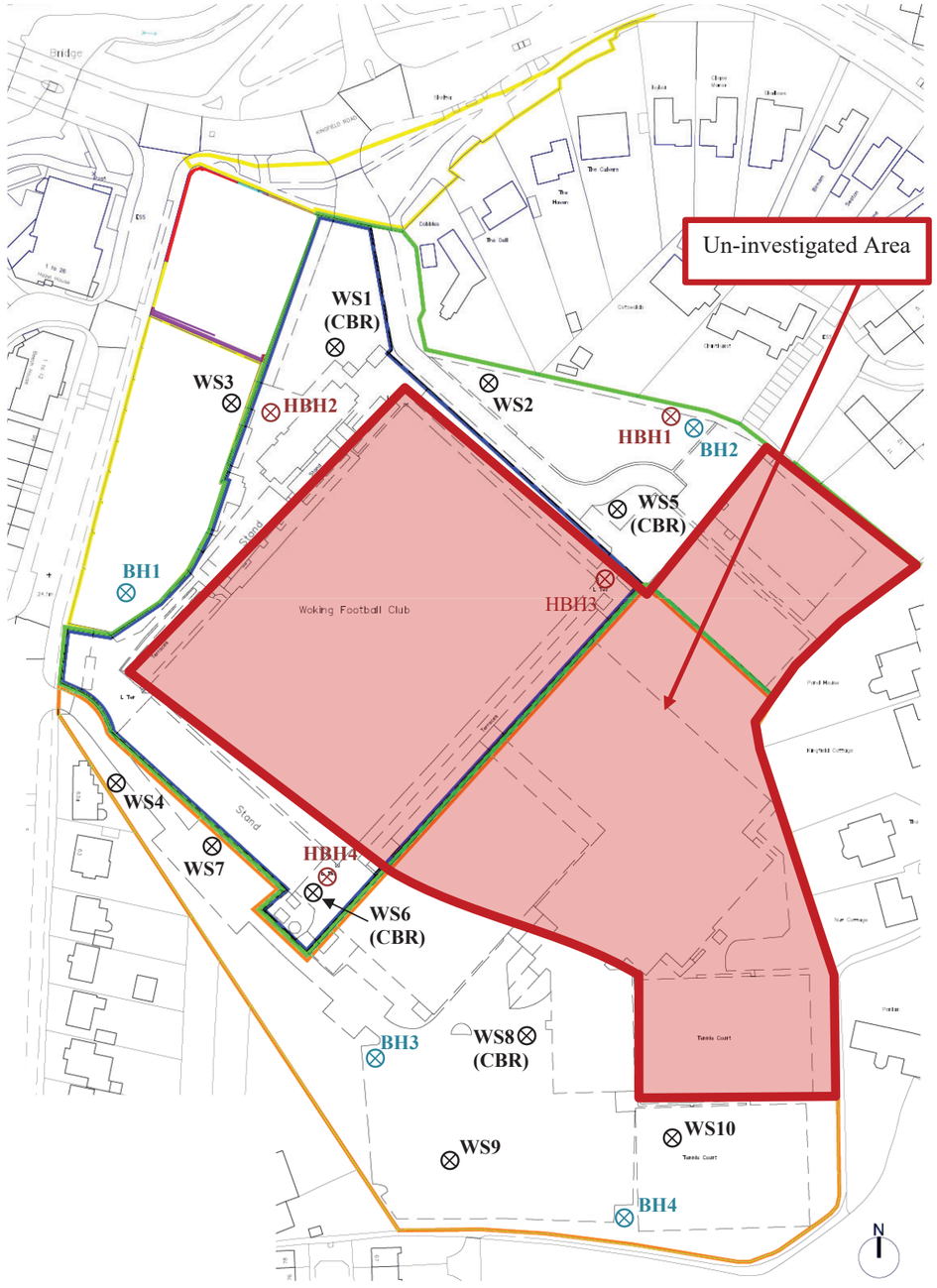
JOMAS ASSOCIATES LTD
T: 0843 289 2187

Project Name	Kingfield Road, Woking	**Client**	Woking Football Club
Project No.	P1381J1460	**Date**	April 2019
Title	Proposed Development over GI Plan	**Prepared By**	SRC



JOMAS ASSOCIATES LTD
T: 0843 289 2187

Project Name	Kingfield Road, Woking	**Client**	Woking Football Club
Project No.	P1381J1460	**Date**	April 2019
Title	Un-investigated Area	**Prepared By**	SRC



APPENDIX 2 – EXPLORATORY HOLE RECORDS

	CABLE PERCUSSION BOREHOLE RECORD	
	Exploratory Hole No:	**BH1**
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA	Project No: P1381J1460
Client:	Goldev Woking Ltd	Ground Level:
Logged By:	RD	Date Commenced: 20/02/2019
Checked By:	PSw	Date Completed: 20/02/2019
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig	Sheet No: 1 Of 6

Water levels recorded during boring, m						
Date:						
Hole depth:						
Casing depth:						
Level water on strike:						
Water Level after 20mins:						

Remarks

1: No water reported.
2:
3:
4:

Sample or Tests										Strata			
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description
		75	75	75	75	75	75	N					
									0.00				
											0.10		Asphalt. (MADE GROUND).
ES	0.20												Gravel. Gravel consists of brick and concrete. (MADE GROUND).
									0.50				
ES	0.80												
									1.00				
											1.20		
SPT-C B	1.50	3	4	7	7	7	7	28	1.50				Medium dense black clayey GRAVEL. Gravel consists of flint. (KEMPTON PARK GRAVEL).
									2.00				
SPT-C B	2.50	4	5	6	6	6	7	25	2.50				
									3.00				
SPT-C	3.50	4	5	6	7	7	7	27	3.50		3.50		Medium dense becoming very dense grey slightly silty SAND. (BAGSHOT FORMATION).
									4.00				
SPT-C B	4.50	4	6	7	7	8	9	31	4.50				
									5.00				

Sample or Tests										Strata			
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description
		75	75	75	75	75	75	N					
									5.00				Medium dense becoming very dense grey slightly silty SAND. (BAGSHOT FORMATION).
SPT-C	5.50	4	5	8	8	9	9	34	5.50				
									6.00				
SPT-C B	6.50	9	12	18	32			50	6.50				
									7.00				
SPT-C	7.50	9	10	19	31			50	7.50				
									8.00				
SPT-C	8.50	10	15	40	10			50	8.50				
	10 blows in R4 for 10mm penetration.												
B									9.00				
SPT-C	9.50	25		50				50	9.50				
	50 blows in R3 for 40mm penetration.												
									10.00				

	CABLE PERCUSSION BOREHOLE RECORD	
	Exploratory Hole No:	**BH1**
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA	Project No: P1381J1460
Client:	Goldev Woking Ltd	Ground Level:
Logged By:	RD	Date Commenced: 20/02/2019
Checked By:	PSw	Date Completed: 20/02/2019
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig	Sheet No: 2 Of 6

Water levels recorded during boring, m						
Date:						
Hole depth:						
Casing depth:						
Level water on strike:						
Water Level after 20mins:						

Remarks

1: No water reported.
2:
3:
4:

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample
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JOMAS										CABLE PERCUSSION BOREHOLE RECORD				
										Exploratory Hole No:		BH1		
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA									Project No:		P1381J1460		
Client:	Goldev Woking Ltd									Ground Level:				
Logged By:	RD									Date Commenced:		20/02/2019		
Checked By:	PSw									Date Completed:		20/02/2019		
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig									Sheet No:		3 Of 6		
Water levels recorded during boring, m														
Date:														
Hole depth:														
Casing depth:														
Level water on strike:														
Water Level after 20mins:														
Remarks														
1: No water reported.														
2:														
3:														
4:														

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
SPT-C B	10.50	9	14	50				50	10.50				Medium dense becoming very dense grey slightly silty SAND. (BAGSHOT FORMATION).	
SPT-C	11.50	10	18	50				50	11.50					
	50 blows in R3 for 25mm penetration.													
SPT-C B	12.50	25		50				50	12.50					
	50 blows in R3 for 41mm penetration.													
SPT-C	13.50	25		50				50	13.50					
	50 blows in R3 for 47mm penetration.													
SPT-C B	14.50	25		50				50	14.50					
	50 blows in R3 for 41mm penetration.													
									15.00					

10.00 11.00 12.00 13.00 14.00

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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JOMAS										CABLE PERCUSSION BOREHOLE RECORD				
										Exploratory Hole No:		BH1		
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA									Project No:		P1381J1460		
Client:	Goldev Woking Ltd									Ground Level:				
Logged By:	RD									Date Commenced:		20/02/2019		
Checked By:	PSw									Date Completed:		20/02/2019		
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig									Sheet No:		4 Of 6		
Water levels recorded during boring, m														
Date:														
Hole depth:														
Casing depth:														
Level water on strike:														
Water Level after 20mins:														
Remarks														
1: No water reported.														
2:														
3:														
4:														

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
SPT-C	15.50	9	15	30	20			50	15.50				Medium dense becoming very dense grey slightly silty SAND. (BAGSHOT FORMATION).	
	20 blows in R4 for 20mm penetration.													
SPT-C B	16.50	9	10	15	35			50	16.50					
SPT-C	17.50	10	12	16	34			50	17.50					
B	18.50								18.50					
SPT-C		25		50				50						
	50 blows in R3 for 47mm penetration.													
SPT-C	19.50	25		50				50	19.50					
	50 blows in R3 for 36mm penetration.													
									20.00					

15.00 16.00 17.00 18.00 19.00

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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JOMAS								CABLE PERCUSSION BOREHOLE RECORD					
								Exploratory Hole No:	BH1				
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA							Project No:	P1381J1460				
Client:	Goldev Woking Ltd							Ground Level:					
Logged By:	RD							Date Commenced:	20/02/2019				
Checked By:	PSw							Date Completed:	20/02/2019				
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig							Sheet No:	5 Of 6				
Water levels recorded during boring, m													
Date:													
Hole depth:													
Casing depth:													
Level water on strike:													
Water Level after 20mins:													
Remarks													
1: No water reported.													
2:													
3:													
4:													

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
B	20.50								20.00				Medium dense becoming very dense grey slightly silty SAND. (BAGSHOT FORMATION).	
SPT-C		25		50				50	20.50					
	50 blows in R3 for 47mm penetration.													
									21.00					
SPT-C	21.50	25		50				50	21.50					
	50 blows in R3 for 31mm penetration.													
									22.00					
SPT-C	22.50	25		50				50	22.50					
	50 blows in R3 for 28mm penetration.													
B									23.00					
SPT-C	23.50	25		50				50	23.50					
	50 blows in R3 for 19mm penetration.													
									24.00					
SPT-C	24.50	50							24.50					
	50 blows in R1 for no penetration.													
									25.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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JOMAS								CABLE PERCUSSION BOREHOLE RECORD					
								Exploratory Hole No:	BH1				
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA							Project No:	P1381J1460				
Client:	Goldev Woking Ltd							Ground Level:					
Logged By:	RD							Date Commenced:	20/02/2019				
Checked By:	PSw							Date Completed:	20/02/2019				
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig							Sheet No:	6 Of 6				
Water levels recorded during boring, m													
Date:													
Hole depth:													
Casing depth:													
Level water on strike:													
Water Level after 20mins:													
Remarks													
1: No water reported.													
2:													
3:													
4:													

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
									25.00				Medium dense becoming very dense grey slightly silty SAND. (BAGSHOT FORMATION).	
									25.50		25.55			
									26.00					
									26.50					
									27.00					
									27.50					
									28.00					
									28.50					
									29.00					
									29.50					
									30.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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		CABLE PERCUSSION BOREHOLE RECORD	
		Exploratory Hole No:	**BH2**
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA	Project No:	P1381J1460
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	RD	Date Commenced:	19/02/2019
Checked By:	PSw	Date Completed:	19/02/2019
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig	Sheet No:	1 Of 5

Water levels recorded during boring, m						
Date:						
Hole depth:						
Casing depth:						
Level water on strike:						
Water Level after 20mins:						

Remarks

1: *Field description.
2: No water reported.
3:
4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
									0.00					
											0.20		Compact* gravel. (MADE GROUND).	
B	0.30								0.50				Medium dense yellow brown SAND. Sand is fine to medium. (BAGSHOT FORMATION).	
SPT-C B	1.20	2	3	4	4	5	4	17	1.00					
									1.50					
									2.00					
											2.40			
B SPT-C	2.50	3	4	6	6	6	6	24	2.50				Medium dense becoming very dense dark grey clayey gravelly SAND. Gravel consists of flint. (BAGSHOT FORMATION).	
									3.00					
B SPT-C	3.50	7	7	6	7	7	7	27	3.50					
									4.00					
SPT-C B	4.50	4	4	5	6	6	6	23	4.50					
									5.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample
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		CABLE PERCUSSION BOREHOLE RECORD	
		Exploratory Hole No:	**BH2**
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA	Project No:	P1381J1460
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	RD	Date Commenced:	19/02/2019
Checked By:	PSw	Date Completed:	19/02/2019
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig	Sheet No:	2 Of 5

Water levels recorded during boring, m						
Date:						
Hole depth:						
Casing depth:						
Level water on strike:						
Water Level after 20mins:						

Remarks

1: *Field description.
2: No water reported.
3:
4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
									5.00				Medium dense becoming very dense dark grey clayey gravelly SAND. Gravel consists of flint. (BAGSHOT FORMATION).	
SPT-C B	5.50	9	12	15	35			50	5.50					
									6.00		6.30			
B SPT-C	6.50	9	15	50				50	6.50				Very dense dark grey silty SAND. Sand is fine. (BAGSHOT FORMATION).	
	50 blows in R3 for 70mm penetration.													
									7.00					
SPT-C B	7.50	9	14	40	10			50	7.50					
	10 blows in R4 for 10mm penetration.													
									8.00					
SPT-C B	8.50	9	144	50				50	8.50					
	50 blows in R3 for 30mm penetration.													
									9.00					
B SPT-C	9.50	25		50				50	9.50					
	50 blows in R3 for 31mm penetration.													
									10.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample
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CABLE PERCUSSION BOREHOLE RECORD

		Exploratory Hole No:	**BH2**
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA	Project No:	P1381J1460
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	RD	Date Commenced:	19/02/2019
Checked By:	PSw	Date Completed:	19/02/2019
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig	Sheet No:	3 Of 5

Water levels recorded during boring, m

Date:						
Hole depth:						
Casing depth:						
Level water on strike:						
Water Level after 20mins:						

Remarks

1: *Field description.
2: No water reported.
3:
4:

Type	Depth (mbgl)	75	75	75	75	75	75	N	Depth scale	Strata Depth (mbgl)	Water Strikes (mbgl)	Strata Description
									10.00			Very dense dark grey silty SAND. Sand is fine. (BAGSHOT FORMATION).
B	10.50								10.50			
SPT-C		25		50				50				
	50 blows in R3 for 70mm penetration.											
B												
									11.00			
SPT-C	11.50	25		50				50	11.50			
	50 blows in R3 for 38mm penetration.											
									12.00			
SPT-C	12.50	9	16	50				50	12.50			
	50 blows in R3 for 70mm penetration.											
									13.00			
SPT-C	13.50	25		50				50	13.50			
	50 blows in R3 for 19mm penetration.											
									14.00			
SPT-C	14.50	25		50				50	14.50			
	50 blows in R3 for 64mm penetration.											
B	15.00								15.00			

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample
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CABLE PERCUSSION BOREHOLE RECORD

		Exploratory Hole No:	**BH2**
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA	Project No:	P1381J1460
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	RD	Date Commenced:	19/02/2019
Checked By:	PSw	Date Completed:	19/02/2019
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig	Sheet No:	4 Of 5

Water levels recorded during boring, m

Date:						
Hole depth:						
Casing depth:						
Level water on strike:						
Water Level after 20mins:						

Remarks

1: *Field description.
2: No water reported.
3:
4:

Type	Depth (mbgl)	75	75	75	75	75	75	N	Depth scale	Strata Depth (mbgl)	Water Strikes (mbgl)	Strata Description
B	15.00								15.00			Very dense dark grey silty SAND. Sand is fine. (BAGSHOT FORMATION).
SPT-C	15.50	25		50				50	15.50			
	50 blows in R3 for 41mm penetration.											
									16.00			
B	16.50								16.50			
SPT-C		25		50				50				
	50 blows in R3 for 38mm penetration.											
									17.00			
SPT-C	17.50	25		50				50	17.50			
	50 blows in R3 for 41mm penetration.											
									18.00			
SPT-C	18.50	25		50				50	18.50			
	50 blows in R3 for 34mm penetration.											
									19.00			
SPT-C	19.50	25		50				50	19.50			
	50 blows in R3 for 45mm penetration.											
									20.00			

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample
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CABLE PERCUSSION BOREHOLE RECORD

Exploratory Hole No:	BH2		
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA	Project No:	P1381J1460
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	RD	Date Commenced:	19/02/2019
Checked By:	PSw	Date Completed:	19/02/2019
Type and diameter of equipment:	Dando 2000 Cable Percussive Rig	Sheet No:	5 Of 5

Water levels recorded during boring, m

Date:						
Hole depth:						
Casing depth:						
Level water on strike:						
Water Level after 20mins:						

Remarks

1: *Field description.
2: No water reported.
3:
4:

Sample or Tests										Strata			
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
									20.00				Very dense dark grey silty SAND. Sand is fine. (BAGSHOT FORMATION).	
B SPT-C	20.50	9	10	15	35			50	20.50					
									21.00					
SPT-C	21.50	25		50				50	21.50					
	50 blows in R3 for 41mm penetration.													
									22.00					
B SPT-C	22.50	25		50				50	22.50					
	50 blows in R3 for 41mm penetration.													
									23.00					
SPT-C	23.50	25		50				50	23.50					
	50 blows in R3 for 30mm penetration.													
									24.00					
B SPT-C	24.50	25		50				50	24.50					
	50 blows in R3 for 26mm penetration.													
									25.00		25.00			

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample
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CABLE PERCUSSION BOREHOLE RECORD

Exploratory Hole No:	BH3		
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA	Project No:	P1381J1460
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	MD	Date Commenced:	04/03/2019
Checked By:	PSw	Date Completed:	05/03/2019
Type and diameter of equipment:	DANDO 2000 Cable Percussive Rig	Sheet No:	1 Of 5

Water levels recorded during boring, m

Date:	04/03/2019					
Hole depth:	25.00					
Casing depth:						
Level water on strike:	2.90					
Water Level after 20mins:	2.70					

Remarks

1:
2:
3:
4:

Sample or Tests										Strata			
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
									0.00				Asphalt. (MADE GROUND)	
											0.20			
ES	0.25												Black clayey sandy gravel. Sand is medium. Gravel consists of fine to coarse, angular to sub-rounded flint, brick and concrete fragments. (MADE GROUND)	
ES D	0.50								0.50					
ES D	1.00								1.00		1.00			
SPT B	1.20	2	2	3	3	3	4	13	1.50				Medium dense orange to brown slightly clayey sandy GRAVEL. Sand is fine to medium. Gravel consists of fine to medium, sub-rounded flint. (KEMPTON PARK GRAVEL)	
D SPT B	2.00	2	3	3	3	4	5	15	2.00					
									2.50		2.70			
D SPT B	3.00	3	4	7	7	8	9	31	3.00				Dense yellow to brown silty SAND. Sand is fine to medium. (BAGSHOT FORMATION)	
									3.50		3.70			
SPT B	4.00	5	7	8	9	11	13	41	4.00				Dense becoming very dense green to grey slightly silty SAND. (BAGSHOT FORMATION)	
									4.50					
SPT B	5.00	7	12	13	14	14	14	55	5.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample
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CABLE PERCUSSION BOREHOLE RECORD

		Exploratory Hole No:	BH3
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA	Project No:	P1381J1460
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	MD	Date Commenced:	04/03/2019
Checked By:	PSw	Date Completed:	05/03/2019
Type and diameter of equipment:	DANDO 2000 Cable Percussive Rig	Sheet No:	2 Of 5

Water levels recorded during boring, m

Date:	04/03/2019					
Hole depth:	25.00					
Casing depth:						
Level water on strike:	2.90					
Water Level after 20mins:	2.70					

Remarks

1:
2:
3:
4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
SPT	5.00	7	12	13	14	14	14	55	5.00				Dense becoming very dense green to grey slightly silty SAND. (BAGSHOT FORMATION)	
B														
									5.50					
SPT (c)	6.00	10	15	13	14	16	7	50	6.00					
	7 blows in R6 for 11mm													
									6.50					
SPT (c)	7.00	8	15	15	15	20		50	7.00					
	20 blows in R5 for 49mm													
B														
									7.50					
SPT (c)	8.00	9	13	37	13			50	8.00					
	13 blows in R4 for 9mm													
B														
									8.50					
SPT (c)	9.00	7	13	27	23			50	9.00					
	23 blows in R4 for 47mm													
									9.50					
SPT (c)	10.00	10	14	39	11			50	10.00					
	11 blows in R4 for 11mm													
B														

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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CABLE PERCUSSION BOREHOLE RECORD

		Exploratory Hole No:	BH3
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA	Project No:	P1381J1460
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	MD	Date Commenced:	04/03/2019
Checked By:	PSw	Date Completed:	05/03/2019
Type and diameter of equipment:	DANDO 2000 Cable Percussive Rig	Sheet No:	3 Of 5

Water levels recorded during boring, m

Date:	04/03/2019					
Hole depth:	25.00					
Casing depth:						
Level water on strike:	2.90					
Water Level after 20mins:	2.70					

Remarks

1:
2:
3:
4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
SPT (c)	10.00	10	14	39	11			50	10.00				Dense becoming very dense green to grey slightly silty SAND. (BAGSHOT FORMATION)	
	11 blows in R4 for 11mm													
B														
									10.50					
SPT (c)	11.00	23	2	41	9			50	11.00					
	9 blows in R4 for 7mm													
									11.50					
SPT (c)	12.00	25		50				50	12.00					
	50 blows in R3 for 63mm													
B														
									12.50					
SPT (c)	13.00	25		50				50	13.00					
	50 blows in R3 for 45mm													
									13.50					
SPT (c)	14.00	25		50				50	14.00					
	50 blows in R3 for 37mm													
B														
									14.50					
SPT (c)	15.00	25		50				50	15.00					
	50 blows in R3 for 35mm													

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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JOMAS				**CABLE PERCUSSION BOREHOLE RECORD**			
				Exploratory Hole No:	**BH3**		
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA			Project No:	P1381J1460		
Client:	Goldev Woking Ltd			Ground Level:			
Logged By:	MD			Date Commenced:	04/03/2019		
Checked By:	PSw			Date Completed:	05/03/2019		
Type and diameter of equipment:	DANDO 2000 Cable Percussive Rig			Sheet No:	4 Of 5		
Water levels recorded during boring, m							
Date:	04/03/2019						
Hole depth:	25.00						
Casing depth:							
Level water on strike:	2.90						
Water Level after 20mins:	2.70						
Remarks							
1:							
2:							
3:							
4:							

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
SPT (c)	15.00	25		50				50	15.00				Dense becoming very dense green to grey slightly silty SAND. (BAGSHOT FORMATION)	
	50 blows in R3 for 35mm													
									15.50					
SPT (c)	16.00	25		50				50	16.00					
	50 blows in R3 for 6mm													
B									16.50					
SPT (c)	17.00	25	2	50				50	17.00					
	50 blows in R3 for 41mm													
									17.50					
SPT (c)	18.00	25		50				50	18.00					
	50 blows in R3 for 34mm													
B									18.50					
SPT (c)	19.00	25		50				50	19.00					
	50 blows in R3 for 39mm													
									19.50					
SPT (c)	20.00	25		50				50	20.00					
	50 blows in R3 for 31mm													
B														

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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JOMAS				**CABLE PERCUSSION BOREHOLE RECORD**			
				Exploratory Hole No:	**BH3**		
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA			Project No:	P1381J1460		
Client:	Goldev Woking Ltd			Ground Level:			
Logged By:	MD			Date Commenced:	04/03/2019		
Checked By:	PSw			Date Completed:	05/03/2019		
Type and diameter of equipment:	DANDO 2000 Cable Percussive Rig			Sheet No:	5 Of 5		
Water levels recorded during boring, m							
Date:	04/03/2019						
Hole depth:	25.00						
Casing depth:							
Level water on strike:	2.90						
Water Level after 20mins:	2.70						
Remarks							
1:							
2:							
3:							
4:							

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
SPT (c)	20.00	25		50				50	20.00				Dense becoming very dense green to grey slightly silty SAND. (BAGSHOT FORMATION)	
	50 blows in R3 for 31mm													
B									20.50					
SPT (c)	21.00	25		47	3			50	21.00					
	3 blows in R4 for 3mm													
									21.50					
SPT (c)	22.00	25		50				50	22.00					
	50 blows in R3 for 33mm													
B									22.50					
SPT (c)	23.50	25		50				50	23.00					
	50 blows in R3 for 27mm													
									23.50					
SPT (c)	24.50	25		50				50	24.00					
	50 blows in R3 for 27mm													
B									24.50					
									25.00		25.00			

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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JOMAS				**CABLE PERCUSSION BOREHOLE RECORD**			
				Exploratory Hole No:	**BH4**		
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA			Project No:	P1381J1460		
Client:	Goldev Woking Ltd			Ground Level:			
Logged By:	MD			Date Commenced:	06/03/2019		
Checked By:	PSw			Date Completed:	06/03/2019		
Type and diameter of equipment:	DANDO 2000 Cable Percussive Rig			Sheet No:	1 Of 5		
Water levels recorded during boring, m							
Date:	05/03/2019						
Hole depth:	25.00						
Casing depth:							
Level water on strike:	3.40						
Water Level after 20mins:	2.90						
Remarks							
1: *Field description							
2:							
3:							
4:							

Sample or Tests										Strata			
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
									0.00				Soft consistency* brown sandy CLAY containing rootlets. Sand is fine. (TOPSOIL)	
ES D	0.25													
ES	0.50								0.50		0.70			
													Medium dense becoming very dense yellow to grey silty gravelly SAND. Sand is fine to medium. (BAGSHOT FORMATION)	
ES D	1.00								1.00					
SPT B	1.20	3	4	4	3	4	4	15						
									1.50					
D	2.00													
SPT B		3	3	4	4	5	7	20	2.00					
									2.50					
D	3.00													
S B		4	5	7	7	8	9	31	3.00					
									3.50					
D	4.00													
SPT B		4	5	7	7	8	9	31	4.00					
									4.50					
D	5.00								5.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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JOMAS				**CABLE PERCUSSION BOREHOLE RECORD**			
				Exploratory Hole No:	**BH4**		
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA			Project No:	P1381J1460		
Client:	Goldev Woking Ltd			Ground Level:			
Logged By:	MD			Date Commenced:	06/03/2019		
Checked By:	PSw			Date Completed:	06/03/2019		
Type and diameter of equipment:	DANDO 2000 Cable Percussive Rig			Sheet No:	2 Of 5		
Water levels recorded during boring, m							
Date:	05/03/2019						
Hole depth:	25.00						
Casing depth:							
Level water on strike:	3.40						
Water Level after 20mins:	2.90						
Remarks							
1: *Field description							
2:							
3:							
4:							

Sample or Tests										Strata			
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
D	5.00								5.00				Medium dense becoming very dense yellow to grey silty gravelly SAND. Sand is fine to medium. (BAGSHOT FORMATION)	
									5.50					
SPT B	6.00	9	11	13	12	13	14	52	6.00					
									6.50					
D	7.00													
SPT (c)		13	12	25	25			50	7.00					
25 blows in R4 for 47mm											7.20			
B													Very dense dark grey slighlty silty SAND. Sand is fine to medium. (BAGSHOT FORMATION)	
									7.50					
SPT (c)	8.00	10	15	23	22			45	8.00					
22 blows in R4 for 41mm														
									8.50					
D	9.00													
SPT (c)		9	16	21	24			45	9.00					
24 blows in R4 for 38mm														
B														
									9.50					
D	10.00								10.00					
SPT (c)		12	13	26	24			50						
24 blows in R4 for 39mm														

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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		CABLE PERCUSSION BOREHOLE RECORD	
		Exploratory Hole No:	**BH4**
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA	Project No:	P1381J1460
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	MD	Date Commenced:	06/03/2019
Checked By:	PSw	Date Completed:	06/03/2019
Type and diameter of equipment:	DANDO 2000 Cable Percussive Rig	Sheet No:	3 Of 5

Water levels recorded during boring, m

Date:	05/03/2019					
Hole depth:	25.00					
Casing depth:						
Level water on strike:	3.40					
Water Level after 20mins:	2.90					

Remarks

1: *Field description
2:
3:
4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
D	10.00								10.00				Very dense dark grey slighlty silty SAND. Sand is fine to medium. (BAGSHOT FORMATION)	
SPT (c)		12	13	26	24			50						
	24 blows in R4 for 39mm													
									10.50					
D	11.00								11.00					
SPT (c)		13	12	25	25			50						
	25 blows in R4 for 32mm													
B									11.50					
D	12.00								12.00					
SPT (c)		13	12	27	23			50						
	23 blows in R4 for 21mm													
									12.50					
D	13.00								13.00					
SPT (c)		10	15	24	26			50						
	26 blows in R4 for 47mm													
B									13.50					
D	14.00								14.00					
SPT (c)		10	12	15	19	16		50						
	16 blows in R5 for 29mm													
B									14.50					
D	15.00								15.00					
SPT (c)		15	10	21	29			50						
	29 blows in R4 for 59mm													
B														

		CABLE PERCUSSION BOREHOLE RECORD	
		Exploratory Hole No:	**BH4**
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA	Project No:	P1381J1460
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	MD	Date Commenced:	06/03/2019
Checked By:	PSw	Date Completed:	06/03/2019
Type and diameter of equipment:	DANDO 2000 Cable Percussive Rig	Sheet No:	4 Of 5

Water levels recorded during boring, m

Date:	05/03/2019					
Hole depth:	25.00					
Casing depth:						
Level water on strike:	3.40					
Water Level after 20mins:	2.90					

Remarks

1: *Field description
2:
3:
4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
D	15.00								15.00				Very dense dark grey slighlty silty SAND. Sand is fine to medium. (BAGSHOT FORMATION)	
SPT (c)		15	10	21	29			50						
	29 blows in R4 for 59mm													
B									15.50					
SPT (c)	16.00	11	14	23	27			50	16.00					
	27 blows in R4 for 22mm													
B									16.50					
SPT (c)	17.00	11	14	25	25			50	17.00					
	25 blows in R4 for 21mm													
									17.50					
SPT (c)	18.00	15	10	31	19			50	18.00					
	19 blows in R4 for 21mm													
B									18.50					
SPT (c)	19.00	25		50				50	19.00					
	50 blows in R3 for 42mm													
B									19.50					
D	20.00								20.00					
SPT (c)		25		50				50						
	50 blows in R3 for 39mm													

CABLE PERCUSSION BOREHOLE RECORD

		Exploratory Hole No:	**BH4**
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA	Project No:	P1381J1460
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	MD	Date Commenced:	06/03/2019
Checked By:	PSw	Date Completed:	06/03/2019
Type and diameter of equipment:	DANDO 2000 Cable Percussive Rig	Sheet No:	5 Of 5

Water levels recorded during boring, m

Date:	05/03/2019					
Hole depth:	25.00					
Casing depth:						
Level water on strike:	3.40					
Water Level after 20mins:	2.90					

Remarks

1: *Field description
2:
3:
4:

Sample or Tests										Strata			
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
D	20.00								20.00				Very dense dark grey slighlty silty SAND. Sand is fine to medium. (BAGSHOT FORMATION)	
SPT (c)		25		50				50						
	50 blows in R3 for 39mm													
									20.50					
									21.00					
SPT (c)	21.50	25		50				50	21.50					
	50 blows in R3 for 41mm													
B														
									22.00					
SPT (c)	22.50	25		50				50	22.50					
	50 blows in R3 for 36mm													
									23.00					
SPT (c)	23.50	25		50				50	23.50					
	50 blows in R3 for 26mm													
B														
SPT (c)	24.00	25		50				50	24.00					
	50 blows in R3 for 29mm													
									24.50					
D	25.00								25.00		25.00			

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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WINDOW/WINDOWLESS SAMPLING BOREHOLE RECORD

		Exploratory Hole No:	**WS1**
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA	Project No:	P1381J1460
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	JW	Date Commenced:	05/03/2019
Checked By:	PSw	Date Completed:	05/03/2019
Type and diameter of equipment:	Windowless Sampler	Sheet No:	1 Of 1

Water levels recorded during boring, m

Date:	05/03/2019					
Hole depth:	3.85					
Casing depth:						
Level water on strike:	3.00					
Water Level after 20mins:						

Remarks

1: Refusa at 4.0m bgl on very dense silty sands deposits.
2:
3:
4:

Sample or Tests										Strata			
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
									0.00				Asphalt. (MADE GROUND)	
											0.15			
ES	0.25												Black slightly clayey sandy gravel. Sand is fine to medium. Gravel consists of fine to coarse, angular to rounded flint, asphalt, concrete, brick and occasional ceramic fragments. (MADE GROUND)	
ES	0.50								0.50					
											0.70			
ES	1.00								1.00				Black clayey gravelly sand. Sand is medium. Gravel consists of fine to coarse, sub-angular to rounded flint with occasional asphalt fragments. (MADE GROUND)	
SPT		2	2	2	3	2	2	9						
											1.30			
D	1.50								1.50				Loose green to grey silty very gravelly SAND. Sand is fine. Gravel consists of fine to medium, sub-angular to rounded flint. (KEMPTON PARK GRAVEL)	
											1.80			
D	2.00								2.00				Loose orange to brown mottled grey clayey silty very sandy GRAVEL. Sand is fine. Gravel consists of fine to coarse, sub-rounded to rounded flint. (KEMPTON PARK GRAVEL)	
SPT		3	4	2	2	2	2	8						
											2.50			
									2.50				Medium dense rapidly becoming very dense grey silty SAND. Sand is coarse. (BAGSHOT FORMATION)	
D	3.00								3.00					
SPT		1	6	5	8	7	7	27						
									3.50					
SPT	3.70	4	14	22	46			68						
	Nequi = 136													
											4.00			
									4.50					
									5.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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JOMAS				WINDOW/WINDOWLESS SAMPLING BOREHOLE RECORD			
				Exploratory Hole No:	WS2		
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA			Project No:	P1381J1460		
Client:	Goldev Woking Ltd			Ground Level:			
Logged By:	JW			Date Commenced:	05/03/2019		
Checked By:	PSw			Date Completed:	05/03/2019		
Type and diameter of equipment:	Windowless Sampler			Sheet No:	1 Of 1		
Water levels recorded during boring, m							
Date:	05/03/2019						
Hole depth:	4.45						
Casing depth:							
Level water on strike:	3.00						
Water Level after 20mins:							

Remarks

1: Refusal at 4.45m bgl on very dense sand deposits.
2:
3:
4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
									0.00		0.05		Asphalt. (MADE GROUND)	
ES	0.25												Brown slightly clayey sandy gravel. Sand is medium to coarse. Gravel consists of fine to coarse, angular to rounded flint, brick, concrete, asphalt with occasional ash and slate fragments. (MADE GROUND)	
ES	0.50								0.50					
ES	1.00								1.00		1.10			
SPT		5	4	3	3	2	3	11					Medium dense brown silty slightly gravelly sand. Sand is fine. Gravel consits of fine to medium, sub-angular to sub-rounded flint with occasional ash and slate fragments. (MADE GROUND)	
D	1.30										1.35			
									1.50				Loose to medium dense yellow to brown silty gravelly SAND. Sand is fine to medium. Gravel consists of fine to coarse, sub-rounded to rounded flint. (KEMPTON PARK GRAVEL)	
SPT	2.00	4	8	9	6	5	4	24	2.00					
D	2.30													
									2.50					
SPT	3.00	5	5	4	2	2	2	10	3.00					
									3.50		3.60			
D	3.80												Very dense grey to brown SAND. Sand is coarse. (BAGSHOT FORMATION)	
SPT	4.00	1	4	10	16	18	22	66	4.00					
											4.45			
									4.50					
									5.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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JOMAS				WINDOW/WINDOWLESS SAMPLING BOREHOLE RECORD			
				Exploratory Hole No:	WS3		
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA			Project No:	P1381J1460		
Client:	Goldev Woking Ltd			Ground Level:			
Logged By:	JW			Date Commenced:	05/03/2019		
Checked By:	PSw			Date Completed:	05/03/2019		
Type and diameter of equipment:	Windowless Sampler			Sheet No:	1 Of 1		
Water levels recorded during boring, m							
Date:							
Hole depth:							
Casing depth:							
Level water on strike:							
Water Level after 20mins:							

Remarks

1: No water reported.
2: Refusal at 3.95m bgl on very dense sand and gravel deposits.
3:
4:

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
									0.00		0.15		Asphalt. (MADE GROUND)	
ES	0.20												Red to brown sandy gravel. Sand is medium. Gravel consists of fine to coarse, angular to sub-rounded flint, concrete, brick, asphalt with occasional glass, wires and metal. (MADE GROUND)	
ES	0.40								0.50					
											0.85			
ES	0.90													
SPT	1.00	2	2	1	2	1	2	6	1.00				Brown slightly clayey gravelly sand with some rootlets. Sand is fine. Gravel consists of fine to coarse, angular to rounded flint and concrete, with occasional brick fragments. (MADE GROUND)	
D	1.20										1.10			
											1.30		Loose orange to brown mottled green silty very gravelly SAND. Sand is fine. (KEMPTON PARK GRAVEL)	
									1.50				No recovery.	
SPT	2.00	1	2	3	5	8	7	23	2.00		2.00			
D	2.50												Medium dense grey mottled orange to brown slightly silty gravelly SAND. Sand is fine to medium. Gravel consists of fine to coarse angular to rounded flint. (KEMPTON PARK GRAVEL)	
									2.50					
											3.00			
SPT	3.00	2	3	3	4	4	5	16	3.00				Medium dense rapidly becoming very dense grey slightly gravelly SAND. Sand is coarse. Gravel consists of fine, sub-rounded to rounded flint. (BAGSHOT FORMATION)	
D	3.20													
SPT	3.50	7	10	17	17	17	17	68	3.50					
											3.95			
									4.00					
									4.50					
									5.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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JOMAS		**WINDOW/WINDOWLESS SAMPLING BOREHOLE RECORD**	
		Exploratory Hole No:	**WS4**
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA	Project No:	P1381J1460
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	JW	Date Commenced:	05/03/2019
Checked By:	PSw	Date Completed:	05/03/2019
Type and diameter of equipment:	Windowless Sampler	Sheet No:	1 Of 1

Water levels recorded during boring, m						
Date:						
Hole depth:						
Casing depth:						
Level water on strike:						
Water Level after 20mins:						

Remarks

1: No water reported.
2: Borehole terminated at 0.50m bgl due to potential service.
3:
4:

Sample or Tests										Strata			
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
ES	0.25												Brown sandy gravelly clay with occasional rootlets. Sand is fine. Gravel consists of fine to coarse, angular to rounded flint, concrete, asphalt and brick fragments. (MADE GROUND - Topsoil)	
ES	0.45										0.48			
											0.50		Concrete. (MADE GROUND)	

0.00 0.50 1.00 1.50 2.00 2.50 3.00 3.50 4.00 4.50 5.00

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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T: 0843 289 2187 E: info@jomasassociates.com W: www.jomasassociates.com

JOMAS		**WINDOW/WINDOWLESS SAMPLING BOREHOLE RECORD**	
		Exploratory Hole No:	**WS5**
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA	Project No:	P1381J1460
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	JW	Date Commenced:	05/03/2019
Checked By:	PSw	Date Completed:	05/03/2019
Type and diameter of equipment:	Windowless Sampler	Sheet No:	1 Of 1

Water levels recorded during boring, m						
Date:						
Hole depth:						
Casing depth:						
Level water on strike:						
Water Level after 20mins:						

Remarks

1: No water reported.
2: Refusal at 2.45m bgl on very dense sand and gravel deposits.
3:
4:

Sample or Tests										Strata			
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
ES	0.25												Grass over brown clayey gravelly sand with occasional rootlets. Sand is fine. Gravel consists of fine to coarse, angular to rounded flint, brick and concrete. (MADE GROND - Topsoil)	
											0.30			
ES	0.50												Red to grey sandy gravel. Sand is medium. Gravel consists of fine to coarse, angular to sub-rounded flint, brick and concrete fragments. (MADE GROUND)	
											0.70			
SPT	1.00	2	1	1	1	1	1	4					Loose rapidly becoming very dense yellow to brown slightly clayey sandy GRAVEL. Sand is fine to medium. Gravel consists of fine to coarse, sub-angular to rounded flint. (KEMPTON PARK GRAVEL)	
D	1.90													
SPT	2.00	7	14	17	18	18	24	77						
											2.45			

0.00 0.50 1.00 1.50 2.00 2.50 3.00 3.50 4.00 4.50 5.00

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

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JOMAS				WINDOW/WINDOWLESS SAMPLING BOREHOLE RECORD			
				Exploratory Hole No:	WS6		
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA			Project No:	P1381J1460		
Client:	Goldev Woking Ltd			Ground Level:			
Logged By:	JW			Date Commenced:	04/03/2019		
Checked By:	PSw			Date Completed:	04/03/2019		
Type and diameter of equipment:	Windowless Sampler			Sheet No:	1 Of 1		
Water levels recorded during boring, m							
Date:	04/03/2019						
Hole depth:	3.75						
Casing depth:							
Level water on strike:	2.10						
Water Level after 20mins:							
Remarks							
1: Refusal at 3.88m on very dense sand and gravel deposits.							
2:							
3:							
4:							

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
									0.00		0.10		Asphalt. (MADE GROUND)	
ES	0.30										0.50		Red to grey sandy gravel. Sand is medium. Gravel consists of fine to coarse, angular to rounded flint, brick, concrete and asphalt fragments. (MADE GROUND)	
ES	0.60								0.50		0.75		Brown silty gravelly sand. Sand is medium. Gravel consists of fine to coarse, angular to rounded flint, brick and concrete. (MADE GROUND)	
ES	1.00												Green to brown silty slightly gravelly sand. Sand is fine. Gravel consists of fine to medium, sub-angular flint. (MADE GROUND)	
SPT		1	0	2	2	3	3	10	1.00		1.40			
									1.50				Loose to medium dense green to brown to orange slightly silty gravelly SAND. Sand is coarse. Gravel consists of fine to coarse, sub-angular to rounded flint. (KEMPTON PARK GRAVEL)	
D	1.80													
SPT	2.00	9	6	7	4	4	2	17	2.00		2.35			
									2.50				Dense becoming very dense grey mottled orange to brown slightly silty gravelly SAND. Sand is coarse. Gravel consists of fine, rounded flint. (KEMPTON PARK GRAVEL)	
D	2.80													
SPT	3.00	3	6	7	8	7	10	32	3.00					
D	3.30													
SPT	3.50	7	10	14	18	21		53	3.50		3.88			
									4.00					
									4.50					
									5.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample
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JOMAS				WINDOW/WINDOWLESS SAMPLING BOREHOLE RECORD			
				Exploratory Hole No:	WS7		
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA			Project No:	P1381J1460		
Client:	Goldev Woking Ltd			Ground Level:			
Logged By:	JW			Date Commenced:	04/03/2019		
Checked By:	PSw			Date Completed:	04/03/2019		
Type and diameter of equipment:	Windowless Sampler			Sheet No:	1 Of 1		
Water levels recorded during boring, m							
Date:	04/03/2019						
Hole depth:	4.15						
Casing depth:							
Level water on strike:	2.65						
Water Level after 20mins:							
Remarks							
1: Refusal at 4.15m bgl on very dense sand and gravel deposits.							
2:							
3:							
4:							

Sample or Tests										Strata				
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
									0.00		0.08		Asphalt. (MADE GROUND)	
ES	0.25												Red to grey to brown sandy gravel. Sand is medium. Gravel consists of fine to coarse, angular to rounded flint and asphalt. (MADE GROUND)	
ES	0.50								0.50		0.75			
													Dark green to grey silty slightly gravelly sand. Sand is fine. Gravel consists of fine brick and asphalt fragments. (MADE GROUND)	
ES	1.00								1.00		1.10			
SPT		1	2	2	2	3	5	12					Dense green to grey mottled orange to brown silty slightly gravelly SAND. Sand is fine to medium. Gravel consists of fine to medium, sub-anguler to rounded flint. (KEMPTON PARK GRAVEL)	
									1.50					
D	2.00													
SPT		6	7	12	14	10	7	43	2.00		2.90			
									2.50				Very dense light brown occasionally mottled orange to brown slightly gravelly SAND. Sand is coarse. Gravel consists of fine, rounded flint. (KEMPTON PARK GRAVEL)	
D	3.00													
SPT		3	5	6	7	8	7	28	3.00					
									3.50					
SPT	3.70	8	10	14	15	15	16	60						
									4.00		4.15			
									4.50					
									5.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample
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JOMAS				**WINDOW/WINDOWLESS SAMPLING BOREHOLE RECORD**			
				Exploratory Hole No:	**WS8**		
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA			Project No:	P1381J1460		
Client:	Goldev Woking Ltd			Ground Level:			
Logged By:	JW			Date Commenced:	04/03/2019		
Checked By:	PSw			Date Completed:	04/03/2019		
Type and diameter of equipment:	Windowless Sampler			Sheet No:	1 Of 1		
Water levels recorded during boring, m							
Date:	04/03/2019						
Hole depth:	3.95						
Casing depth:							
Level water on strike:	1.10						
Water Level after 20mins:	1.55						
Remarks							
1: Refusal at 3.95m bgl on very dense sand and gravel deposits.							
2:							
3:							
4:							

Sample or Tests										Strata			
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
									0.00					
											0.10		Asphalt. (MADE GROUND)	
ES	0.30										0.40		Red to grey slightly clayey sandy gravel. Sand is medium. Gravel consists of fine to coarse, angular to sub-rounded flint, brick, concrete and asphalt fragments. (MADE GROUND)	
									0.50		0.75		Yellow gravelly sand. Sand is medium to coarse. Gravel consists of fine to coarse, angular flint with occasional brick and asphalt fragments. (MADE GROUND)	
ES	1.00												Dark grey silty gravelly sand. Sand is fine to medium. Gravel consists of fine to coarse, sub-angular to rounded flint. (KEMPTON PARK GRAVEL)	
SPT		5	4	6	5	4	2	17	1.00		1.10		Medium dense brown mottled orange to grey silty slightly gravelly SAND. Sand is fine to medium. Gravel consists of fine, rounded flint. (KEMPTON PARK GRAVEL)	
									1.50					
D	2.00										2.05			
SPT		1	2	3	5	7	8	23	2.00				Medium dense becoming very dense yellow to brown occasionally mottled orange to grey gravelly SAND. Sand is coarse. Gravel consists of fine to medium, sub-rounded to rounded flint. (KEMPTON PARK GRAVEL)	
									2.50					
D	3.00													
SPT		8	5	6	5	5	9	25	3.00					
SPT	3.50	19	12	20	19	19	19	77	3.50					
											3.95			
									4.00					
									4.50					
									5.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample
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JOMAS				**WINDOW/WINDOWLESS SAMPLING BOREHOLE RECORD**			
				Exploratory Hole No:	**WS9**		
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA			Project No:	P1381J1460		
Client:	Goldev Woking Ltd			Ground Level:			
Logged By:	JW			Date Commenced:	04/03/2019		
Checked By:	PSw			Date Completed:	04/03/2019		
Type and diameter of equipment:	Windowless Sampler			Sheet No:	1 Of 1		
Water levels recorded during boring, m							
Date:	04/03/2019						
Hole depth:	3.75						
Casing depth:							
Level water on strike:	1.50						
Water Level after 20mins:							
Remarks							
1: Refusal at 3.75m bgl on very dense sand deposits.							
2: * Field description							
3:							
4:							

Sample or Tests										Strata			
Type	Depth (mbgl)	Result								Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N						
									0.00					
											0.12		Asphalt. (MADE GROUND)	
ES	0.20												Red to grey sandy gravel. Sand is medium. Gravel consists of fine to coarse, angular to sub-rounded flint, brick, concrete and asphalt fragments. (MADE GROUND)	
											0.30			
ES	0.50								0.50				Brown slightly clayey gravelly sand. Sand is fine. Gravel consists of fine to medium, angular to sub-rounded flint with occasional brick and asphalt fragments. (MADE GROUND)	
											0.70			
ES	0.90												Dense orange to brown occasionally mottled green to grey silty gravelly SAND. Sand is fine to medium. Gravel consists of fine to coarse sub-angular to rounded flint. (KEMPTON PARK GRAVEL)	
SPT	1.00	5	8	9	11	8	8	36	1.00					
									1.50					
D	1.50										1.60			
													Medium dense* grey mottled orange to brown silty slightly gravelly SAND. Sand is fine. Gravel consists of fine, sub-rounded to rounded flint. (KEMPTON PARK GRAVEL)	
SPT	2.00	2	2	3	3	4	6	16	2.00		2.00			
													Medium dense becoming very dense light orange to brown to grey SAND. Sand is coarse. (BAGSHOT FORMATION)	
D	2.50								2.50					
SPT	3.00	2	3	5	9	9	9	32	3.00					
											3.75			
SPT	3.50	9	17	22	26	30		78	3.50					
									4.00					
									4.50					
									5.00					

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample
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WINDOW/WINDOWLESS SAMPLING BOREHOLE RECORD

Exploratory Hole No:	**WS10**		
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA	Project No:	P1381J1460
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	JW	Date Commenced:	04/03/2019
Checked By:	PSw	Date Completed:	04/03/2019
Type and diameter of equipment:	Windowless Sampler	Sheet No:	1 Of 1

Water levels recorded during boring, m

Date:	04/03/2019					
Hole depth:	3.95					
Casing depth:						
Level water on strike:	3.00					
Water Level after 20mins:						

Remarks

1: Refusal at 3.95m bgl on very dense silty sand deposits.
2:
3:
4:

Sample or Tests									Strata				
Type	Depth (mbgl)	Result							Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N					
										0.15		Asphalt. (MADE GROUND)	
ES	0.25									0.30		Brown sandy gravel. Gravel consists of fine to coarse, sub-angular to sub-rounded flint, brick and asphalt fragments. (MADE GROUND)	
ES	0.50											Green to grey silty gravelly SAND. Gravel consists of fine to coarse, sub-rounded to rounded flint. (KEMPTON PARK GRAVEL)	
ES	1.00									1.10			
SPT		2	5	6	8	8	6	28				Medium dense green to orange slightly gravelly SAND. Sand is medium to coarse. Gravel consists of fine, sub-rounded to rounded flint. (KEMPTON PARK GRAVEL)	
D	2.00									2.30			
SPT		2	1	2	1	2	3	8					
												Medium dense becoming very dense grey occasionally mottled orange slightly silty SAND. Sand is coarse. (BAGSHOT FORMATION)	
D	3.00												
SPT		4	5	5	4	4	11	24					
SPT	3.60	7	8	17	24	26		67		3.95			

0.00, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample

Jomas Associates Ltd - Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD
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APPENDIX 3 – CHEMICAL LABORATORY TEST RESULTS

Emma Hucker
Jomas Associates Ltd
Lakeside House
1 Furzeground Way
Stockley Park
UB11 1BD

e: Jomas Associates -

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
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Analytical Report Number : 19-32465

Replaces Analytical Report Number : 19-32465, issue no. 1

Project / Site name:	Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA	**Samples received on:**	05/03/2019
Your job number:	JJ1460	**Samples instructed on:**	11/03/2019
Your order number:	P1381JJ1460.8	**Analysis completed by:**	22/03/2019
Report Issue Number:	2	**Report issued on:**	22/03/2019
Samples Analysed:	17 soil samples		

Signed:

Rexona Rahman
Head of Customer Services
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Iss No 19-32465-2 Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA JJ1460
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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 19-32465

Project / Site name: Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA
Your Order No: P1381JJ1460.8

Lab Sample Number				1174615	1174616	1174617	1174618	1174619
Sample Reference				WS1	WS1	WS2	WS3	WS3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.50	0.40	0.90
Date Sampled				05/03/2019	05/03/2019	05/03/2019	05/03/2019	05/03/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	15	15	6.3	8.6	11
Total mass of sample received	kg	0.001	NONE	1.1	1.6	1.5	1.3	1.3
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	Amosite	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	Not-detected	Detected	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	< 0.001	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	< 0.001	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.7	7.9	8.8	9.5	8.4
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO_4	mg/kg	50	MCERTS	980	450	1300	32000	9400
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.28	0.19	0.18	1.9	1.9
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	283	193	181	1940	1920
Total Organic Carbon (TOC)	%	0.1	MCERTS	3.7	-	-	0.8	-
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.63	< 0.05	0.77	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	2.1	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.35	< 0.05	1.8	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	1.4	< 0.05	33	0.75	0.28
Anthracene	mg/kg	0.05	MCERTS	0.54	< 0.05	10	0.20	0.13
Fluoranthene	mg/kg	0.05	MCERTS	2.6	0.36	45	1.1	0.61
Pyrene	mg/kg	0.05	MCERTS	2.4	0.28	37	0.94	0.62
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.6	< 0.05	21	0.54	0.42
Chrysene	mg/kg	0.05	MCERTS	1.4	< 0.05	17	0.56	0.33
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	2.1	< 0.05	21	0.57	0.48
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.87	< 0.05	8.7	0.35	0.28
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.7	< 0.05	18	0.55	0.42
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.90	< 0.05	7.9	0.32	0.25
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.36	< 0.05	2.6	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.1	< 0.05	9.0	0.40	0.31
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	17.9	< 0.80	234	6.24	4.13

Analytical Report Number: 19-32465

Project / Site name: Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA
Your Order No: P1381JJ1460.8

Lab Sample Number				1174615	1174616	1174617	1174618	1174619
Sample Reference				WS1	WS1	WS2	WS3	WS3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.50	0.40	0.90
Date Sampled				05/03/2019	05/03/2019	05/03/2019	05/03/2019	05/03/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	40	4.7	7.5	12	14
Boron (water soluble)	mg/kg	0.2	MCERTS	11	2.6	0.7	4.8	5.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	< 0.2	< 0.2	0.2	0.3
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	23	11	19	23	21
Copper (aqua regia extractable)	mg/kg	1	MCERTS	140	7.9	20	38	40
Lead (aqua regia extractable)	mg/kg	1	MCERTS	930	29	71	69	60
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	3.0	< 0.3	< 0.3	< 0.3	0.4
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	33	5.3	8.4	16	10
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	380	19	63	140	160
Monoaromatics & Oxygenates								
Benzene	ug/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
p & m-xylene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
o-xylene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	< 0.1	-
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	< 0.001	-	-	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	-	-	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	-	-	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	-	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	< 8.0	-	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	< 8.0	-	-	12
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	< 10	-	-	12
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	< 0.001	-	-	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	-	-	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	-	-	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	-	-	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	< 10	-	-	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	< 10	-	-	20
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	< 10	-	-	25
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	-	< 2.0	< 2.0	-
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	-	20	< 4.0	-
TPH (C16 - C21)	mg/kg	1	MCERTS	7.8	-	270	4.7	-
TPH (C21 - C40)	mg/kg	10	MCERTS	120	-	1200	530	-
TPH Texas (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	< 0.1	-

Analytical Report Number: 19-32465

Project / Site name: Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA
Your Order No: P1381JJ1460.8

Lab Sample Number				1174615	1174616	1174617	1174618	1174619
Sample Reference				WS1	WS1	WS2	WS3	WS3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.50	0.40	0.90
Date Sampled				05/03/2019	05/03/2019	05/03/2019	05/03/2019	05/03/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Chloroethane	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
Bromomethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Vinyl Chloride	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
Trichlorofluoromethane	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
1,1-Dichloroethene	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,1-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
2,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Trichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,2-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,1-Dichloropropene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
Benzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Tetrachloromethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Trichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Dibromomethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Bromodichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Tetrachloroethene	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Chlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
p & m-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Styrene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Tribromomethane	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
o-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Isopropylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Bromobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
n-Propylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
2-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
4-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
tert-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Hexachlorobutadiene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0

Analytical Report Number: 19-32465

Project / Site name: Woking Football Club, Kingfield Road, Woking, Surr
Your Order No: P1381JJ1460.8

Lab Sample Number				1174620	1174621	1174622	1174623	1174624
Sample Reference				WS4	WS5	WS6	WS6	WS7
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.25	0.25	0.30	1.00	0.50
Date Sampled				04/03/2019	05/03/2019	05/03/2019	04/03/2019	04/03/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	9.3	7.4	7.2	15	15
Total mass of sample received	kg	0.001	NONE	1.3	1.4	1.3	1.6	1.2
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	-	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.7	10.5	10.3	7.7	9.9
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO_4	mg/kg	50	MCERTS	540	720	2300	250	1300
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.018	0.084	0.35	0.045	0.18
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	18.4	84.3	350	45.3	183
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	0.7	0.9	-	0.7
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.43	< 0.05	1.3
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.12	< 0.05	0.24
Fluoranthene	mg/kg	0.05	MCERTS	0.35	0.38	0.75	< 0.05	2.3
Pyrene	mg/kg	0.05	MCERTS	0.38	0.31	0.80	< 0.05	2.0
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.25	0.24	0.46	< 0.05	0.63
Chrysene	mg/kg	0.05	MCERTS	0.19	0.18	0.32	< 0.05	0.49
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.30	0.27	0.53	< 0.05	0.44
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.17	0.14	0.20	< 0.05	0.20
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.31	0.25	0.43	< 0.05	0.34
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.20	< 0.05	0.22	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.24	< 0.05	0.29	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	2.39	1.77	4.55	< 0.80	8.00

Analytical Report Number: 19-32465

Project / Site name: Woking Football Club, Kingfield Road, Woking, Surr
Your Order No: P1381JJ1460.8

Lab Sample Number				1174620	1174621	1174622	1174623	1174624
Sample Reference				WS4	WS5	WS6	WS6	WS7
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.25	0.25	0.30	1.00	0.50
Date Sampled				04/03/2019	05/03/2019	05/03/2019	04/03/2019	04/03/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.6	17	12	5.2	13
Boron (water soluble)	mg/kg	0.2	MCERTS	0.8	0.3	1.7	0.5	1.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.4	0.7	< 0.2	0.3
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15	12	13	14	18
Copper (aqua regia extractable)	mg/kg	1	MCERTS	14	14	19	6.0	27
Lead (aqua regia extractable)	mg/kg	1	MCERTS	44	49	77	9.3	71
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	7.9	7.2	14	5.6	13
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	55	80	99	18	69
Monoaromatics & Oxygenates								
Benzene	ug/kg	1	MCERTS	-	-	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
o-xylene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	-	< 0.1
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	< 2.0	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	< 8.0	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	< 8.0	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	< 10	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	< 2.0	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	< 10	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	< 10	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	< 10	-
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	-	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	-	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	4.8	< 1.0	3.9	-	16
TPH (C21 - C40)	mg/kg	10	MCERTS	140	< 10	690	-	160
TPH Texas (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	-	< 0.1

Analytical Report Number: 19-32465

Project / Site name: Woking Football Club, Kingfield Road, Woking, Surr
Your Order No: P1381JJ1460.8

Lab Sample Number				1174620	1174621	1174622	1174623	1174624
Sample Reference				WS4	WS5	WS6	WS6	WS7
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.25	0.25	0.30	1.00	0.50
Date Sampled				04/03/2019	05/03/2019	05/03/2019	04/03/2019	04/03/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Chloroethane	µg/kg	1	NONE	-	-	-	< 1.0	-
Bromomethane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Vinyl Chloride	µg/kg	1	NONE	-	-	-	< 1.0	-
Trichlorofluoromethane	µg/kg	1	NONE	-	-	-	< 1.0	-
1,1-Dichloroethene	µg/kg	1	NONE	-	-	-	< 1.0	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Trichloromethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-	-	< 1.0	-
Benzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Tetrachloromethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Trichloroethene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Dibromomethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Bromodichloromethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Tetrachloroethene	µg/kg	1	NONE	-	-	-	< 1.0	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
p & m-Xylene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Styrene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Tribromomethane	µg/kg	1	NONE	-	-	-	< 1.0	-
o-Xylene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Isopropylbenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Bromobenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Butylbenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-	-	< 1.0	-

Analytical Report Number: 19-32465

Project / Site name: Woking Football Club, Kingfield Road, Woking, Surr
Your Order No: P1381JJ1460.8

Lab Sample Number				1174625	1174626	1174627	1174628	1174629
Sample Reference				WS7	WS8	WS9	WS9	WS10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.30	0.20	0.50	0.25
Date Sampled				04/03/2019	04/03/2019	04/03/2019	04/03/2019	04/03/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	17	22	< 0.1	26
Moisture Content	%	N/A	NONE	16	3.3	2.0	7.7	6.7
Total mass of sample received	kg	0.001	NONE	1.5	1.4	1.4	1.3	1.5
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	-	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.2	8.9	9.5	8.0	9.5
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO_4	mg/kg	50	MCERTS	310	3000	890	360	580
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.12	0.058	0.062	0.068	0.079
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	117	57.8	61.5	68.0	78.7
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	1.0	1.2	-	0.8
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.2	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.38	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	2.9	0.30	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	2.8	0.35	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.6	0.20	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.1	0.17	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	2.0	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.63	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.8	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.89	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.34	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.1	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	16.7	1.02	< 0.80

Analytical Report Number: 19-32465

Project / Site name: Woking Football Club, Kingfield Road, Woking, Surr
Your Order No: P1381JJ1460.8

Lab Sample Number				1174625	1174626	1174627	1174628	1174629
Sample Reference				WS7	WS8	WS9	WS9	WS10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.30	0.20	0.50	0.25
Date Sampled				04/03/2019	04/03/2019	04/03/2019	04/03/2019	04/03/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	5.0	11	17	5.3	5.9
Boron (water soluble)	mg/kg	0.2	MCERTS	0.6	0.5	0.3	0.5	0.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.4	1.4	< 0.2	0.5
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	10	7.6	9.2	11	7.3
Copper (aqua regia extractable)	mg/kg	1	MCERTS	7.6	11	7.3	10	7.7
Lead (aqua regia extractable)	mg/kg	1	MCERTS	22	14	34	28	20
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	3.9	6.4	6.3	5.1	3.7
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	24	56	130	25	56
Monoaromatics & Oxygenates								
Benzene	ug/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
o-xylene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-	< 0.1
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	-	< 2.0	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	-	-	< 8.0	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	-	-	< 8.0	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	-	< 10	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-	-	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	-	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	-	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	-	< 2.0	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	-	-	< 10	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	-	-	< 10	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	-	< 10	-
TPH (C10 - C12)	mg/kg	2	MCERTS	-	< 2.0	< 2.0	-	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	-	< 4.0	16	-	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	-	5.2	47	-	< 1.0
TPH (C21 - C40)	mg/kg	10	MCERTS	-	280	520	-	190
TPH Texas (C6 - C8)	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-	< 0.1

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Project / Site name: Woking Football Club, Kingfield Road, Woking, Surr
Your Order No: P1381JJ1460.8

Lab Sample Number				1174625	1174626	1174627	1174628	1174629
Sample Reference				WS7	WS8	WS9	WS9	WS10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.30	0.20	0.50	0.25
Date Sampled				04/03/2019	04/03/2019	04/03/2019	04/03/2019	04/03/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
Chloroethane	µg/kg	1	NONE	< 1.0	-	-	< 1.0	-
Bromomethane	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
Vinyl Chloride	µg/kg	1	NONE	< 1.0	-	-	< 1.0	-
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	-	-	< 1.0	-
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	-	-	< 1.0	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Trichloromethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	-	-	< 1.0	-
Benzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Trichloroethene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Dibromomethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
Tetrachloroethene	µg/kg	1	NONE	< 1.0	-	-	< 1.0	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Styrene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Tribromomethane	µg/kg	1	NONE	< 1.0	-	-	< 1.0	-
o-Xylene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Bromobenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-

Analytical Report Number: 19-32465

Project / Site name: Woking Football Club, Kingfield Road, Woking, Surr
Your Order No: P1381JJ1460.8

Lab Sample Number				1174630	1174631			
Sample Reference				WS1	WS7			
Sample Number				None Supplied	None Supplied			
Depth (m)				3.00	2.00			
Date Sampled				05/03/2019	04/03/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	15	17			
Total mass of sample received	kg	0.001	NONE	1.1	1.1			
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-			
Asbestos in Soil	Type	N/A	ISO 17025	-	-			
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-			
Asbestos Quantification Total	%	0.001	ISO 17025	-	-			
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.1	7.2			
Total Cyanide	mg/kg	1	MCERTS	-	-			
Total Sulphate as SO_4	mg/kg	50	MCERTS	-	-			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0092	0.015			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	-			
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-			
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-			
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	-	-			
Acenaphthylene	mg/kg	0.05	MCERTS	-	-			
Acenaphthene	mg/kg	0.05	MCERTS	-	-			
Fluorene	mg/kg	0.05	MCERTS	-	-			
Phenanthrene	mg/kg	0.05	MCERTS	-	-			
Anthracene	mg/kg	0.05	MCERTS	-	-			
Fluoranthene	mg/kg	0.05	MCERTS	-	-			
Pyrene	mg/kg	0.05	MCERTS	-	-			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-			
Chrysene	mg/kg	0.05	MCERTS	-	-			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-			
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	-			

Analytical Report Number: 19-32465

Project / Site name: Woking Football Club, Kingfield Road, Woking, Surr
Your Order No: P1381JJ1460.8

Lab Sample Number				1174630	1174631			
Sample Reference				WS1	WS7			
Sample Number				None Supplied	None Supplied			
Depth (m)				3.00	2.00			
Date Sampled				05/03/2019	04/03/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	-			
Boron (water soluble)	mg/kg	0.2	MCERTS	-	-			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-			
Chromium (hexavalent)	mg/kg	4	MCERTS	-	-			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	-			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	-			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	-			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	-			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	-			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	-			
Monoaromatics & Oxygenates								
Benzene	ug/kg	1	MCERTS	-	-			
Toluene	µg/kg	1	MCERTS	-	-			
Ethylbenzene	µg/kg	1	MCERTS	-	-			
p & m-xylene	µg/kg	1	MCERTS	-	-			
o-xylene	µg/kg	1	MCERTS	-	-			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-			
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	-	-			
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-			
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-			
TPH (C10 - C12)	mg/kg	2	MCERTS	-	-			
TPH (C12 - C16)	mg/kg	4	MCERTS	-	-			
TPH (C16 - C21)	mg/kg	1	MCERTS	-	-			
TPH (C21 - C40)	mg/kg	10	MCERTS	-	-			
TPH Texas (C6 - C8)	mg/kg	0.1	MCERTS	-	-			

Analytical Report Number: 19-32465
Project / Site name: Woking Football Club, Kingfield Road, Woking, Sur
Your Order No: P1381JJ1460.8

Lab Sample Number				1174630	1174631			
Sample Reference				WS1	WS7			
Sample Number				None Supplied	None Supplied			
Depth (m)				3.00	2.00			
Date Sampled				05/03/2019	04/03/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	-			
Chloroethane	µg/kg	1	NONE	-	-			
Bromomethane	µg/kg	1	ISO 17025	-	-			
Vinyl Chloride	µg/kg	1	NONE	-	-			
Trichlorofluoromethane	µg/kg	1	NONE	-	-			
1,1-Dichloroethene	µg/kg	1	NONE	-	-			
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-			
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-			
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-			
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-			
Trichloromethane	µg/kg	1	MCERTS	-	-			
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-			
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-			
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-			
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-			
Benzene	µg/kg	1	MCERTS	-	-			
Tetrachloromethane	µg/kg	1	MCERTS	-	-			
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-			
Trichloroethene	µg/kg	1	MCERTS	-	-			
Dibromomethane	µg/kg	1	MCERTS	-	-			
Bromodichloromethane	µg/kg	1	MCERTS	-	-			
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-			
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-			
Toluene	µg/kg	1	MCERTS	-	-			
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-			
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-			
Dibromochloromethane	µg/kg	1	ISO 17025	-	-			
Tetrachloroethene	µg/kg	1	NONE	-	-			
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-			
Chlorobenzene	µg/kg	1	MCERTS	-	-			
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-			
Ethylbenzene	µg/kg	1	MCERTS	-	-			
p & m-Xylene	µg/kg	1	MCERTS	-	-			
Styrene	µg/kg	1	MCERTS	-	-			
Tribromomethane	µg/kg	1	NONE	-	-			
o-Xylene	µg/kg	1	MCERTS	-	-			
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-			
Isopropylbenzene	µg/kg	1	MCERTS	-	-			
Bromobenzene	µg/kg	1	MCERTS	-	-			
n-Propylbenzene	µg/kg	1	ISO 17025	-	-			
2-Chlorotoluene	µg/kg	1	MCERTS	-	-			
4-Chlorotoluene	µg/kg	1	MCERTS	-	-			
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-			
tert-Butylbenzene	µg/kg	1	MCERTS	-	-			
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-			
sec-Butylbenzene	µg/kg	1	MCERTS	-	-			
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-			
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-			
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-			
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-			
Butylbenzene	µg/kg	1	MCERTS	-	-			
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-			
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-			
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-			
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-			

Analytical Report Number: 19-32465
Project / Site name: Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA
Your Order No: P1381JJ1460.8

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1174618	WS3	0.40	120	Loose Fibres	**Amosite**	< 0.001	**< 0.001**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Analytical Report Number : 19-32465

Project / Site name: Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1174615	WS1	None Supplied	0.50	Brown loam and sand with gravel.
1174616	WS1	None Supplied	1.00	Brown loam and sand with gravel.
1174617	WS2	None Supplied	0.50	Brown loam and sand with gravel.
1174618	WS3	None Supplied	0.40	Brown sand with gravel and brick.
1174619	WS3	None Supplied	0.90	Brown sand with gravel and brick.
1174620	WS4	None Supplied	0.25	Brown loam and sand with gravel and vegetation.
1174621	WS5	None Supplied	0.25	Brown loam and sand with vegetation and gravel.
1174622	WS6	None Supplied	0.30	Brown sand with gravel and brick.
1174623	WS6	None Supplied	1.00	Light brown sandy clay.
1174624	WS7	None Supplied	0.50	Brown clay and sand with gravel and brick.
1174625	WS7	None Supplied	1.00	Brown sandy clay with vegetation.
1174626	WS8	None Supplied	0.30	Brown gravelly sand with stones.
1174627	WS9	None Supplied	0.20	Light brown sand with gravel and stones.
1174628	WS9	None Supplied	0.50	Brown sandy loam with vegetation and gravel
1174629	WS10	None Supplied	0.25	Brown clay and sand with gravel and stones.
1174630	WS1	None Supplied	3.00	Light brown sand.
1174631	WS7	None Supplied	2.00	Brown sandy clay.

Analytical Report Number : 19-32465

Project / Site name: Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
PRO (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS

Iss No 19-32465-2 Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA JJ1460
This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 19-32465

Project / Site name: Woking Football Club, Kingfield Road, Woking, Surrey, GU22 9AA

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
WS10		S	19-32465	1174629	c	Total cyanide in soil	L080-PL	c
WS4		S	19-32465	1174620	c	Total cyanide in soil	L080-PL	c
WS6		S	19-32465	1174623	c	Total cyanide in soil	L080-PL	c
WS7		S	19-32465	1174624	c	Total cyanide in soil	L080-PL	c
WS7		S	19-32465	1174625	c	Total cyanide in soil	L080-PL	c
WS8		S	19-32465	1174626	c	Total cyanide in soil	L080-PL	c
WS9		S	19-32465	1174627	c	Total cyanide in soil	L080-PL	c
WS9		S	19-32465	1174628	c	Total cyanide in soil	L080-PL	c

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature

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Analytical Report Number : 19-31350

Replaces Analytical Report Number : 19-31350, issue no. 1

Project / Site name:	Woking Football Club Kingfield Road, Woking, Surrey, GU22 9AA	**Samples received on:**	21/02/2019
Your job number:	JJ1460	**Samples instructed on:**	27/02/2019
Your order number:	P1381JJ1460.4	**Analysis completed by:**	22/03/2019
Report Issue Number:	2	**Report issued on:**	22/03/2019
Samples Analysed:	3 soil samples		

Signed:

Rexona Rahman
Head of Customer Services
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Analytical Report Number: 19-31350

Project / Site name: Woking Football Club Kingfield Road, Woking, Surrey, GU22 9AA
Your Order No: P1381JJ1460.4

Lab Sample Number				1168612	1168613	1168614		
Sample Reference				BH1	BH1	BH2		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.20	2.50	5.50		
Date Sampled				20/02/2019	20/02/2019	20/02/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	50	< 0.1	< 0.1		
Moisture Content	%	N/A	NONE	10	16	17		
Total mass of sample received	kg	0.001	NONE	1.1	0.44	0.47		
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile & Crocidolite	-	-		
Asbestos in Soil	Type	N/A	ISO 17025	Detected	-	-		
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	0.013	-	-		
Asbestos Quantification Total	%	0.001	ISO 17025	0.013	-	-		
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	11.7	9.0	9.0		
Total Cyanide	mg/kg	1	MCERTS	< 1	-	-		
Total Sulphate as SO_4	mg/kg	50	MCERTS	4100	-	-		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.14	0.089	0.073		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	141	-	-		
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	-		
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	-		
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	-		
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	-		
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	-		
Phenanthrene	mg/kg	0.05	MCERTS	0.24	-	-		
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-		
Fluoranthene	mg/kg	0.05	MCERTS	0.38	-	-		
Pyrene	mg/kg	0.05	MCERTS	0.33	-	-		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-		
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-	-		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	-		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	-		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	-		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	-		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	-		
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	0.95	-	-		

Analytical Report Number: 19-31350

Project / Site name: Woking Football Club Kingfield Road, Woking, Surrey, GU22 9AA
Your Order No: P1381JJ1460.4

Lab Sample Number				1168612	1168613	1168614		
Sample Reference				BH1	BH1	BH2		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.20	2.50	5.50		
Date Sampled				20/02/2019	20/02/2019	20/02/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.8	-	-		
Boron (water soluble)	mg/kg	0.2	MCERTS	0.8	-	-		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.2	-	-		
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-	-		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	16	-	-		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	30	-	-		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	31	-	-		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	-		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	-	-		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	-		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	69	-	-		
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	-	-		
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	-	-		
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	-	-		
TPH (C16 - C21)	mg/kg	1	MCERTS	8.2	-	-		
TPH (C21 - C40)	mg/kg	10	MCERTS	480	-	-		
TPH Texas (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	-	-		

The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: **19-31350**
Project / Site name: **Woking Football Club Kingfield Road, Woking, Surrey, GU22 9AA**
Your Order No: **P1381JJ1460.4**

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1168612	BH1	0.20	148	Hard/ Cement Type Material & Loose Fibres	**Chrysotile & Crocidolite**	0.013	**0.013**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 19-31350

Project / Site name: Woking Football Club Kingfield Road, Woking, Surrey, GU22 9AA

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1168612	BH1	None Supplied	0.20	Brown clay and gravel with stones and tar.
1168613	BH1	None Supplied	2.50	Light grey sandy clay.
1168614	BH2	None Supplied	5.50	Light brown sandy clay.

Analytical Report Number : 19-31350

Project / Site name: Woking Football Club Kingfield Road, Woking, Surrey, GU22 9AA

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
PRO (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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The results included within the report are representative of the samples submitted for analysis.

Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
BH1		S	19-31350	1168612	c	Total cyanide in soil	L080-PL	c

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature

APPENDIX 4 – GEOTECHNICAL LABORATORY TEST RESULTS

4041

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

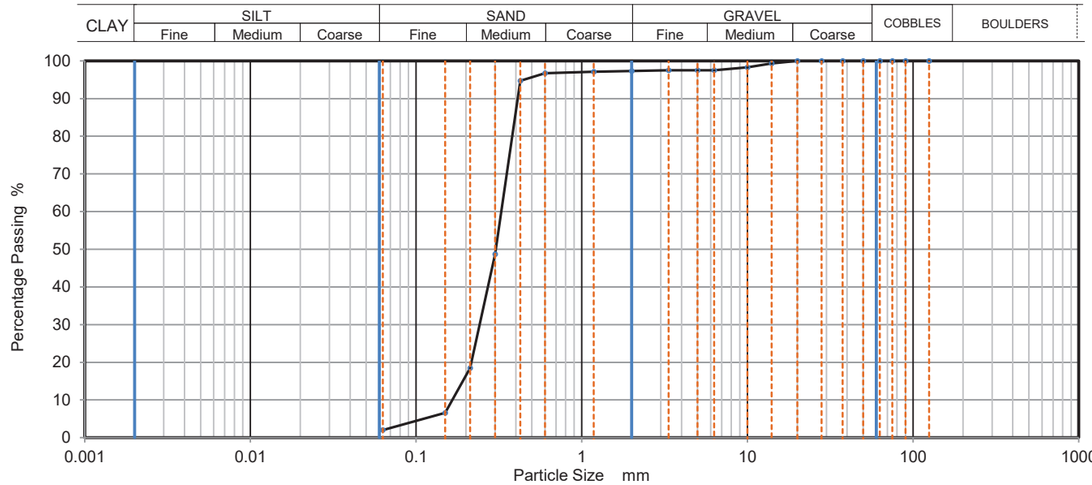
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Environmental Science

Client:	Jomas Associates Ltd	Client Reference:	JJ1460
Client Address:	Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD	Job Number:	19-32658
		Date Sampled:	20/02/2019
		Date Received:	21/02/2019
Contact:	Emma Hucker	Date Tested:	18/03/2019
Site Name:	Woking Football Club, Kingfield Road, Woking	Sampled By:	Not Given
Site Address:	Woking Football Club, Kingfield Road, Woking		

Test Results:

Laboratory Reference:	1175812	Depth Top [m]:	6.50
Hole No.:	BH1	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Grey slightly gravelly slightly clayey SAND		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	98		
6.3	98		
5	98		
3.35	98		
2	97		
1.18	97		
0.6	97		
0.425	95		
0.3	49		
0.212	19		
0.15	7		
0.063	2		

Dry Mass of sample [g]: 1012

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	2.70
Sand	94.90
Fines <0.063mm	2.40

Grading Analysis		
D100	mm	20
D60	mm	0.327
D30	mm	0.242
D10	mm	0.166
Uniformity Coefficient		2
Curvature Coefficient		1.1

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 26/03/2019

Signed: Darren Berrill
Geotechnical General Manager

GF 100.10

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
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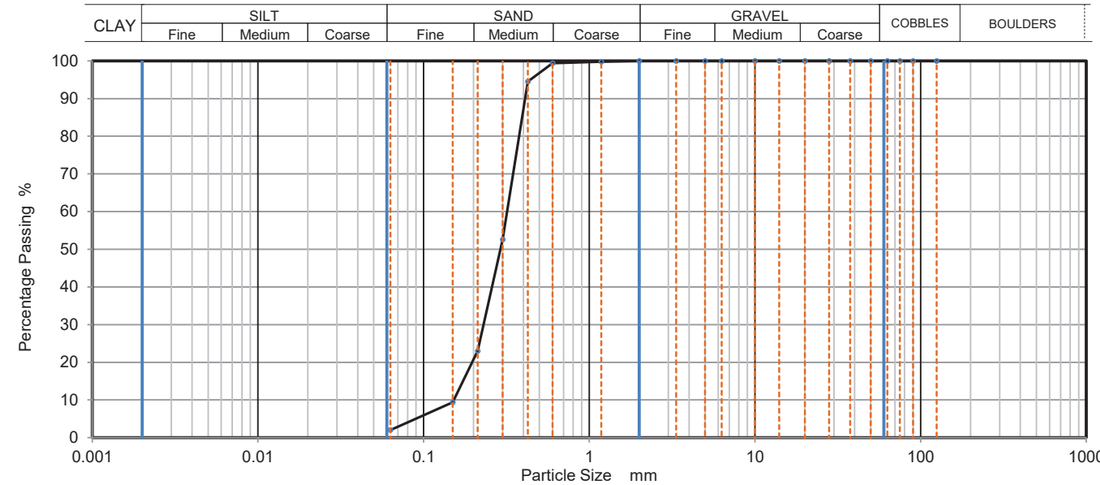
Watford Herts WD18 8YS

Environmental Science

Client:	Jomas Associates Ltd	Client Reference:	JJ1460
Client Address:	Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD	Job Number:	19-32658
		Date Sampled:	20/02/2019
		Date Received:	21/02/2019
Contact:	Emma Hucker	Date Tested:	18/03/2019
Site Name:	Woking Football Club, Kingfield Road, Woking	Sampled By:	Not Given
Site Address:	Woking Football Club, Kingfield Road, Woking		

Test Results:

Laboratory Reference:	1175813	Depth Top [m]:	10.50
Hole No.:	BH1	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Grey slightly clayey SAND		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	99		
0.425	95		
0.3	53		
0.212	23		
0.15	9		
0.063	3		

Dry Mass of sample [g]: 404

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.00
Sand	97.30
Fines <0.063mm	2.70

Grading Analysis		
D100	mm	2
D60	mm	0.319
D30	mm	0.23
D10	mm	0.152
Uniformity Coefficient		2.1
Curvature Coefficient		1.1

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 26/03/2019

Signed: Darren Berrill
Geotechnical General Manager

GF 100.10

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The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland."

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

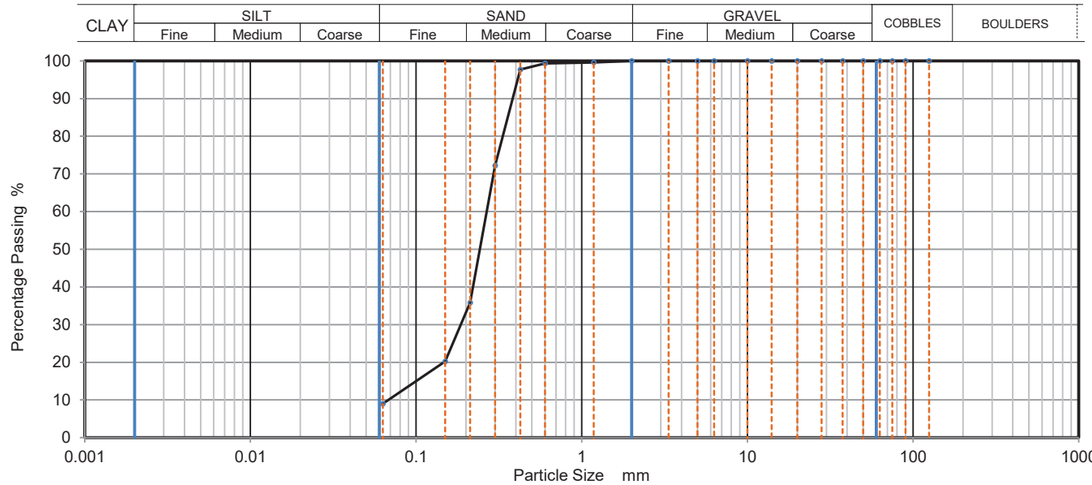
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Environmental Science

Client:	Jomas Associates Ltd	Client Reference:	JJ1460
Client Address:	Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD	Job Number:	19-32658
		Date Sampled:	20/02/2019
		Date Received:	21/02/2019
Contact:	Emma Hucker	Date Tested:	18/03/2019
Site Name:	Woking Football Club, Kingfield Road, Woking	Sampled By:	Not Given
Site Address:	Woking Football Club, Kingfield Road, Woking		

Test Results:

Laboratory Reference:	1175814	Depth Top [m]:	14.50
Hole No.:	BH1	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brownish grey slightly clayey SAND		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	99		
0.425	98		
0.3	72		
0.212	36		
0.15	20		
0.063	10		

Dry Mass of sample [g]: 594

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.00
Sand	90.20
Fines <0.063mm	9.80

Grading Analysis		
D100	mm	2
D60	mm	0.267
D30	mm	0.186
D10	mm	0.0643
Uniformity Coefficient		4.2
Curvature Coefficient		2

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 26/03/2019

Signed: Darren Berrill
Geotechnical General Manager

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for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Particle Size Distribution

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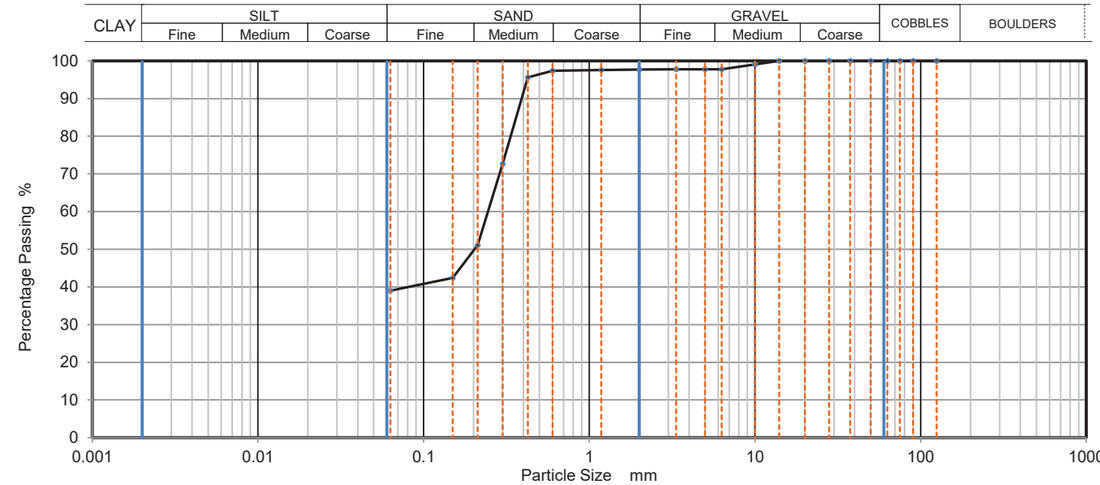
Environmental Science

Client:	Jomas Associates Ltd	Client Reference:	JJ1460
Client Address:	Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD	Job Number:	19-32658
		Date Sampled:	20/02/2019
		Date Received:	21/02/2019
Contact:	Emma Hucker	Date Tested:	18/03/2019
Site Name:	Woking Football Club, Kingfield Road, Woking	Sampled By:	Not Given
Site Address:	Woking Football Club, Kingfield Road, Woking		

Test Results:

Laboratory Reference:	1175815	Depth Top [m]:	4.50
Hole No.:	BH2	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brownish grey slightly gravelly very clayey SAND		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	98		
5	98		
3.35	98		
2	98		
1.18	98		
0.6	97		
0.425	96		
0.3	73		
0.212	51		
0.15	42		
0.063	39		

Dry Mass of sample [g]: 368

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	2.30
Sand	58.60
Fines <0.063mm	39.10

Grading Analysis		
D100	mm	14
D60	mm	0.244
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 26/03/2019

Signed: Darren Berrill
Geotechnical General Manager

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for and on behalf of i2 Analytical Ltd

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Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

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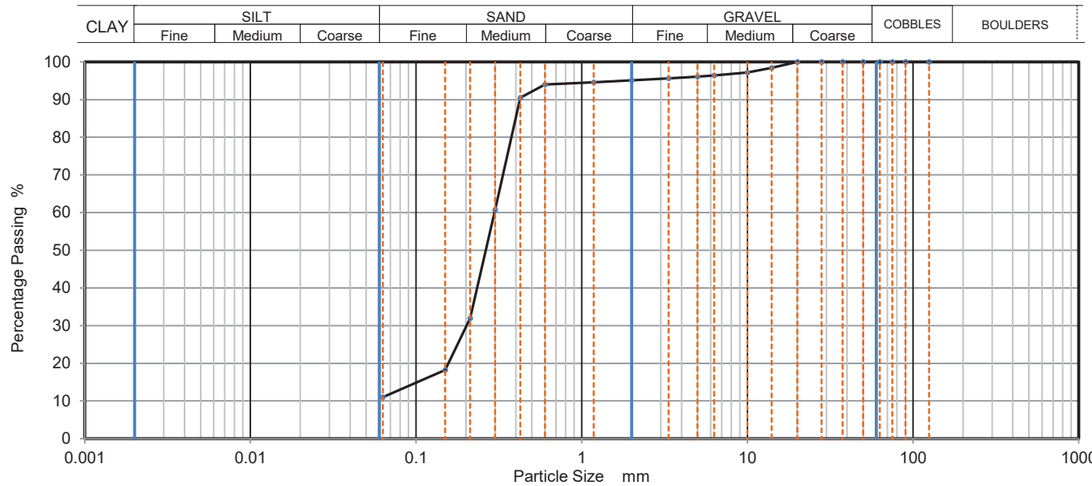
Watford Herts WD18 8YS

Environmental Science

Client:	Jomas Associates Ltd	Client Reference:	JJ1460
Client Address:	Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD	Job Number:	19-32658
		Date Sampled:	20/02/2019
		Date Received:	21/02/2019
Contact:	Emma Hucker	Date Tested:	18/03/2019
Site Name:	Woking Football Club, Kingfield Road, Woking	Sampled By:	Not Given
Site Address:	Woking Football Club, Kingfield Road, Woking		

Test Results:

Laboratory Reference:	1175816	Depth Top [m]:	7.50
Hole No.:	BH2	Depth Base [m]:	8.00
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brownish grey slightly gravelly clayey SAND		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	98		
10	97		
6.3	96		
5	96		
3.35	96		
2	95		
1.18	95		
0.6	94		
0.425	91		
0.3	61		
0.212	32		
0.15	18		
0.063	12		

Dry Mass of sample [g]: 1006

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	4.90
Sand	83.40
Fines <0.063mm	11.70

Grading Analysis		
D100	mm	20
D60	mm	0.298
D30	mm	0.202
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 26/03/2019

Signed: Darren Berrill
Geotechnical General Manager

GF 100.10

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

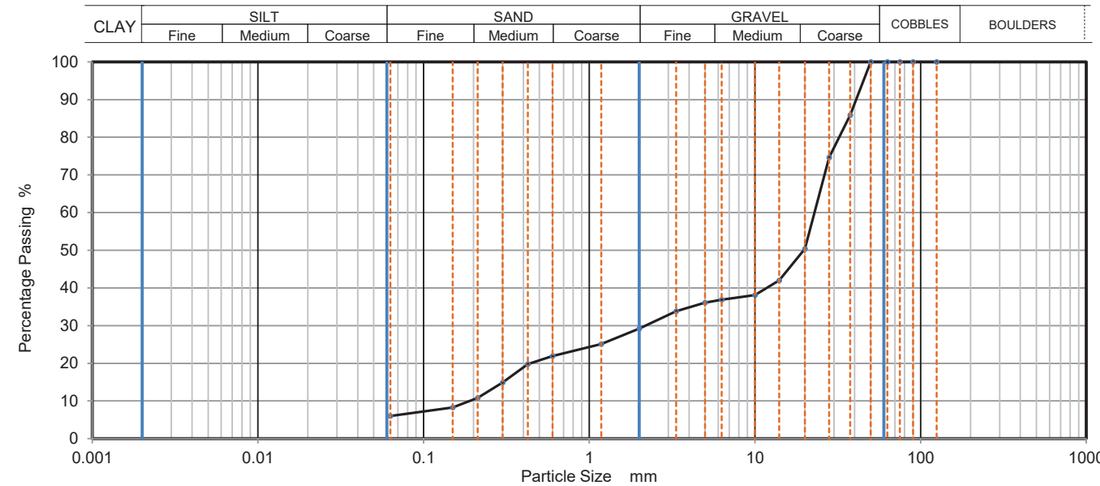
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Environmental Science

Client:	Jomas Associates Ltd	Client Reference:	JJ1460
Client Address:	Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD	Job Number:	19-32609
		Date Sampled:	06/03/2019
		Date Received:	21/02/2019
Contact:	Emma Hucker	Date Tested:	18/03/2019
Site Name:	Woking Football Club, Kingfield Road, Woking	Sampled By:	Not Given
Site Address:	Woking Football Club, Kingfield Road, Woking		

Test Results:

Laboratory Reference:	1175547	Depth Top [m]:	2.00
Hole No.:	BH3	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Greyish brown slightly clayey sandy GRAVEL		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	86		
28	75		
20	50		
14	42		
10	38		
6.3	37		
5	36		
3.35	34		
2	29		
1.18	25		
0.6	22		
0.425	20		
0.3	15		
0.212	11		
0.15	8		
0.063	7		

Dry Mass of sample [g]: 5292

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	70.80
Sand	22.40
Fines <0.063mm	6.70

Grading Analysis		
D100	mm	50
D60	mm	22.8
D30	mm	2.2
D10	mm	0.19
Uniformity Coefficient		120
Curvature Coefficient		1.1

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks: The material submitted - fails to meet the minimum mass requirements as stated in BS1377 Part 2 Table 3

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 26/03/2019

Signed: Darren Berrill
Geotechnical General Manager

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TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
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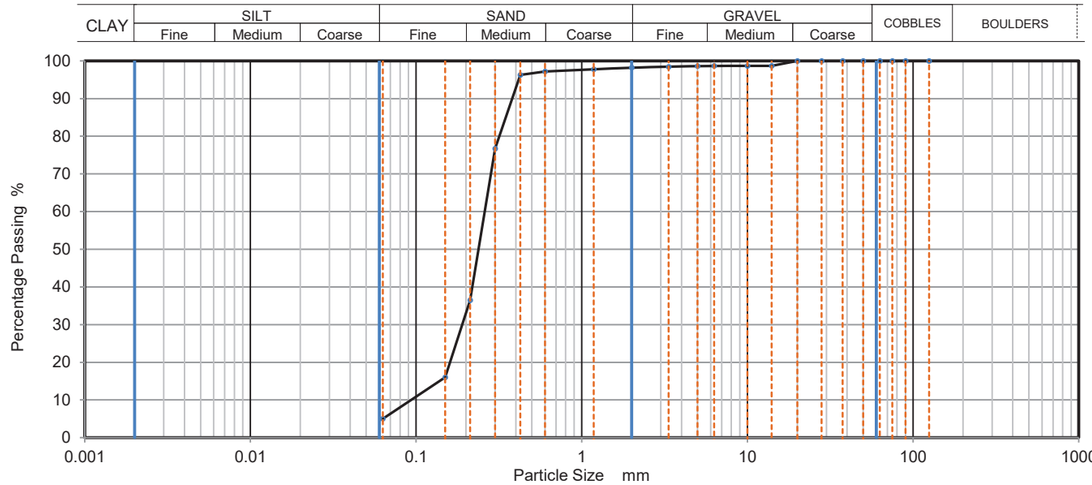
Croxley Green Business Park
Watford Herts WD18 8YS

Environmental Science

Client:	Jomas Associates Ltd	Client Reference:	JJ1460
Client Address:	Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD	Job Number:	19-32609
		Date Sampled:	06/03/2019
		Date Received:	21/02/2019
Contact:	Emma Hucker	Date Tested:	18/03/2019
Site Name:	Woking Football Club, Kingfield Road, Woking	Sampled By:	Not Given
Site Address:	Woking Football Club, Kingfield Road, Woking		

Test Results:

Laboratory Reference:	1175548	Depth Top [m]:	5.00
Hole No.:	BH3	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Grey slightly clayey SAND		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	99		
6.3	99		
5	99		
3.35	98		
2	98		
1.18	98		
0.6	97		
0.425	96		
0.3	77		
0.212	37		
0.15	16		
0.063	6		

Dry Mass of sample [g]: 486

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	1.80
Sand	92.70
Fines <0.063mm	5.50

Grading Analysis		
D100	mm	20
D60	mm	0.26
D30	mm	0.19
D10	mm	0.0913
Uniformity Coefficient		2.8
Curvature Coefficient		1.5

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 26/03/2019

Signed: Darren Berrill
Geotechnical General Manager

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Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

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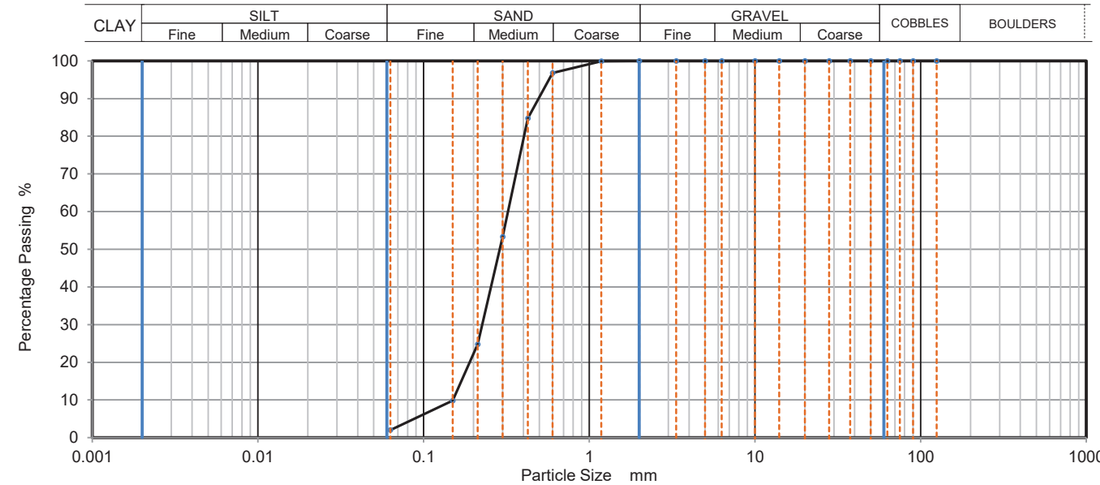
Watford Herts WD18 8YS

Environmental Science

Client:	Jomas Associates Ltd	Client Reference:	JJ1460
Client Address:	Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD	Job Number:	19-32609
		Date Sampled:	06/03/2019
		Date Received:	21/02/2019
Contact:	Emma Hucker	Date Tested:	18/03/2019
Site Name:	Woking Football Club, Kingfield Road, Woking	Sampled By:	Not Given
Site Address:	Woking Football Club, Kingfield Road, Woking		

Test Results:

Laboratory Reference:	1175549	Depth Top [m]:	8.00
Hole No.:	BH3	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Grey SAND		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	97		
0.425	85		
0.3	53		
0.212	25		
0.15	10		
0.063	3		

Dry Mass of sample [g]: 499

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.00
Sand	97.10
Fines <0.063mm	2.90

Grading Analysis		
D100	mm	2
D60	mm	0.323
D30	mm	0.226
D10	mm	0.151
Uniformity Coefficient		2.1
Curvature Coefficient		1

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 26/03/2019

Signed: Darren Berrill
Geotechnical General Manager

GF 100.10

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Page 1 of 1

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
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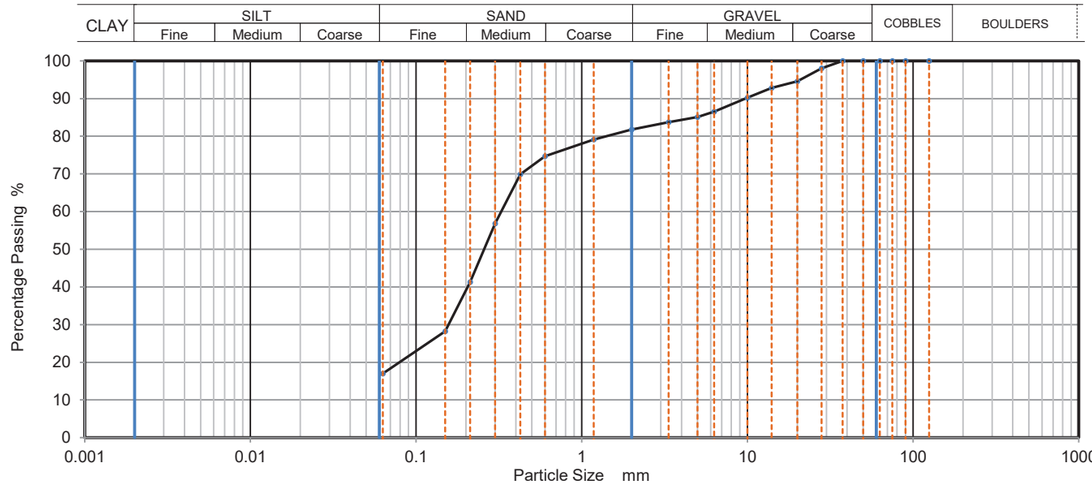
Environmental Science

Client:	Jomas Associates Ltd	Client Reference:	JJ1460
Client Address:	Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD	Job Number:	19-32609
		Date Sampled:	06/03/2019
		Date Received:	21/02/2019
Contact:	Emma Hucker	Date Tested:	18/03/2019
Site Name:	Woking Football Club, Kingfield Road, Woking	Sampled By:	Not Given
Site Address:	Woking Football Club, Kingfield Road, Woking		

Test Results:

Laboratory Reference:	1175550	Depth Top [m]:	1.20
Hole No.:	BH4	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brownish grey gravelly clayey SAND		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	98		
20	95		
14	93		
10	90		
6.3	87		
5	85		
3.35	84		
2	82		
1.18	79		
0.6	75		
0.425	70		
0.3	57		
0.212	41		
0.15	28		
0.063	17		

Dry Mass of sample [g]: 1958

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	18.20
Sand	64.40
Fines <0.063mm	17.40

Grading Analysis		
D100	mm	37.5
D60	mm	0.327
D30	mm	0.158
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 26/03/2019

Signed: Darren Berrill
Geotechnical General Manager

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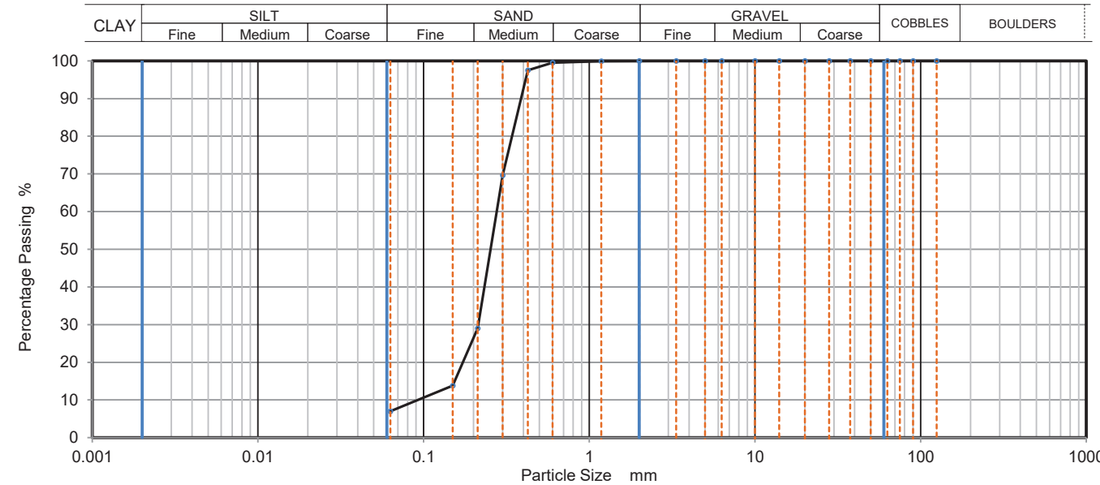
Client:	Jomas Associates Ltd	Client Reference:	JJ1460
Client Address:	Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD	Job Number:	19-32609
		Date Sampled:	06/03/2019
		Date Received:	21/02/2019
Contact:	Emma Hucker	Date Tested:	18/03/2019
Site Name:	Woking Football Club, Kingfield Road, Woking	Sampled By:	Not Given
Site Address:	Woking Football Club, Kingfield Road, Woking		

Test Results:

Laboratory Reference:	1175551	Depth Top [m]:	6.00
Hole No.:	BH4	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brown slightly clayey SAND		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	98		
0.3	70		
0.212	29		
0.15	14		
0.063	7		

Dry Mass of sample [g]: 465

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.00
Sand	92.60
Fines <0.063mm	7.40

Grading Analysis		
D100	mm	2
D60	mm	0.276
D30	mm	0.214
D10	mm	0.0892
Uniformity Coefficient		3.1
Curvature Coefficient		1.9

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 26/03/2019

Signed: Darren Berrill
Geotechnical General Manager

GF 100.10

for and on behalf of i2 Analytical Ltd

4041

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

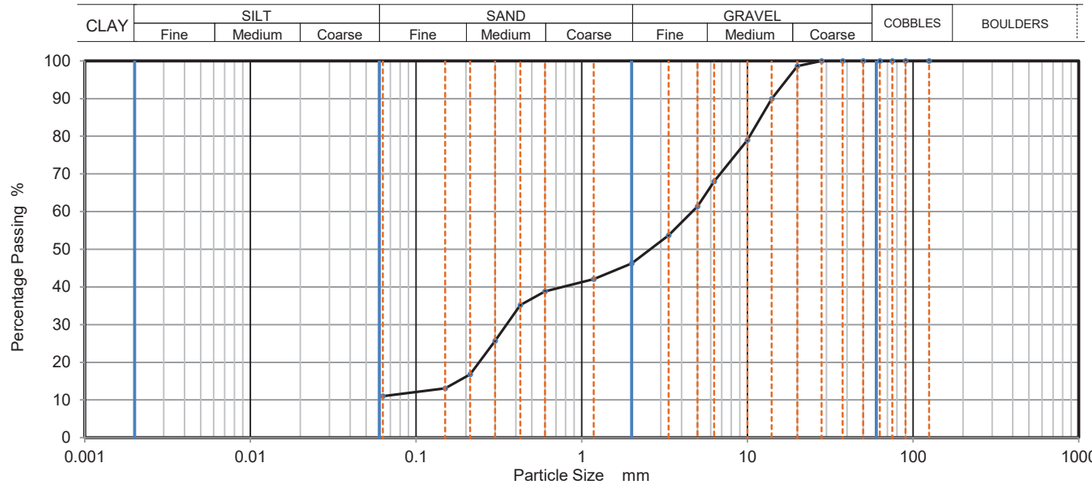
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Environmental Science

Client:	Jomas Associates Ltd	Client Reference:	JJ1460
Client Address:	Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD	Job Number:	19-32463
		Date Sampled:	05/03/2019
		Date Received:	06/03/2019
Contact:	Emma Hucker	Date Tested:	20/03/2019
Site Name:	Woking Football Club, Kingfield Road, Woking, Surrey	Sampled By:	Not Given
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey		

Test Results:

Laboratory Reference:	1174599	Depth Top [m]:	2.00
Hole No.:	WS1	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Multicolour very sandy clayey GRAVEL		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	90		
10	79		
6.3	68		
5	61		
3.35	54		
2	46		
1.18	42		
0.6	39		
0.425	35		
0.3	26		
0.212	17		
0.15	13		
0.063	11		

Dry Mass of sample [g]: 927

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	53.80
Sand	35.00
Fines <0.063mm	11.20

Grading Analysis		
D100	mm	28
D60	mm	4.65
D30	mm	0.352
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks: The material submitted - fails to meet the minimum mass requirements as stated in BS1377 Part 2 Table 3

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 26/03/2019

Signed: Darren Berrill
Geotechnical General Manager

GF 100.10

for and on behalf of i2 Analytical Ltd

4041

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

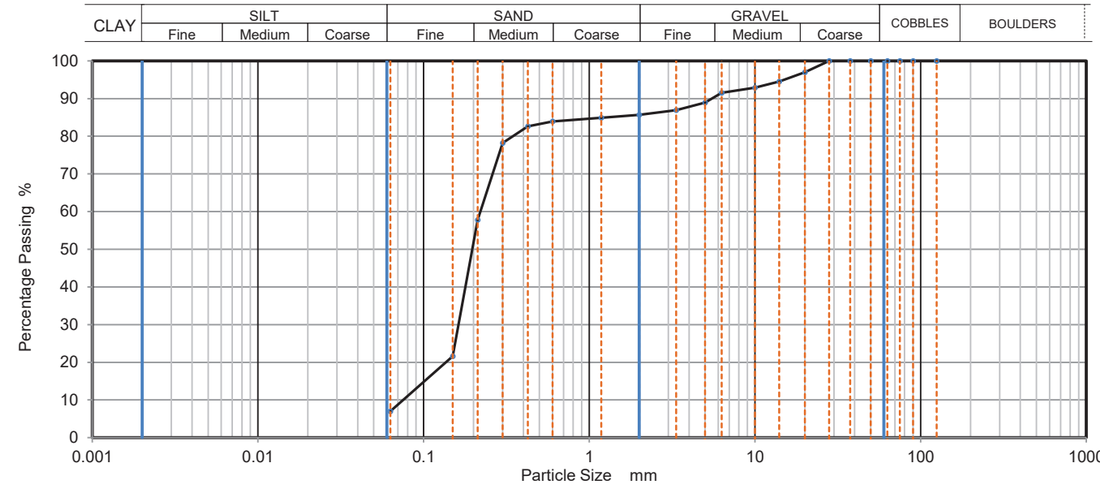
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Environmental Science

Client:	Jomas Associates Ltd	Client Reference:	JJ1460
Client Address:	Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD	Job Number:	19-32463
		Date Sampled:	05/03/2019
		Date Received:	06/03/2019
Contact:	Emma Hucker	Date Tested:	20/03/2019
Site Name:	Woking Football Club, Kingfield Road, Woking, Surrey	Sampled By:	Not Given
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey		

Test Results:

Laboratory Reference:	1174600	Depth Top [m]:	3.00
Hole No.:	WS3	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brownish grey gravelly slightly clayey SAND		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	97		
14	95		
10	93		
6.3	92		
5	89		
3.35	87		
2	86		
1.18	85		
0.6	84		
0.425	83		
0.3	78		
0.212	58		
0.15	22		
0.063	8		

Dry Mass of sample [g]: 821

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	14.30
Sand	77.90
Fines <0.063mm	7.80

Grading Analysis		
D100	mm	28
D60	mm	0.22
D30	mm	0.162
D10	mm	0.0722
Uniformity Coefficient		3
Curvature Coefficient		1.7

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 26/03/2019

Signed: Darren Berrill
Geotechnical General Manager

GF 100.10

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

4041

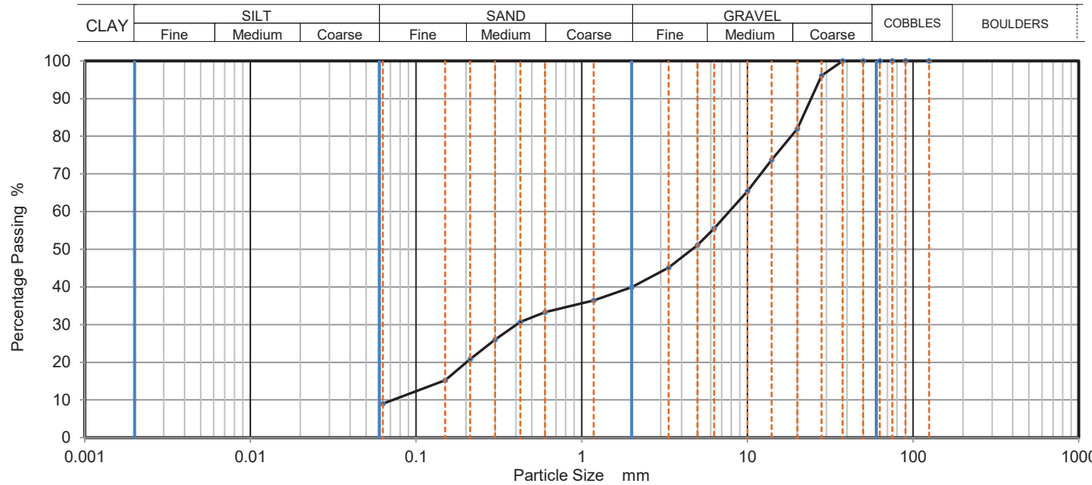
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Environmental Science

Client:	Jomas Associates Ltd	Client Reference:	JJ1460
Client Address:	Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD	Job Number:	19-32463
		Date Sampled:	05/03/2019
		Date Received:	06/03/2019
Contact:	Emma Hucker	Date Tested:	20/03/2019
Site Name:	Woking Football Club, Kingfield Road, Woking, Surrey	Sampled By:	Not Given
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey		

Test Results:

Laboratory Reference:	1174601	Depth Top [m]:	2.00
Hole No.:	WS5	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Multicolour slightly clayey sandy GRAVEL		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	96		
20	82		
14	74		
10	65		
6.3	56		
5	51		
3.35	45		
2	40		
1.18	36		
0.6	33		
0.425	31		
0.3	26		
0.212	21		
0.15	15		
0.063	10		

Dry Mass of sample [g]: 984

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	60.10
Sand	30.00
Fines <0.063mm	9.90

Grading Analysis		
D100	mm	37.5
D60	mm	7.77
D30	mm	0.403
D10	mm	0.0643
Uniformity Coefficient		120
Curvature Coefficient		0.33

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks: The material submitted - fails to meet the minimum mass requirements as stated in BS1377 Part 2 Table 3

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 26/03/2019

Signed: Darren Berrill
Geotechnical General Manager

GF 100.10

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

4041

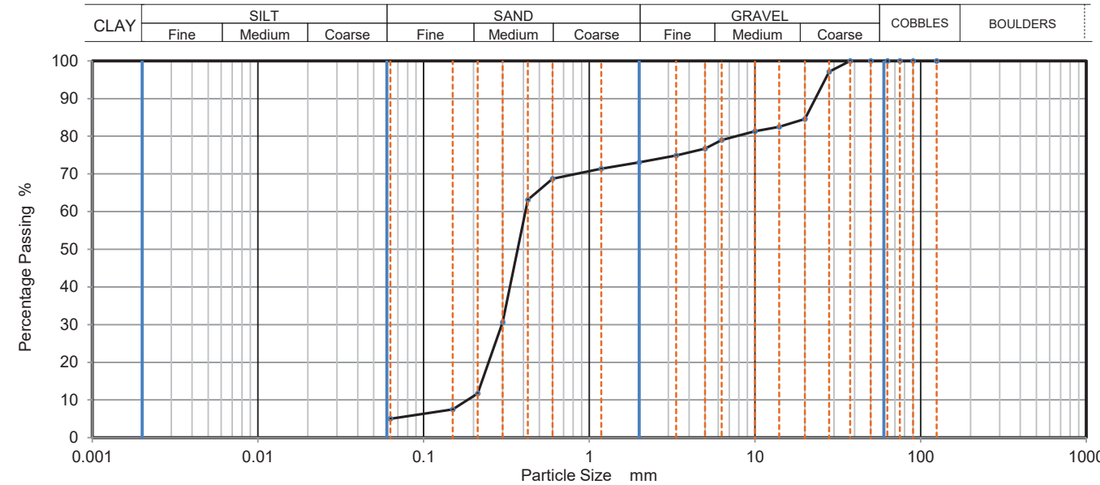
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Environmental Science

Client:	Jomas Associates Ltd	Client Reference:	JJ1460
Client Address:	Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD	Job Number:	19-32463
		Date Sampled:	05/03/2019
		Date Received:	06/03/2019
Contact:	Emma Hucker	Date Tested:	20/03/2019
Site Name:	Woking Football Club, Kingfield Road, Woking, Surrey	Sampled By:	Not Given
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey		

Test Results:

Laboratory Reference:	1174602	Depth Top [m]:	1.80
Hole No.:	WS6	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Multicolour gravelly slightly clayey SAND		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	97		
20	85		
14	83		
10	81		
6.3	79		
5	77		
3.35	75		
2	73		
1.18	71		
0.6	69		
0.425	63		
0.3	31		
0.212	12		
0.15	8		
0.063	6		

Dry Mass of sample [g]: 838

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	26.90
Sand	67.40
Fines <0.063mm	5.70

Grading Analysis		
D100	mm	37.5
D60	mm	0.411
D30	mm	0.297
D10	mm	0.184
Uniformity Coefficient		2.2
Curvature Coefficient		1.2

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks: The material submitted - fails to meet the minimum mass requirements as stated in BS1377 Part 2 Table 3

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 26/03/2019

Signed: Darren Berrill
Geotechnical General Manager

GF 100.10

for and on behalf of i2 Analytical Ltd

4041

TEST CERTIFICATE

Particle Size Distribution

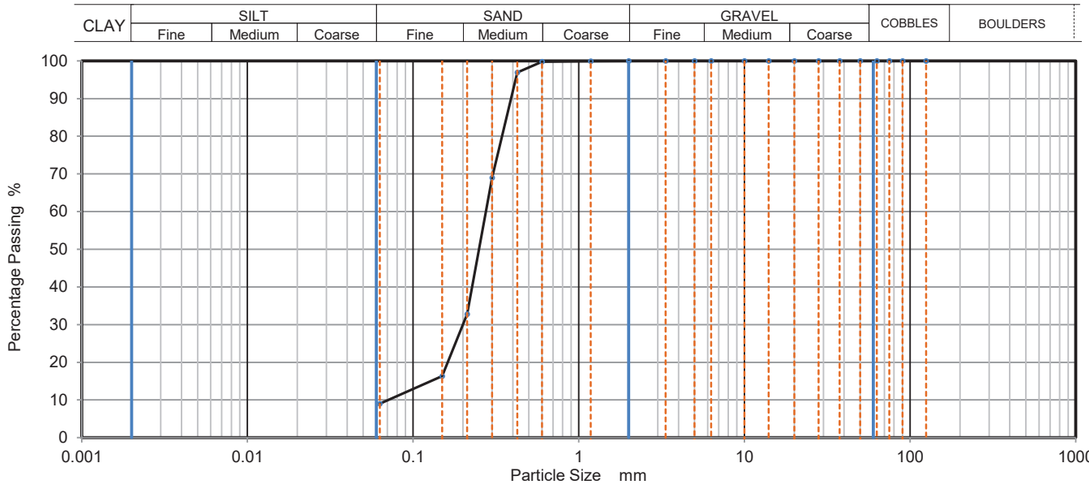
Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Client:	Jomas Associates Ltd	Client Reference:	JJ1460
Client Address:	Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD	Job Number:	19-32463
		Date Sampled:	05/03/2019
		Date Received:	06/03/2019
Contact:	Emma Hucker	Date Tested:	20/03/2019
Site Name:	Woking Football Club, Kingfield Road, Woking, Surrey	Sampled By:	Not Given
Site Address:	Woking Football Club, Kingfield Road, Woking, Surrey		

Test Results:

Laboratory Reference:	1174603	Depth Top [m]:	3.00
Hole No.:	WS10	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brownish grey slightly clayey SAND		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	97		
0.3	69		
0.212	33		
0.15	16		
0.063	10		

Dry Mass of sample [g]: 366

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.00
Sand	90.30
Fines <0.063mm	9.70

Grading Analysis		
D100	mm	2
D60	mm	0.275
D30	mm	0.2
D10	mm	0.0656
Uniformity Coefficient		4.2
Curvature Coefficient		2.2

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 26/03/2019

Signed: Darren Berrill
Geotechnical General Manager

GF 100.10

for and on behalf of i2 Analytical Ltd

APPENDIX 5 – SOIL GAS AND GROUNDWATER MONITORING RECORDS

GAS AND GROUNDWATER MONITORING BOREHOLE RECORD SHEET

Site: Kingfield Road	**Operative(s):** JLW	**Date:** 14/03/2019	**Time:** 10:55	**Round:** 1	**Page:** 1

MONITORING EQUIPMENT

Instrument Type	Instrument Make	Serial No.	Date Last Calibrated
Analox	GA5000	G501805	30/01/2019
PID	Phocheck tiger	T-106448	04/10/2018
Dip Meter	GeoTech		

MONITORING CONDITIONS

Weather Conditions: Cloudy/Sunny	**Ground Conditions:** Damp/Wet	**Temperature:** 12°C
Barometric Pressure (mbar): 1000	**Barometric Pressure Trend (24hr):** Steady	**Ambient Concentration:** 0.0%CH_4, 0.1%CO_2, 21.1%O_2

MONITORING RESULTS

Monitoring Point Location	Flow		Atmospheric Pressure (mbar)	CH_4 %	CH_4 % LEL	CO_2 %	O_2 %	VOC (ppm)		H_2S (ppm)	CO (ppm)	Depth to product (mbgl)	Depth to water (mbgl)	Depth to Base of well (mbgl)
	Peak	Steady						Peak	Steady					
WS2	0.0	0.0	1000	0.0	/	4.4	12.6	/	/	0	0	/	2.45	3.06
WS7	0.0	0.0	1002	0.0	/	0.3	16.9	/	/	0	0	/	1.81	3.07
WS10	0.0	0.0	1001	0.4	/	5.7	1.5	/	/	0	3	/	1.69	2.94
BH1	0.0	0.0	1001	0.0	/	3.2	13.6	/	/	0	0	/	1.75	4.97
BH2	+0.2	+0.2	1001	0.0	/	3.3	6.5	/	/	0	0	/	1.82	3.15
BH3	-18.6	-3.7	1001	0.0	/	0.1	19.6	/	/	1	>>>>	/	1.21	4.54
HBH2	0.0	0.0	1001	0.0	/	0.2	15.4	/	/	0	0	/	2.06	4.50
HBH4	0.0	0.0	1001	0.0	/	2.5	13.5	/	/	0	0	/	1.71	5.89

No PID available on site so VOC readings were not taken.

GAS AND GROUNDWATER MONITORING BOREHOLE RECORD SHEET

Site: Kingfield Road	**Operative(s):** JLW	**Date:** 21/03/2019	**Time:** 13:32	**Round:** 2	**Page:** 1

MONITORING EQUIPMENT

Instrument Type	Instrument Make	Serial No.	Date Last Calibrated
Analox	GA5000	G501805	30/01/2019
PID	Phocheck tiger	T-106448	04/10/2018
Dip Meter	GeoTech		

MONITORING CONDITIONS

Weather Conditions: Overcast	**Ground Conditions:** Damp	**Temperature:** 12°C
Barometric Pressure (mbar): 1031	**Barometric Pressure Trend (24hr):** Steady	**Ambient Concentration:** 0.0%CH_4, 0.1%CO_2, 20.8%O_2

MONITORING RESULTS

Monitoring Point Location	Flow		Atmospheric Pressure (mbar)	CH_4 %	CH_4 % LEL	CO_2 %	O_2 %	VOC (ppm)		H_2S (ppm)	CO (ppm)	Depth to product (mbgl)	Depth to water (mbgl)	Depth to Base of well (mbgl)
	Peak	Steady						Peak	Steady					
WS2	+0.1	+0.1	1031	0.0	/	3.0	15.9	0.4	0.4	0	0	/	2.46	3.06
WS7	+0.1	+0.1	1031	0.0	/	0.7	18.9	1.0	1.0	0	0	/	2.04	3.05
WS10	+0.1	+0.1	1031	0.0	/	2.0	14.2	0.5	0.5	0	5	/	1.81	2.95
BH1	+0.1	+0.1	1031	0.0	/	3.1	14.1	0.6	0.6	0	0	/	1.81	4.94
BH2	+0.2	+0.2	1032	0.0	/	3.7	6.4	3.8	3.8	0	1	/	1.92	3.12
BH3	-3.8	-3.8	1031	0.0	/	0.0	19.8	2.3	2.3	0	481	/	1.21	4.52
HBH2	0.0	0.0	1032	1.3	/	2.4	11.5	0.4	0.3	0	5	/	2.13	4.48
HBH4	0.0	0.0	1031	0.0	/	1.6	18.9	0.4	0.3	0	0	/	1.88	5.89

GAS AND GROUNDWATER MONITORING BOREHOLE RECORD SHEET

Site: Kingfield Road	**Operative(s):** JLW	**Date:** 28/03/2019	**Time:** 10:21	**Round:** 3	**Page:** 1

MONITORING EQUIPMENT

Instrument Type	Instrument Make	Serial No.	Date Last Calibrated
Analox	GA5000	G501805	30/01/2019
PID	Phocheck tiger	T-106448	04/10/2018
Dip Meter	GeoTech		

MONITORING CONDITIONS

Weather Conditions: Cloudy	**Ground Conditions:** Moist	**Temperature:** 12°C
Barometric Pressure (mbar): 1035	**Barometric Pressure Trend (24hr):** Falling	**Ambient Concentration:** 0.0%CH_4, 0.1%CO_2, 20.5%O_2

MONITORING RESULTS

Monitoring Point Location	Flow		Atmospheric Pressure (mbar)	CH_4 %	CH_4 % LEL	CO_2 %	O_2 %	VOC (ppm)		H_2S (ppm)	CO (ppm)	Depth to product (mbgl)	Depth to water (mbgl)	Depth to Base of well (mbgl)
	Peak	Steady						Peak	Steady					
WS2	0.0	0.0	1035	0.0	/	4.4	14.1	0	0	0	0	/	2.55	3.06
WS7	0.0	0.0	1035	0.0	/	0.8	19.2	0	0	0	0	/	2.21	3.06
WS10	0.0	0.0	1035	0.0	/	2.3	14.7	0	0	0	0	/	1.93	2.90
BH1	0.0	0.0	1035	0.0	/	4.0	15.3	0	0	0	0	/	2.07	4.92
BH2	0.0	0.0	1035	0.0	/	4.3	4.6	2	2	0	0	/	2.07	3.13
BH3	-0.1	0.0	1035	0.0	/	0.1	19.4	2	2	0	20	/	1.49	4.52
HBH2	-0.1	-0.1	1035	1.3	/	5.5	15.6	0	0	0	3	/	2.17	4.37
HBH4	0.0	0.0	1035	0.0	/	1.4	19.2	0	0	0	0	/	2.02	5.89

*Flow carried out before gas monitoring in all boreholes.

GAS AND GROUNDWATER MONITORING BOREHOLE RECORD SHEET

Site: Kingfield Road	**Operative(s):** JPB	**Date:** 02/04/2019	**Time:** 10:03	**Round:** 4	**Page:** 1

MONITORING EQUIPMENT

Instrument Type	Instrument Make	Serial No.	Date Last Calibrated
Analox	GA5000	G501805	30/01/2019
PID	Phocheck tiger	T-106448	04/10/2018
Dip Meter	GeoTech		

MONITORING CONDITIONS

Weather Conditions: Overcast	**Ground Conditions:** Dry	**Temperature:** 7°C
Barometric Pressure (mbar): 1002	**Barometric Pressure Trend (24hr):** Falling	**Ambient Concentration:** 0.0%CH_4, 0.1%CO_2, 21.0%O_2

MONITORING RESULTS

Monitoring Point Location	Flow		Atmospheric Pressure (mbar)	CH_4 %	CH_4 % LEL	CO_2 %	O_2 %	VOC (ppm)		H_2S (ppm)	CO (ppm)	Depth to product (mbgl)	Depth to water (mbgl)	Depth to Base of well (mbgl)
	Peak	Steady						Peak	Steady					
WS2	0.0	0.0	1002	0.0	/	7.2	8.3	0	0	0	0	/	2.59	3.04
WS7	0.0	0.0	1003	0.0	/	1.5	17.0	0	0	0	0	/	2.28	3.04
WS10	0.0	0.0	1003	0.0	/	4.5	5.9	0	0	0	0	/	1.95	2.87
BH1	0.0	0.0	1003	0.0	/	4.5	15.3	0	0	0	0	/	2.03	4.87
BH2	0.0	0.0	1002	0.0	/	4.9	3.5	1	1	0	0	/	2.07	3.10
BH3														
HBH2	+0.9	+0.9	1003	0.9	/	5.7	5.5	0	0	0	1	/	2.18	4.31
HBH4	0.0	0.0	1003	0.0	/	2.0	17.9	0	0	0	0	/	2.08	5.90

*Flow carried out before gas monitoring in boreholes except WS2 and BH2

APPENDIX 6 – CALIFORNIA BEARING RATIO TEST RESULTS

WE LISTEN, WE PLAN, WE DELIVER

Geotechnical Engineering and Environmental Services across the UK.

CBR Calculation

Jomas Job: Kingsfield Road, Woking
Jomas Job No.: P1381J1460

Test Location: CBR1
Date of test: 05/03/2019

Calculating Engineer: CLP
Approved by PS

Date: 04/04/2019
Date: 04/04/2019

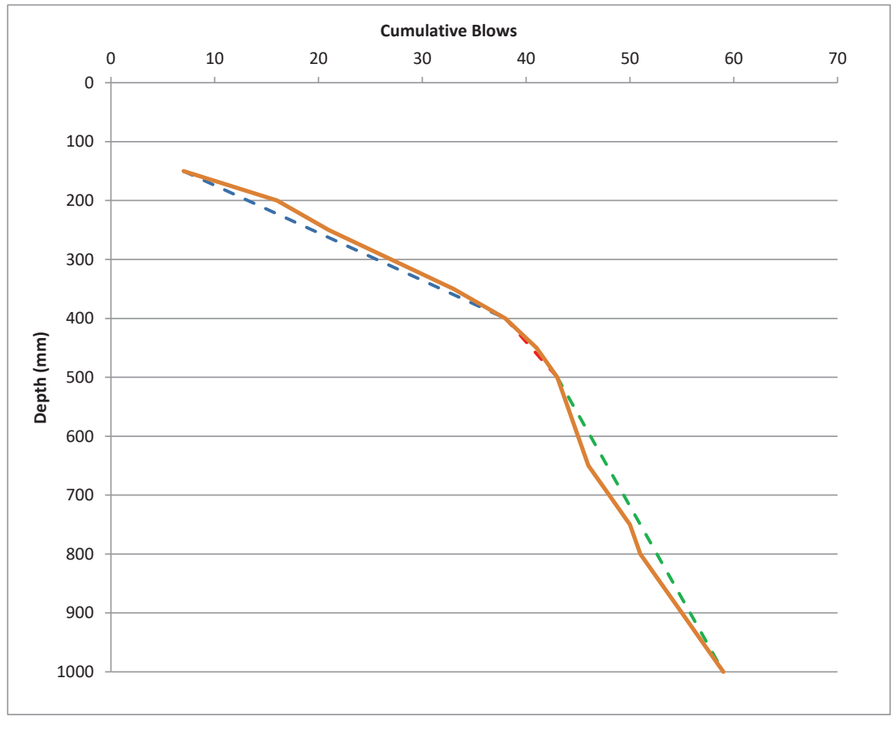
Depth (mm)	Nr Blow	Cumulative blows
50		
100		
150	7	7
200	9	16
250	5	21
300	6	27
350	6	33
400	5	38
450	3	41
500	2	43
550	1	44
600	1	45
650	1	46
700	2	48
750	2	50
800	1	51
850	2	53
900	2	55
950	2	57
1000	2	59

Test	Initial Depth (mm)	Final Depth (mm)	mm / blow	CBR* (%)	E (MPa)
CBR1-Test 1	150	400	8.1	33.2	165.59
CBR1-Test 2	400	500	20.0	12.7	89.53
CBR1-Test 3	500	1000	31.3	7.9	66.07

* CBR calculated using method outlined in IAN 73/06

Test Notes:

Test carried out using a Perth Probe type dynamic cone probe consisting of a 8 kg free fall hammer lifted and dropped through a height of 575mm
Colour of text refers to the modelled gradient on graph below
GL - 0.15m: Asphalt. (MADE GROUND)
0.15-0.70m: Black slightly clayey sandy gravel. Sand is fine to medium. Gravel consists of fine to coarse, angular to rounded flint, asphalt, concrete, brick and occasional ceramic fragments.



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CBR Calculation

Jomas Job: Kingsfield Road, Woking
Jomas Job No.: P1381J1460

Test Location: CBR5
Date of test: 05/03/2019

Calculating Engineer: CLP
Approved by PS

Date: 04/04/2019
Date: 04/04/2019

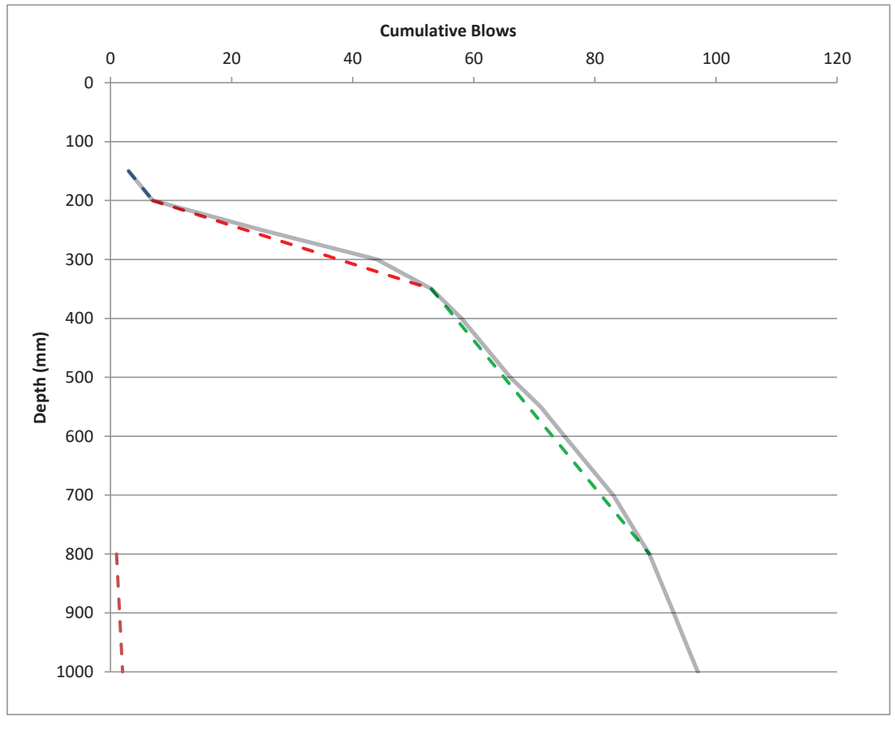
Depth (mm)	Nr Blow	Cumulative blows
50		
100		
150	3	3
200	4	7
250	18	25
300	19	44
350	9	53
400	5	58
450	4	62
500	4	66
550	5	71
600	4	75
650	4	79
700	4	83
750	3	86
800	3	89
850	2	91
900	2	93
950	2	95
1000	2	97

Test	Initial Depth (mm)	Final Depth (mm)	mm / blow	CBR* (%)	E (MPa)
CBR5-Test 1	150	200	12.5	20.9	123.14
CBR5-Test 2	200	350	3.3	86.6	305.86
CBR5-Test 3	350	800	12.5	20.9	123.14
CBR5-Test 4	800	1000	25.0	10.1	77.32

* CBR calculated using method outlined in IAN 73/06

Test Notes:

Test carried out using a Perth Probe type dynamic cone probe consisting of a 8 kg free fall hammer lifted and dropped through a height of 575mm
Colour of text refers to the modelled gradient on graph below
GL-0.30m: Grass over brown clayey gravelly sand with occasional rootlets. Sand is fine.
Gravel consists of fine to coarse, angular to rounded flint, brick and concrete. (MADE GROND - Topsoil).



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CBR Calculation

Jomas Job: Kingsfield Road, Woking
Jomas Job No.: P1381J1460

Test Location: CBR6
Date of test: 05/03/2019

Calculating Engineer: CLP
Approved by PS

Date: 04/04/2019
Date: 04/04/2019

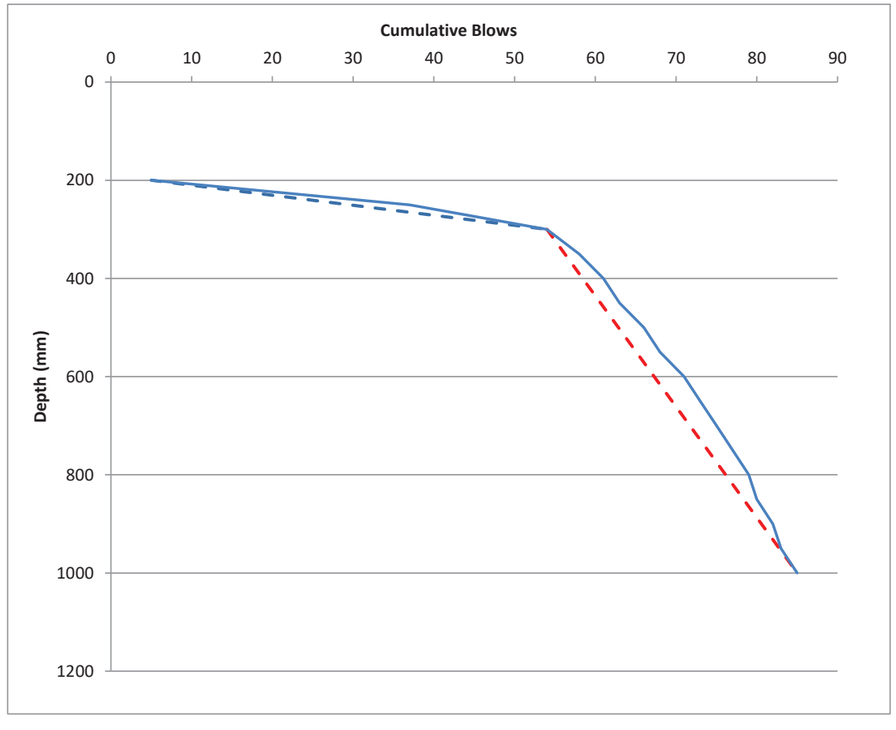
Depth (mm)	Nr Blow	Cumulative blows
50		
100		
150		
200	5	5
250	32	37
300	17	54
350	4	58
400	3	61
450	2	63
500	3	66
550	2	68
600	3	71
650	2	73
700	2	75
750	2	77
800	2	79
850	1	80
900	2	82
950	1	83
1000	2	85

Test	Initial Depth (mm)	Final Depth (mm)	mm / blow	CBR* (%)	E (MPa)
CBR6-Test 1	200	300	2.0	142.1	419.93
CBR6-Test 2	300	1000	22.6	11.2	82.61

* CBR calculated using method outlined in IAN 73/06

Test Notes:

Test carried out using a Perth Probe type dynamic cone probe consisting of a 8 kg free fall hammer lifted and dropped through a height of 575mm
Colour of text refers to the modelled gradient on graph below
GL – 0.10m: Asphalt. (MADE GROUND)
0.10-0.50m: Red to grey sandy gravel. Sand is medium. Gravel consists of fine to coarse, angular to rounded flint, brick, concrete and asphalt fragments. (MADE GROUND).



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CBR Calculation

Jomas Job: Kingsfield Road, Woking
Jomas Job No.: P1381J1460

Test Location: CBR8
Date of test: 05/03/2019

Calculating Engineer: CLP
Approved by PS

Date: 04/04/2019
Date: 04/04/2019

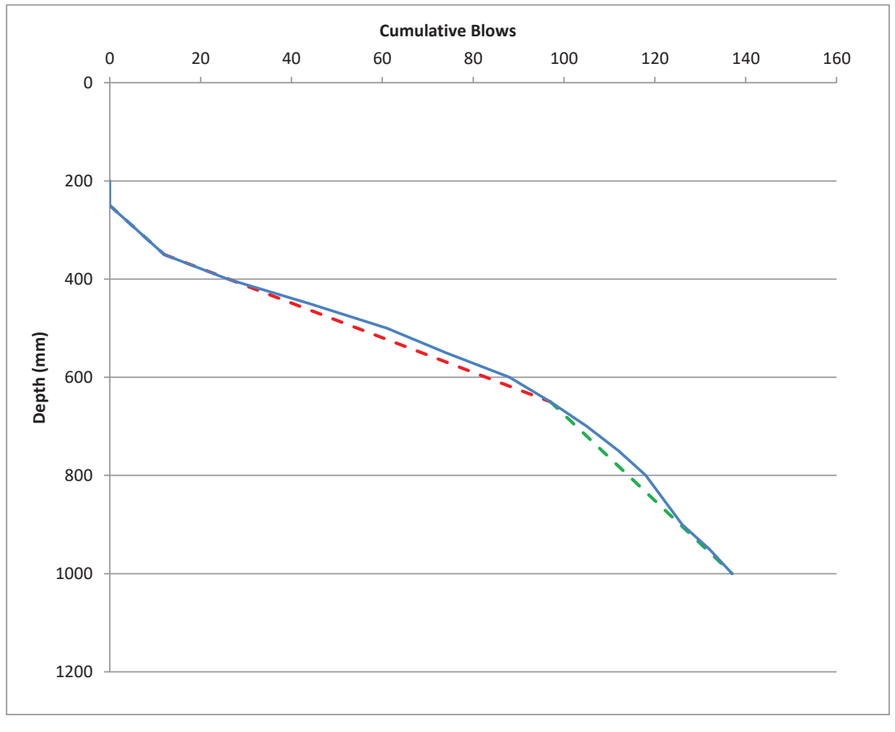
Depth (mm)	Nr Blow	Cumulative blows
50		
100		
150		
200	0	0
250	0	0
300	6	6
350	6	12
400	14	26
450	18	44
500	17	61
550	13	74
600	14	88
650	9	97
700	8	105
750	7	112
800	6	118
850	4	122
900	4	126
950	6	132
1000	5	137

Test	Initial Depth (mm)	Final Depth (mm)	mm / blow	CBR* (%)	E (MPa)
CBR8-Test 1	250	350	8.3	32.1	162.06
CBR8-Test 2	350	650	3.5	79.6	289.8
CBR8-Test 3	650	1000	8.8	30.5	156.84

* CBR calculated using method outlined in IAN 73/06

Test Notes:

Test carried out using a Perth Probe type dynamic cone probe consisting of a 8 kg free fall hammer lifted and dropped through a height of 575mm
Colour of text refers to the modelled gradient on graph below
GL-0.10m: Asphalt. (MADE GROUND)
0.10-0.40m: Red to grey slightly clayey sandy gravel. Sand is medium. Gravel consists of fine to coarse, angular to sub-rounded flint, brick, concrete and asphalt fragments. (MADE



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