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OP5 APPENDIX 15.1 – FLOOD RISK ASSESSMENT AND SURFACE WATER DRAINAGE STRATEGY

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March 2022

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Executive Summary

Otterpool Park LLP, as the applicant, are proposing a garden settlement called Otterpool Park (the proposed Development) that is located to the west of Folkestone in Kent.

Arcadis has prepared this updated Flood Risk Assessment (FRA) and site-wide Surface Water Drainage Strategy (SWDS) on behalf of Otterpool Park LLP, including a separate updated Water Cycle Study (WCS), ES Appendix 15.2, as part of the amended outline planning application for the proposed Otterpool Park Development. The amended application for planning permission relates to an existing outline planning application that was submitted to Folkestone & Hythe District Council (F&HDC) as the local planning authority ('LPA') in 2019 (the '2019 planning application'), under planning reference Y19/0275/FH.

The amended outline planning application is part of a three-tier approach to the planning process and seeks permission for a new garden settlement accommodating up to 8,500 homes (Use Classes C2 and C3) and Use Class E, F, B2, C1, Sui Generis development with related infrastructure, highway works, green and blue infrastructure, with access, appearance, landscaping, layout and scale matters to be reserved. The Application Site, which has a total area of 589 ha, is located within the wider Otterpool Framework Masterplan Area, which ultimately aims to deliver up to 10,000 new homes across a total area of 756 ha.

This FRA and SWDS report provides details of the local flooding history of the site and assesses the likelihood of flooding in the future from multiple sources and recommends suitable mitigation strategies, informed by detailed river modelling and high-level surface water drainage and groundwater modelling. The site-wide SWDS is presented as a combined report with the FRA. It provides the technical guidance, recommendations and predicted outcomes of the proposed integrated water management strategy solutions that will ensure flood risk is not increased within the development boundary or downstream of the site while maximising the potential multiple benefits.

The WCS findings and recommendations are also provided in a separate report prepared by Arcadis, which should be read in conjunction with this FRA & SWDS report as they are closely interlinked, formulating an integrated approach to sustainable water management.

1 Introduction

Otterpool Park LLP, as the applicant for an amended outline planning application, intends to develop 589 hectares (ha) of land surrounding the former Folkestone Racecourse (hereafter referred to as the site) to develop a new garden settlement known as Otterpool Park. The new garden settlement (the 'proposed Development') is proposed as part of the UK Government's nationwide initiative to deliver new housing stock across the country, including the Locally-Led Garden Villages, Cities, Towns and Cities programme that was first announced by the Department for Communities and Local Government (DCLG) in 2016[1]. The proposed Development is located within the administrative area of Folkestone and Hythe District Council (F&HDC) in Kent.

This document relates to the amended application for planning permission, that was originally submitted to F&HDC as the local planning authority ('LPA') in 2019 (the '2019 planning application'), under planning reference Y19/0275/FH, and which was the subject of environmental impact assessment (EIA). It was proposed to amend the 2019 planning application to enable a revised and more flexible approach to the planning implementation process, while incorporating some general updates to the proposed Development. The revised three-tier approach to the planning process and the key changes to the proposed Development are described in Section 3.

This updated Flood Risk Assessment (FRA) and accompanying site-wide Surface Water Drainage Strategy (SWDS) has been prepared to support the Tier 1 outline planning application in accordance with the National Planning Policy Framework (NPPF)[2] and the associated Flood Risk & Coastal Change Planning Practice Guidance (PPG)[3] and local guidance. The scope of this study is to provide an assessment of all sources of flooding and, where required, outline mitigation options. As part of this assessment, a site-wide Surface Water Drainage Strategy (SWDS) has also been developed, incorporating Sustainable Drainage Systems (SuDS) and integrated water management principles.

The Tier 1 outline planning application seeks permission for a new garden settlement accommodating up to 8,500 homes (Use Classes C2 and C3) and Use Class E, F, B2, C1, Sui Generis development with related infrastructure, highway works, green and blue infrastructure, with access, appearance, landscaping, layout and scale matters to be reserved. The Application Site, which has a total area of approximately 589 ha, is located within the wider Otterpool Framework Masterplan Area (OFMA), which ultimately aims to deliver up to 10,000 new homes across a total area of 756 ha.

The effects of residual flood risk on the development proposals and third parties are also reported, through assessment of exceedance events or failure of any proposed mitigation measures, to ensure that all aspects of flood risk and mitigation have been considered.

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/733047/Locally-led_garden_villages__towns_and_cities_archived.pdf

[2] National Planning Policy Framework, Ministry of Housing, Communities and Local Government, 2021

[3] Flood risk and coastal change, Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government, 2014

2 Area of study and location

The Otterpool Park Framework Masterplan Area covers a total area of 756 ha of land directly south-west of Junction 11 of the M20 motorway, and south of the Channel Tunnel Rail Link (CTRL) in the administrative area of F&HDC in Kent. Figure 1 shows the red line boundary for the proposed Development which is centred around National Grid Reference TR 112 365 in the general area of Otterpool Manor buildings.

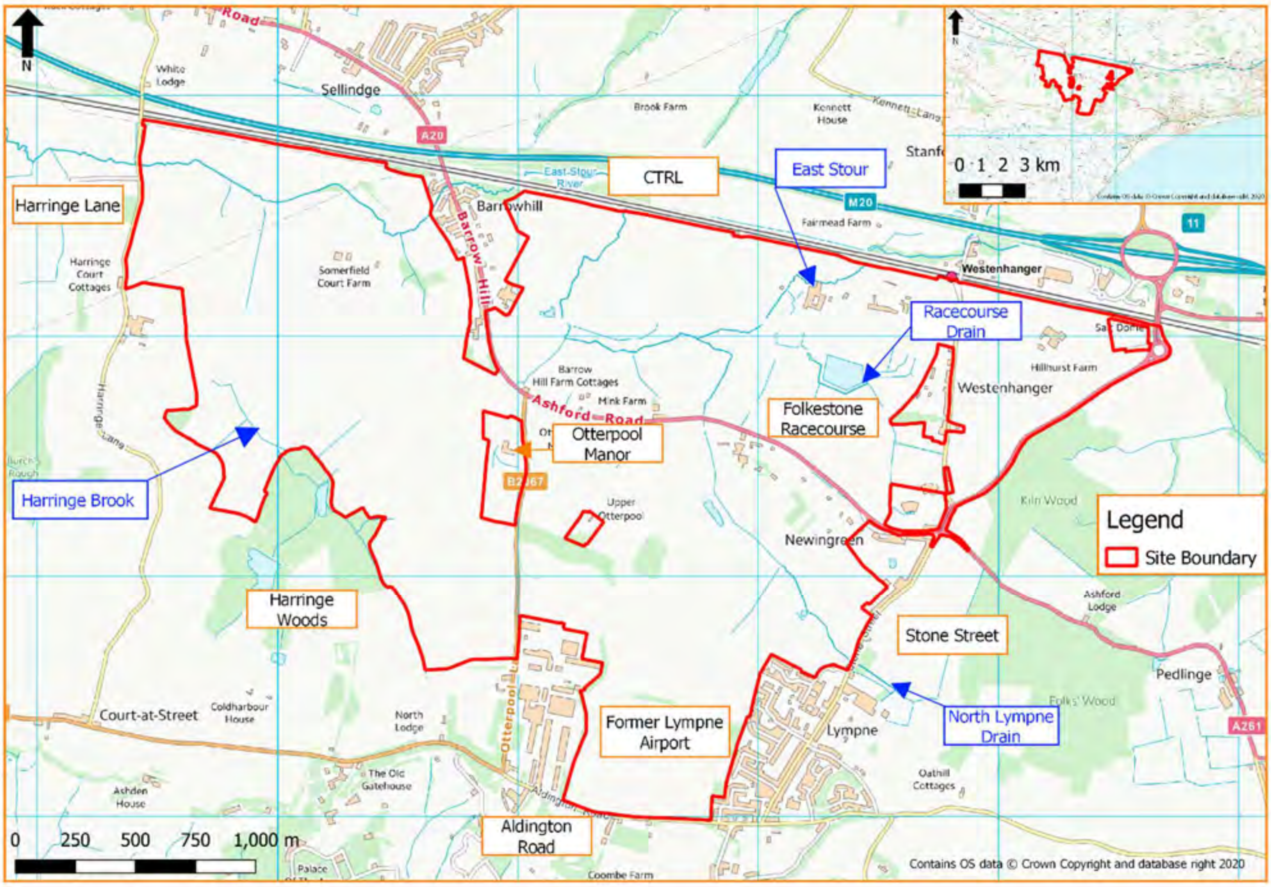

Figure 1: Location Plan
(The planning Application Site boundary is outlined in red.)

The northern boundary runs along a section of the CTRL railway embankment from Harringe Lane in the west to the A20 in the east, with the southern border running along Aldington Road and around Harringe Woods. The site is also bounded by Harringe Lane to the west and Stone Street to the east.

Currently, there are no existing settlements on site. Scattered residences are present along Ashford Road and the A20. Larger settlements are present just outside the amended application boundary in Barrow Hill to the north and Lympne to the south-east. Review of the UK Centre for Ecology and Hydrology (CEH) Land Cover Map (LCM) 2007[4] dataset shows that existing land cover comprises arable land, both improved and rough grassland, woodland and pockets of urbanised areas.

Most of the existing land is currently used as farmland. The historical Lympne Airport site is now partially used as Lympne Business Park. Folkestone racecourse is present in the north east, however, is no longer functioning.

The site area can generally be described as gradually falling towards the north and north-west, shown in Figure 2, which displays the 2m lidar data upon the site area. The site elevations vary with a high point of approximately 107mAOD to the south and a low point of approximately 57mAOD towards the north-west.

[4] UK Land Cover Map LCM2007. 2011. Centre for Ecology and Hydrology.

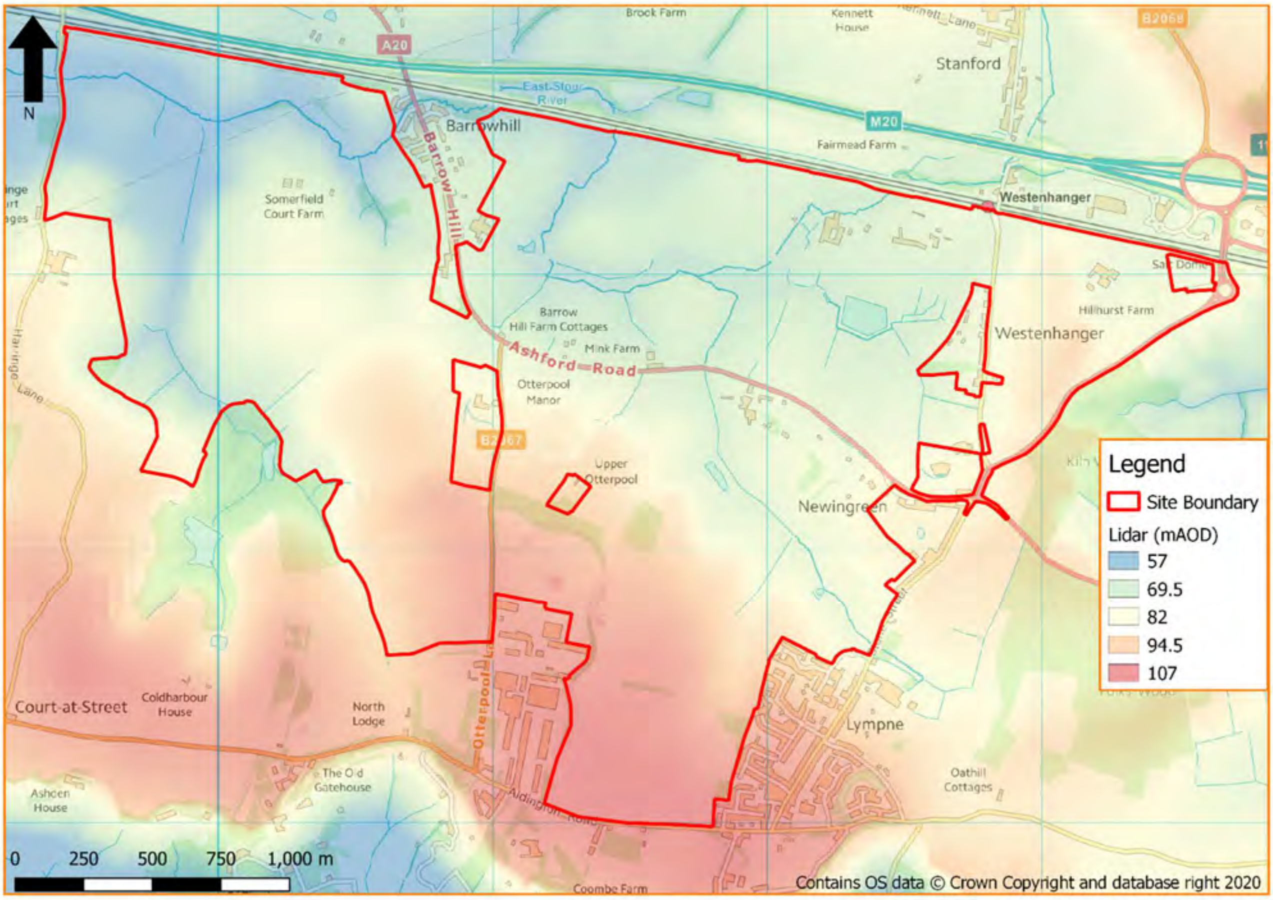

Figure 2: Lidar for the site © Environment Agency.
(The planning Application Site boundary is outlined in red.)

2.1 Catchment understanding

A review of the topographical data, detailed river network and background mapping reveal the potential drainage routes identified in Figure 3 overleaf. Due to the undulating topography, surface water flows through several minor drainage valleys into the River East Stour that runs from east to west through the northern half of the site.

The River East Stour leaves the red line boundary at the north-west corner of the site and flows west towards Ashford, where it joins the Great Stour. Therefore, this report seeks to demonstrate that careful consideration has been given to the design of the proposed flood risk and drainage measures to ensure that there is no increase in overall flood risk within these downstream areas.

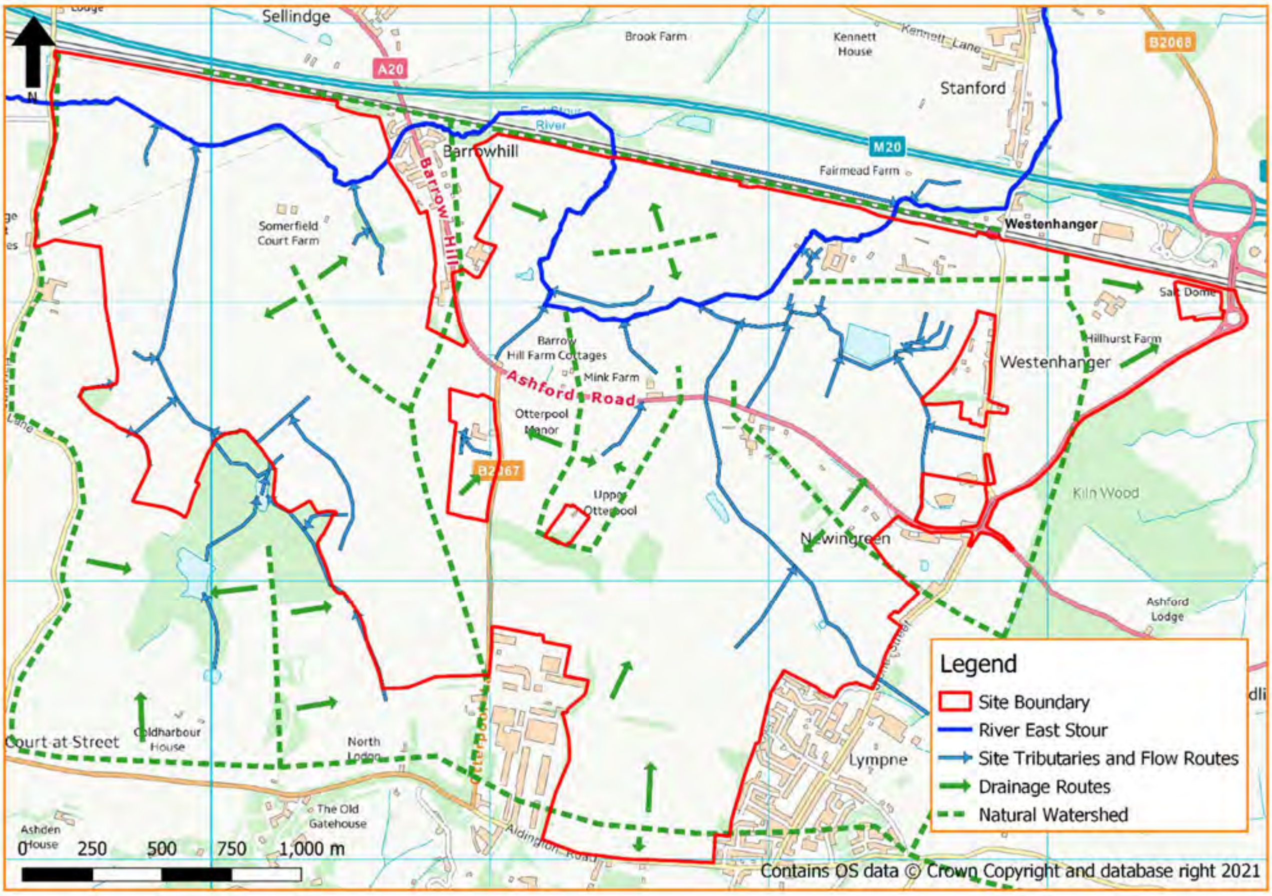

Figure 3: Flow and drainage routes derived from lidar / OS DTM.
(The planning Application Site boundary is outlined in red.)

2.2 Ground conditions

2.2.1 Preliminary desktop review

Hydrogeology

The hydrogeology aquifer classification data from the British Geological Survey (BGS)[5] shows that the majority of the site lies upon a section of the Lower Greensand Group which is a highly productive aquifer with significant intergranular flow. This formation is generally sandstone and conveys water of a soft nature at a rate of up to 50 l/s.

A small proportion of the site is located upon a section of the Wealden Group, which consists mainly of rocks with very limited groundwater.

An initial analysis of the limited available British Geological Survey (BGS) borehole scans[6] for the site area did not highlight the presence of shallow groundwater levels, but further site-specific ground investigation is required to confirm this.

A review of the Environment Agency (EA) Source Protection Zone (SPZ)[7] data (protection zones defined around large public potable water abstractions) concluded that there are no SPZs within the site boundary. The closest SPZ to the site is 2.2 km to the east. This indicates that, should infiltration-based methods of

[5] https://www.bgs.ac.uk/datasets/hydrogeology-625k/, aquifer classification, British Geological Survey 2021

[6] Borehole Scans, 2016. British Geological Survey (available at https://www.bgs.ac.uk/information-hub/borehole-records/)

[7] Source Protection Zone mapping. Environment Agency. Available at https://magic.defra.gov.uk/MagicMap.aspx

surface water drainage be applied, the impacts on existing potable water abstractions would be limited. Further discussion is included below and in Section 6.

Soils and Geology

An initial review of the Soilscapes map[8] shows that the soil types for the proposed site location can be split into four main areas.

Most of the site, in its upper parts, is covered by freely draining, slightly acidic but base-rich soils, which creates good conditions for sustainable water management using infiltration-based SuDS due to its permeable nature. Whereas the lower parts of the site are mainly covered with loamy soils with naturally high groundwater. It is likely that the River East Stour will influence this as well as the underlying geology. Areas with naturally high groundwater have been assumed to have very limited potential for SuDS infiltration.

West of the site is partially covered by slowly permeable, seasonally wet, slightly acidic loamy soils which follows the profile of the Harringe Brook. To the north-east, freely draining and slightly acidic loamy soils cover a small proportion of the site, which indicates some limited opportunities for water management strategies using infiltration-based SuDS.

The superficial and bedrock outcrop geology at the site is shown in Figure 4.

The key findings of a preliminary Phase 1[9] and Phase 2 site investigation in relation to geology and hydrogeology in support of this Tier 1 outline planning application are discussed in the subsequent sections. Further details on geology, hydrogeology and land quality are set out in Chapter 15 of the Environment Statement.

Superficial deposits are predominantly present in the north and north-east parts of the site. Head deposits are generally comprised of fragmented material that has moved downslope, following weathering and due to solifluction (soil creep) processes. The findings of the site investigation identified that it is comprised of yellowish brown, slightly clayey sandy gravel deposits with occasional limestone cobbles.

[8] Soilscapes mapping. Cranfield University (http://www.landis.org.uk/soilscapes/)

[9] Otterpool Park Ground Investigation Factual Report (UA008926-43-AFS-GLR-G001), Arcadis 2017

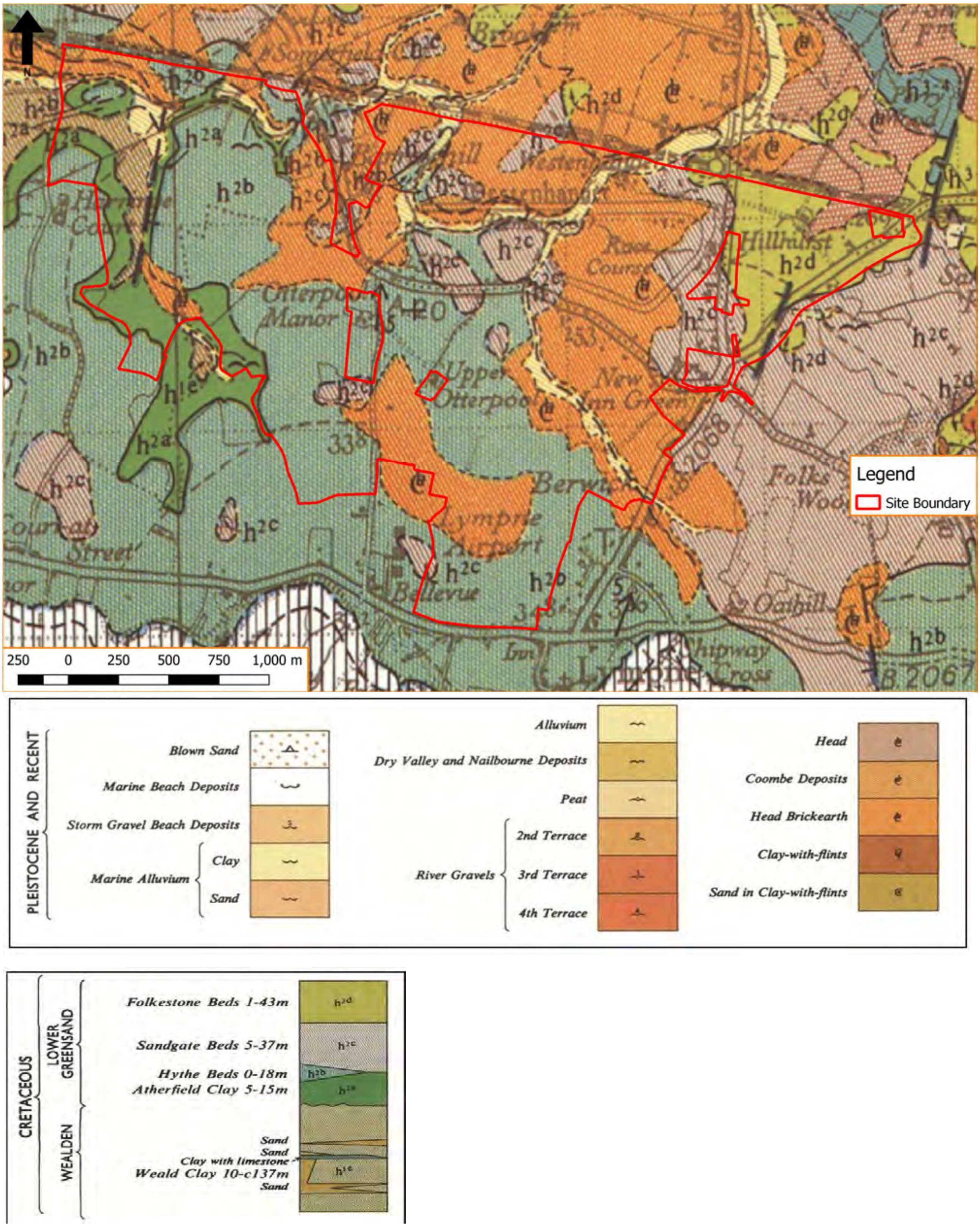

Figure 4: Superficial and bedrock geology (Source: BGS).
(The planning Application Site boundary is outlined in red.)

2.2.2 Site investigation data

The findings from three sources of site investigation data are discussed below.

Arcadis Phase 1 and Phase 2 Ground Investigations

Phase 1 and Phase 2 ground investigations were completed by Arcadis in 2017 and 2018. The locations of the different investigations are shown in Figure 5 and have been used to provide further information on the geology, hydrogeology and hydrology of relevance to the SWDS. A summary of the key findings is given below, with further detail included in Appendix A.

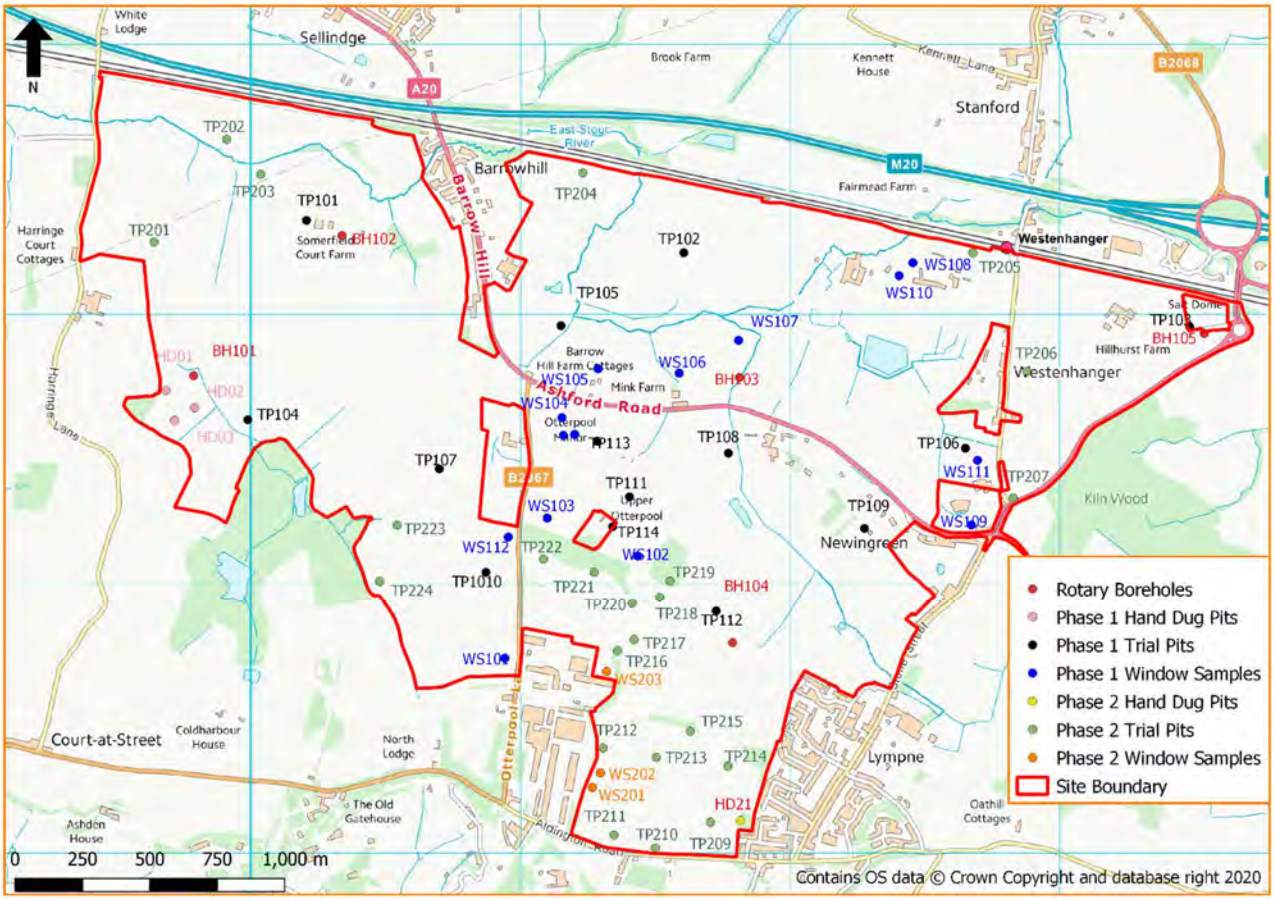

Figure 5: Preliminary site investigation locations completed in 2017 (phase 1) and 2018 (phase 2). (The planning Application Site boundary is outlined in red.)

Ten soakaway infiltration tests were completed at Phase 1 trial pit locations based on BRE365[10] methodology. Six of these tests (TP102, TP103, TP104, TP106, TP107 and TP109) recorded insufficient infiltration flow and so were abandoned. For the successful tests undertaken, values are provided in Table 1. The geomean of the results is given as $2.1x10^{-5}$ m/s.

10 BRE, 1991. Digest 365 – Soakaway Design

Table 1: Phase 1 BRE 365 Infiltration tests in trial pits.

Trial pit	Test result (infiltration rate, m/s)	Test result (infiltration rate, m/hr)
TP101	1.44×10^{-4}	0.51840
TP108	8.69×10^{-6}	0.03128
TP110	4.15×10^{-6}	0.01494
TP112	4.24×10^{-5}	0.15264

Falling head tests were undertaken at five sites; within these five sites, eight separate tests were successful, with one site (BH101) recorded as an abandoned test due to very high permeability rates. Data from these tests indicates that the ground permeability derived (as per the requirements and methods given in BS EN ISO 22282-1:2012[11] and BS EN ISO 22282-2:2012[12]) across the proposed Development varies from 2.5×10^{-8} m/s to greater than 1.2×10^{-5} m/s, with the lowest permeability reported where testing was undertaken in clay formation and head deposit locations. Tests undertaken in the Hythe Beds Formation (the bedrock unit in the upper portions of the site) ranged from 4.8×10^{-7}m/s to greater than 1.2×10^{-5}m/s, with a geomean of approximately 2.3×10^{-6}m/s. The test results are presented in Table 2.

Table 2: Falling head test results undertaken in borehole and window sample locations Phase 1.

Location ID	Test section top (m bgl)	Test section base (m bgl)	Permeability (m/s)	Permeability (m/hr)	Comment
BH101	6.0	10.0	n/a	n/a	Test abandoned due to high permeability rates and inability to produce sufficient head of water Head deposits overlying Sandgate Beds Formation at 4 m bgl and Hythe Beds Formation at 6 m bgl
BH103	4.0	10.0	1.22×10^{-5}	0.04392	Alluvium overlying Hythe Beds Formation at 2.5 m bgl
	4.0	10.0	4.57×10^{-6}	0.01645	
	4.0	10.2	5.35×10^{-6}	0.01926	
BH104	2.0	9.95	1.01×10^{-6}	0.00364	Hythe Beds Formation at outcrop overlying Atherfield Formation at 6.8 m bgl
			4.77×10^{-7}	0.00172	
BH105	2.0	10.0	2.24×10^{-7}	0.00081	Head deposits overlying Sandgate Beds Formation (siltstone) at 3.5 m bgl
			1.28×10^{-7}	0.00046	

[11] BS EN ISO 22282-1:2012. Geotechnical investigation and testing – Geohydraulic testing. Part 1: General Rules. British Standards Institution.
[12] BS EN ISO 22282-2:2012. Geotechnical investigation and testing – Geohydraulic testing. Part 2: Water permeability tests in a borehole using open systems. British Standards Institution.

Location ID	Test section top (m bgl)	Test section base (m bgl)	Permeability (m/s)	Permeability (m/hr)	Comment
WS112	1.0	3.5	2.5×10^{-8}		Head deposits to the base of the pit at 3.5 m bgl. Bedrock not encountered.

Overall, Phase 1 preliminary infiltration test and falling head test results suggest that the infiltration capacity associated with the Hythe Beds Formation aquifer and superficial deposits are in general relatively low[9]. Phase 2 infiltration tests (completed in August 2018) in other parts of the site generally showed very limited or zero infiltration capacity, but BH204 and TP208 at the most southern boundary of the site showed extremely good infiltration to such an extent where it was even unable to produce enough supply of water to produce a positive head of water to undertake the tests. Phase 1 and Phase 2 results indicate a notable variability in ground conditions and infiltration potential across the site, but further site investigation during the detailed design stage will improve the current estimates used in this FRA and SWDS.

Peter Brett Associates 2008 Investigations

Peter Brett Associates (PBA) site investigations[13] included ten borehole locations and soakaway infiltration testing at three trial pit locations, which indicated infiltration rates of between 2.5 X 10^{-4}m/s and 4.1 X 10^{-6}m/s in the underlying Hythe Beds Formation. Infiltration rates for the Head Brickearth deposits were measured to be between 1.0 X 10^{-6}m/s and 4.5 X 10^{-7}m/s.

Head Deposits were recorded with a thickness of up to 3.9m, extending to the top of the Hythe Beds Formation at approximately 96m to 103mAOD. The Hythe Beds Formation was encountered at a thickness of approximately 8m-9m, extending to the to the top of the Atherfield Clay at approximately 87mAOD – 94mAOD.

SLR Consulting 2010 Site Investigations

The SLR Groundwater Addendum Report[14] identified the following geological conditions at the former Otterpool Quarry site:

- Made Ground comprising silty gravelly sand, silty sandy gravel and granular sub base between 0.6m and 1.5m thick.
- Quarry backfill material comprising green grey gravelly Clay between 2.4m and 8.2m thick.
- Intact Hythe beds (base of quarry floor) comprising Limestone encountered at between 3.6m and 9.2m bgl.

These findings do not generally support the use of shallow infiltration-based SuDS in this area.

2.2.3 Hydrogeology

A review of the Aquifer Designation Map[15] indicates that the Folkestone Beds Formation and Hythe Beds Formation are classified as Principal Aquifer which are described as layers of rock that have high intergranular and/or fracture permeability. These formations are generally sandstone and conveys water of a soft nature with good infiltration rates, depending on fracture permeability and bed thickness.

The Sandgate Beds Formation is classified as Secondary A Aquifer, which is described as permeable layers capable of supporting water supplies at a local rather than strategic scale. A small proportion of the site is located upon the Wealden Clay Formation an Atherfield Clay Formation, both of which are classified as

[13] Hydrogeological Assessment Report for Phides Estates (Overseas) Ltd (October 2008) – Link Park Lympne, PBA 2008
[14] Groundwater Addendum Report for Countrystyle Recycling Ltd. (October 2010) – Otterpool Quarry, SLR 2008
[15] https://magic.defra.gov.uk/magicmap.aspx, accessed on 01/12/2020

unproductive strata described as rock layers with low permeability that have negligible significance for water supply or river base flow.

The presence of these aquifers generally supports the potential use of infiltration-based SuDS (subject to further infiltration rates testing, groundwater levels monitoring etc.) during the detailed design stage. Whereas the head deposits, Atherfield Clay Formation and Weald Clay Formation are Unproductive (non-aquifers), limiting the opportunity for infiltration-based SuDS.

However, the Hythe Beds Formation is relatively thin on site (based on the site investigation data) and underlain by the Atherfield Clay. The top of the Atherfield Clay, therefore, forms the lower bound to the Hythe Beds Formation aquifer, which was found at 6.8m below ground level (bgl) at BH104. Borehole logs show that the Hythe Beds Formation consists of weathered fractured micritic limestones and weathered coarse sandstones.

A schematic of the cross-section of the geology through the site (i.e. starting from the escapement towards A20 through the former Lympne Airfield) is given in Figure 6 for illustrative purposes.

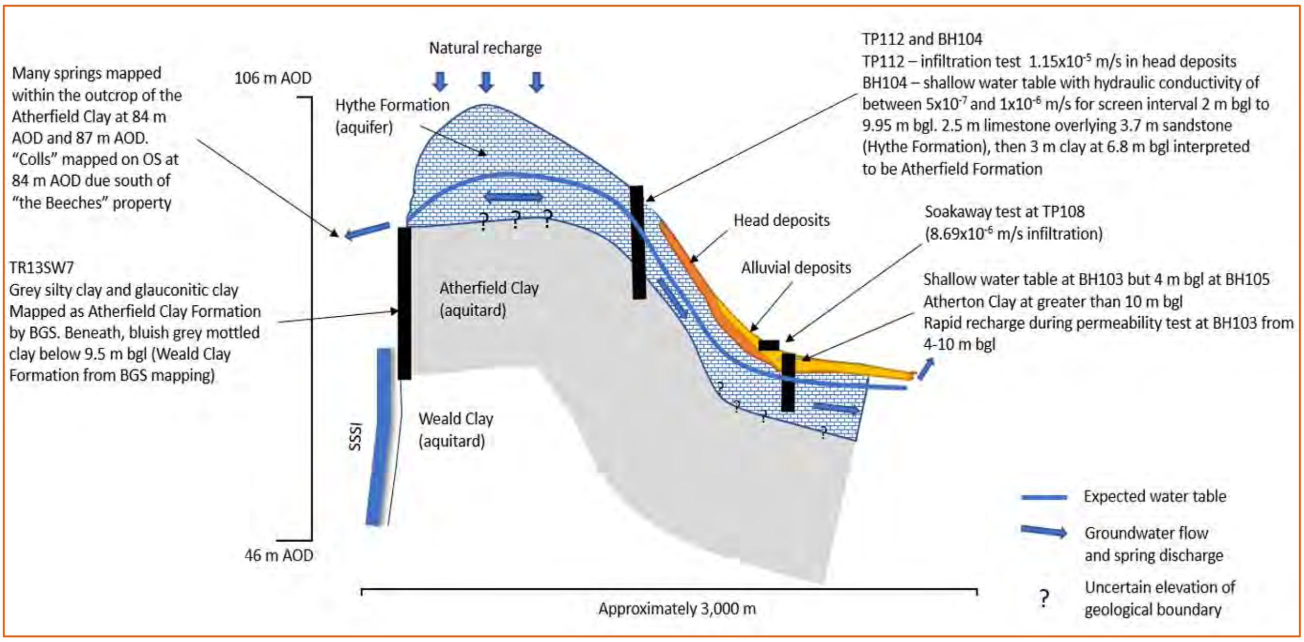

Figure 6: Bedrock geology illustrative sketch (Source: interpreted from BGS and Arcadis Phase 1 Ground Investigation)

As illustrated above, low permeability surface head deposits exist (range from 1 m to 5 m in thickness) from TP112/ BH104 towards TP108 and the East Stour valley further downstream. Trial pit and borehole logs show that the head deposits are poorly sorted gravels with clay matrix. Geological mapping indicates that these head deposits are limited in extent.

Infiltration of water into the Hythe Beds Formation is usually through joints and fractures, principally through the weathered and fractured "Ragstone". There is also a limited degree of matrix flow (although much less than the primary fissure flow) though the sandier "Hassock" layers. The relatively impermeable nature of the underlying Atherfield Clay Formation prevents further downward movement of water.

Groundwater levels recorded across the Otterpool site range from approximately 0.9m bgl to 9.9m bgl (66.3 mAOD to 91.3mAOD)[9]. The deepest groundwater levels are found at the southern edge of the site, where the topography is highest, whilst the shallowest groundwater levels are found on the slopes and lower parts of the site in the north and within the floodplain of the River East Stour.

Figure 7 shows a plot of average recorded groundwater levels for monitoring completed during the Arcadis ground investigation[9]. The plot indicates that groundwater flows north towards the River East Stour. A groundwater divide is also expected at the southern edge of the site, though it is not shown as there are no data in this area. Similarly, PBA and SLR reports discussed above generally indicate a northerly groundwater flow direction although the resting groundwater level is believed to be located within backfill (Made Ground) in some borehole locations and within the natural Hythe Beds Bedrock in others. The SLR report also indicates that the groundwater levels have risen since the quarrying activities ceased and localised pockets of perched groundwater is present within Made Ground in some areas of the former Otterpool Quarry Site, indicating the need to further monitor groundwater levels to inform the proposed SuDS design at Otterpool Park.

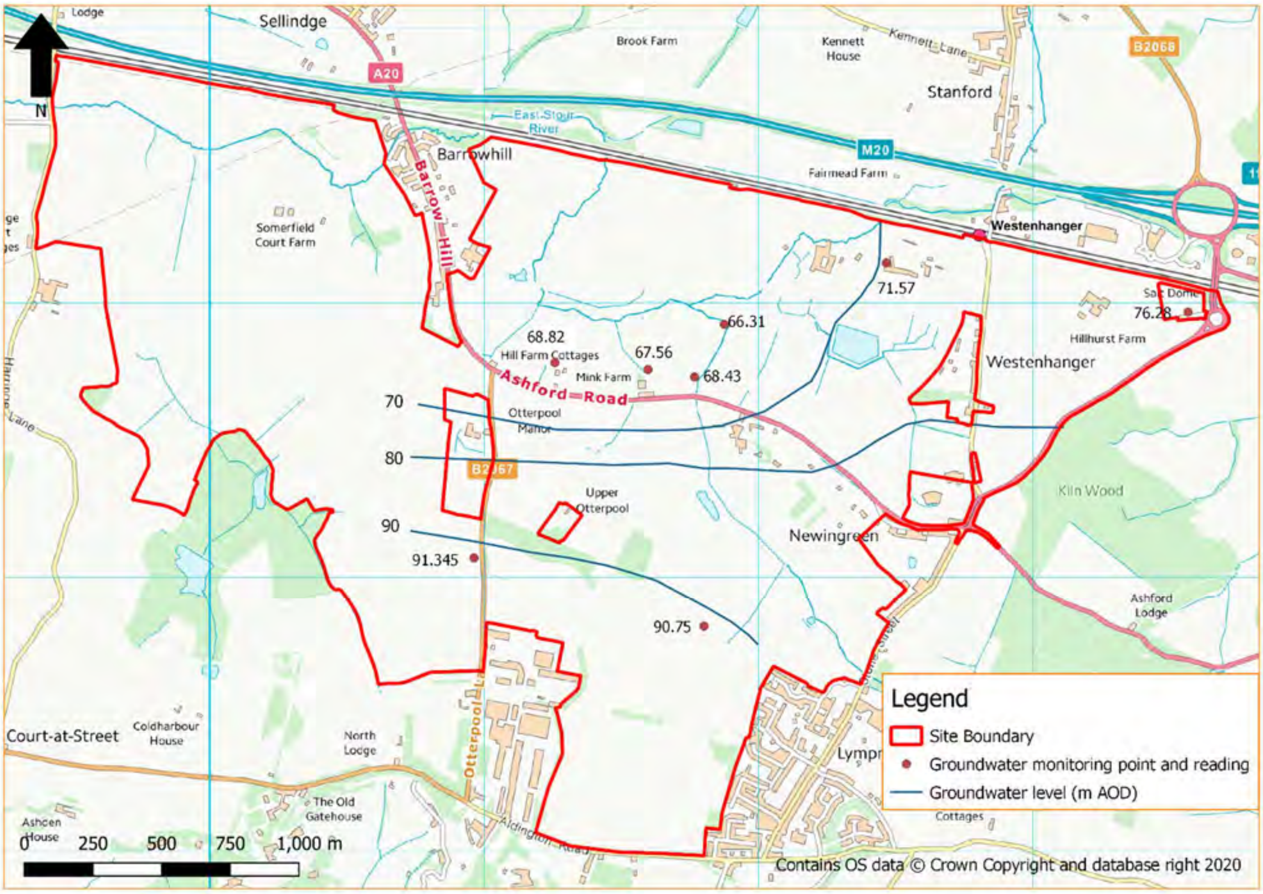

Figure 7: Groundwater level contours for the situation in September 2017.
(The planning Application Site boundary is outlined in red.)

3 Revised planning approach and development proposals

3.1 Three tier planning approach

Following consultation on the Environment Statement[16] submitted as part of the 2019 planning application (the '2019 ES'), a 'three-tier' approach is proposed for the amended planning application. The conditions that would be attached to the Tier 1 outline planning permission, if granted, would require two further consents stages to control the design and delivery of the proposed Development from outline to the reserved matters stage. It is anticipated that there will be development quantum threshold 'triggers' that will inform the need to provide certain key infrastructure in advance of other development phases or zones coming forward. These triggers will be established by the LPA and key infrastructure providers) in order to demonstrate how the proposed Development can be constructed without the need for fixed development phasing at the outline application stage.

The 'three tier' planning approach includes the following key stages, as illustrated in Figure 8:

- **Tier 1: Outline planning application** – agreement of overall land uses, parameter plans (ES Appendix 4.2) and a series of site wide strategies.
- **Tier 2: Detailed masterplan and design code for each phase** – each phase of development will need to be supported by a detailed masterplan that will accord with the Tier 1 material.
- **Tier 3: Reserved Matters application** – each development plot will need to be the subject of a reserved matters application, the detail of which will need to include detailed design for the relevant plot and will need to be in accordance with the information approved as part of Tier 1 and Tier 2.

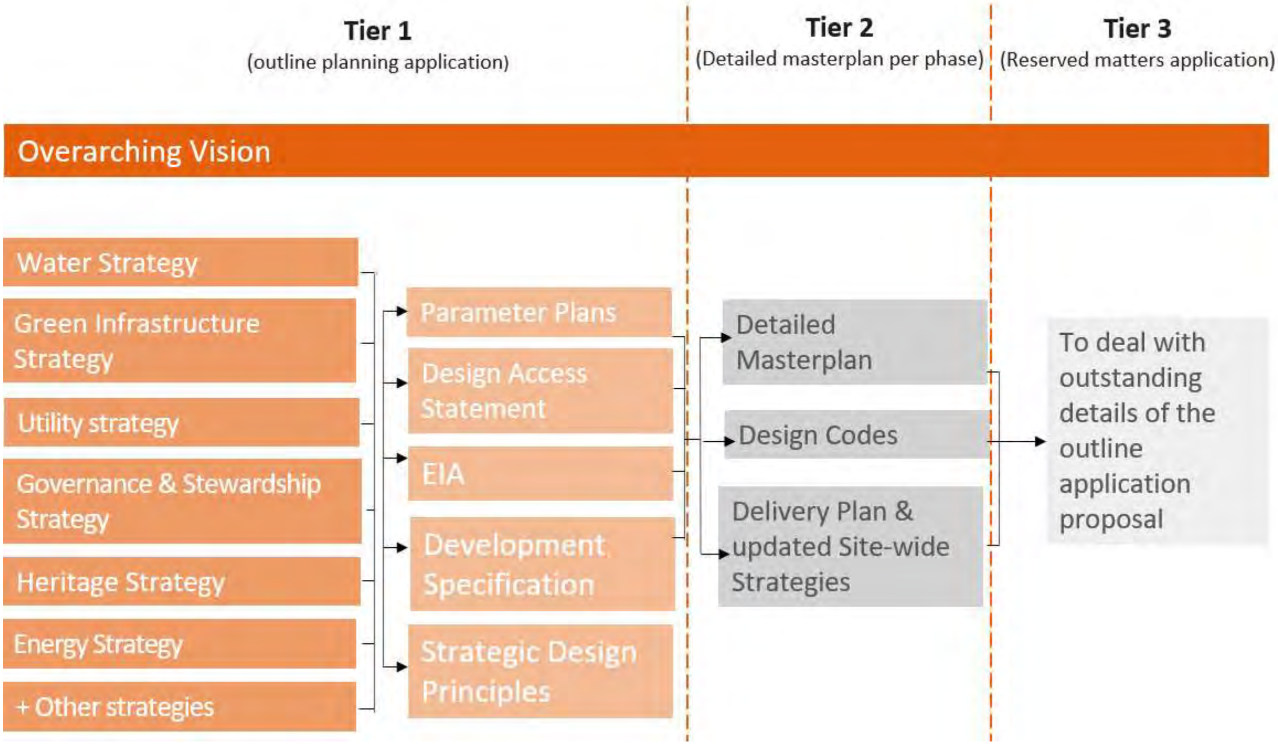

Figure 8: Tiered planning approach.

3.2 Development proposals

Details of the proposed Development are given in the Development Specification (ES Appendix 4.1) and Strategic Design Principles (ES Appendix 4.3) Documents prepared by the planning consultant (QUOD) and

[16] Environmental Statement for Otterpool Park, Arcadis, February 2019

will be submitted as part of the amended outline planning application documentation, along with the Parameter Plans (ES Appendix 4.2) and other supporting plans.

The key changes to the 2019 planning application include:

- The inclusion of Westenhanger Castle within the red line planning application boundary;
- The exclusion of approximately 2ha of land in the north-eastern corner of the site; and
- The inclusion of additional land in the north-west of the Site for wastewater treatment.

The proposed Development is expected to be constructed in phases over a 19-year period. However, the details of phasing are reserved.

The proposed Development includes 8,500 dwellings combined with commercial, retail, education, health, community and leisure facilities, parking, landscaping, and public open space. A summary of the maximum floor space for approval of each use is shown in Table 3. In addition to this, approximately 271 ha of strategic green infrastructure and 20 ha of new infrastructure are included.

Table 3: Total Proposed Residential Units and Floorspace by Use

Land Use	Including	Maximum No. of Proposed Units
Residential	Residential units and Extra Care accommodation	8,500

Land Use	Including	Proposed Gross External Area (GEA) Floorspace (m^2)
Education and Community Facilities	Schools , nurseries, crèches, reserve school floorspace and/or SEN, health centres, place of worship, community centres.	Up to 67,000
Hotel	Hotel	Up to 8,000
Leisure	Sports pavilion and indoor sports hall	Up to 8,500
Mixed retail and related uses	Shops, professional services, restaurants, cafes, drinking establishments, hot food takeaways, offices, businesses	Up to 29,000
Employment	Commercial business space in hubs, commercial business park, light industrial business park.	Up to 87,500
Total		**Up to 200,000**

An illustration of the emerging Masterplan for the proposed Development is shown in Figure 9.

Public open space and blue-green infrastructure

A key feature of any garden settlement is its inclusion of a rich blue-green infrastructure and ability to maximise the natural environment. Otterpool Park has been planned as a holistic 'Green' development providing accessible routes between the residential setting, informal and formal sport, play spaces, food production areas, community space, work place and the wider surroundings.

Parameter Plan OPM(P)4002_YY (ES Appendix 4.2), confirms the location of open space across the site. This open space will include public realm and space for leisure, sport and play as well as other forms of open space, such as up to 5 ha of burial ground. The parameter plan secures 260.5 ha of open space (44% of the

Application Site). Furthermore, as an indicative guideline, it is anticipated that within Development Areas (other than private gardens) approximately 10-15% of the land will be provided as open space. This will result in approximately 50% of the total Application Site being open space. The open space will provide a range of green infrastructure, for example, formal play areas, habitats, space for food production and outdoor sports.

The location of key green spaces is fixed by Parameter Plan OPM(P)4002_YY (ES Appendix 4.2). The precise configuration of additional incidental green spaces is however subject to detailed design at the reserved matters stage, having regard to the Parameter Plans (ES Appendix 4.2) and Strategic Design Principles (ES Appendix 4.3).

The designation of strategic areas of public open space will consider the need to preserve or enhance the setting of heritage assets within the site and to minimise the harm caused to heritage assets, notably Westenhanger Castle at the northern boundary of the site and Otterpool Manor in the southern/central part of the site.

The proposed SuDS and Flood Risk Management strategy makes use of the existing River East Stour and local watercourses as part of 'blue-green corridors'. They take account of the capacity of existing watercourses and includes proposals to designate land for landscaped flood alleviation purposes, while enhancing the role and amenity of existing watercourses through the site. Opportunities have been taken to maintain important hedgerows and trees on the site, provide new planting and enhance biodiversity.

Section 6 to Section 9 provide the relevant details of the proposed SuDS Strategy and Flood Risk Management Strategy that have been assessed in this report.

Figure 9: Illustrative masterplan (Ref - Otterpool Park Green Infrastructure Strategy, Arcadis March 2022 (ES Appendix 4.11)) (The planning Application Site boundary is outlined in red.)

Highways

The main access to Otterpool Park will be from Junction 11 of the M20 via the A20. It is recognised that traffic will also use other routes, including via A20 from the west, B2067 Otterpool Lane from the south or A261 Hythe Road from the east.

A network of proposed primary roads will provide access through Otterpool Park, connecting both sides of the A20 and serving the station, town centre, schools, local centres and employment as well as giving access to the residential areas. These routes will provide for bus movements and have walking and cycling connections alongside. The primary roads are indicated in the Development Areas and Movement Corridors Parameter Plan (OPM(P)4001_YY) (ES Appendix 4.2). There will also be other access roads delivered across the Site but the detail of these will not be submitted until Tier 2 and Tier 3 stages.

A comprehensive range of measures are proposed to promote sustainable travel and vehicle choices including the provision of walking and cycling routes. The primary walking and cycling route are indicated in the Development Areas and Movement Corridors Parameter Plan (OPM(P)4001_YY) (ES Appendix 4.2). There will be other walking and cycling routes delivered across the Site but the detail of these will not be submitted until Tier 2 and Tier 3 stages.

A number of on-site highway improvements are proposed as part of the Tier 1 outline planning application (e,g., Newingreen Junction, Upgrade of the A20 Ashford Road, Otterpool Avenue, Bridges) and several off-site highways improvements, as described in the submitted Development Specification (ES Appendix 4.1) document.

Three new road bridge crossings over the River East Stour are proposed to connect the proposed Development through the Riverside Park.

Residential

The proposed Development will comprise a mixture of high, medium and low densities of residential provision throughout the new settlement, reflecting a range of housing types. The overall mix of C3 residential development for Otterpool Park is set out in submitted Development Specification (ES Appendix 4.1) Document. Residential development includes residential units as well as residential accommodation for older people such as age restricted homes, assisted living homes, extra care facilities, care homes, sheltered housing and care villages.

The proposed Housing Strategy confirms that overall, the development will achieve provision of 22% affordable housing. Due to the significant infrastructure requirements of the development however, flexibility is sought for varying levels of affordable housing to be delivered for different parts of the site. The Section 106 legal agreement will secure the level of affordable housing delivered.

Mixed retail and related users

Up to 29,000sqm GEA of mixed retail and related uses is proposed. This floorspace includes uses such as shops, professional services, retail services, cafes, restaurants, drinking establishments, hot food takeaways (use classes E, F and Sui Generis). A single food store of up to 500sqm is proposed.

The delivery of the retail floorspace will be focused in the Town Centre and Castle Park phase of development, although across the Site (within the Development Areas shown on the Development Areas and Movement Corridors Parameter Plan (OPM(P)4001_YY) (ES Appendix 4.2), there would be an element of retail and related services such as local neighbourhood retail shops, professional services and food and drink venues to meet local needs.

Employment

This floorspace, of up to 87,500sqm, includes use class E and Sui Generis (office, research and development and light industrial process) and B2 (general industrial).

Education and Community Facilities

Up to 67,000 m^2 GEA of education floorspace is proposed. This floorspace includes schools (primary, secondary and 6th form), nurseries and crèches, health centres, places of worship and other non-residential institutions such as libraries and community centres (use class E and F).

Hotel

Hotel floorspace (up to 8,000 m^2 GEA, use class C1) is also proposed to be provided.

Leisure

This floorspace includes leisure and assembly uses (use class E, F and Sui Generis) such as the sports pavilion and indoor sports hall (up to 8,500 m^2 GEA).

Infrastructure and Utilities

Delivering Otterpool Park will require substantial upgrades of the existing utility infrastructure including a new electrical primary substation, potable water network reinforcement and provision of a fibre-to-home broadband network. A Utilities Strategy (ES Appendix 4.8) is submitted in support of the Outline Planning Application.

4 Planning policy

4.1 National planning context

The NPPF was first published in 2012 and most recently updated in 2021. Along with its accompanying PPG[3] (flood risk and coastal change), the NPPF sets out the government's planning policies for England and how these are expected to be applied. The principal aim of the NPPF is to achieve sustainable development. This includes ensuring that flood risk is taken into account at all stages of the planning process, avoiding inappropriate development in areas at risk of flooding and directing development away from those areas where risks are highest. Where development is necessary in areas of flooding, the NPPF aims to ensure that it is safe, without increasing flood risk elsewhere. Suitable mitigation and adaption measures are also advised in the planning process to address the likely future impacts of climate change.

Early adoption of, and adherence to, the principles set out in the NPPF and its Technical Guidance, with respect to flood risk, should ensure that detailed designs and plans for developments take due account of flood risk and the need for appropriate mitigation, if required.

Flood Risk & Coastal Change PPG identifies four Flood Zone classifications, detailed in Table 4 below.

Table 4: Flood Zones (PPG, Flood Risk and Coastal Change, Table 1)

Flood Zone	Annual Probability of Flooding (%)
1 Low Probability	Fluvial and Tidal <0.1%
2 Medium Probability	Fluvial 0.1 – 1.0 % Tidal 0.1 – 0.5 %
3a High Probability	Fluvial >1.0 % Tidal >0.5 %
3b The Functional Floodplain	Land where water has to flow or be stored in times of flood, identified by local authorities in Strategic Flood Risk Assessments. Fluvial and Tidal >5.0 % is recommended as a starting point for consideration, but it should not be defined solely by rigid probability parameters.

The NPPF specifies that the suitability of all new development in relation to flood risk should be assessed by applying the Sequential Test to demonstrate that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development proposed. The PPG provides further guidance on the compatibility of each land use classification in relation to each of the Flood Zones as summarised in Table 5.

Table 5: Flood Risk Vulnerability Classification (PPG, Flood Risk and Coastal Change, Table 3/ NPPF, Annex 3)

Flood Zone	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
1 Low Probability	✓	✓	✓	✓	✓
2 Medium Probability	✓	Exception Test required	✓	✓	✓
3a High Probability	Exception Test required	×	Exception Test required	✓	✓
3b The Functional Floodplain	Exception Test required	×	×	×	✓
Key:	✓ Development is appropriate		× Development should not be permitted		

When a development site falls partly within multiple Flood Zones, the highest risk Flood Zone should be used when assessing development vulnerability as in Table 5. If it is not possible for development to be located in zones with a lower risk of flooding, the Exception Test may have to be applied. For the Exception Test to be passed, it should be demonstrated that:

a) The development would provide wider sustainability benefits to the community that outweigh the flood risk; and
b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

4.2 Local planning context

The proposed Development is promoted by Otterpool Park LLP as part of the garden settlement initiative which has been approved and partially funded by the UK Government. The proposed Development is allocated in the F&HDC Core Strategy Review 2022. The proposed Development is for a sustainable and modern, high-quality development as part of a garden settlement initiative. It will include the following:

- Up to 8,500 homes;
- Employment opportunities;
- Primary and Secondary Schools;
- Town and Village centres;
- Approximately 50% Green Infrastructure;
- Enhancement of the local natural environment.

Policy SS3 of the Core Strategy Review (2022) states that "*for development located within zones identified by the Environment Agency (EA) as being at risk from flooding…, site-specific evidence will be required in the form of a detailed flood risk assessment. This will need to demonstrate that the proposal is safe and meets with the sequential approach within the applicable character area (Urban Area, Romney Marsh Area or North Downs Area), and where applicable, the exception tests set out in national policy utilising the current applicable Strategic Flood Risk Assessment (SFRA). A site-specific flood risk assessment may be required for other sources of flood risk as identified with EA surface water flood mapping.*" Policy SS3 also goes on to state:

"*Development should also meet the following criteria as applicable:*

i) no residential development, other than replacement dwellings, should take place within areas identified at "extreme risk" as shown on the SFRA 2115 climate change hazard maps; and

ii) all applications for replacement dwellings, should, via detailed design and the incorporation of flood resilient construction measures, reduce the risk to life of occupants and seek provisions to improve flood risk management; and *iii) Strategic scale development proposals should be sequentially justified against district-wide site alternatives.*"

Furthermore, policy SS7 states that the green and blue infrastructure for Otterpool Park shall deliver "*sustainable drainage systems (SuDS) to maximise landscape and biodiversity value and to avoid any increase in, and where possible reduce, downstream flooding of the River East Stour, developed as part of an integrated water management solution.*" The sustainability principles include the need to plan for the supply of water and control water usage will be essential, as the district is an area of water scarcity.

Policy SS8 states that the Otterpool Park garden settlement development shall be informed by a Water Cycle Strategy *'b. All new build housing shall be built to water efficiency standards that exceed the current building regulations so as to achieve a maximum use of 90 110 litres per person per day of potable water (including external water use). The development shall be informed by a Water Cycle Strategy which includes detail of:*

i. Water efficiency, and demand management measures to be implemented to minimise water use and maximise the recycling and reuse of water resources (i.e. through the use of 'grey' water) across the settlement, utilising integrated water management solutions;

ii. The need to maintain the integrity of water quality, how it will be protected and improved, and how the development complies with the Water Framework Directive;

iii. Surface water management measures to avoid increasing, and where possible to reduce, flood risk through the use of Sustainable Drainage Systems (SuDS); and

iv. Water services infrastructure requirements and their delivery having regard to Policy CSD5, and as agreed with the relevant statutory providers, and the EA guidance on Water Cycle Studies".

Policy SS8 also requires all proposed development to satisfy the requirements of policy CSD5 (d) in order to avoid any significant impact on the water quality of the Stodmarsh European designated sites.

Policy CSD5 states that development should contribute to sustainable water resource management which maintains or improves the quality and quantity of surface and ground water bodies, and where applicable, the quality of the coastal environment and bathing waters. Amongst other matters, the draft policy states that "*New buildings and dwellings must be delivered in line with wastewater capacity and designed so as to ensure that, in relation to greenfield development, peak rate of surface water runoff from the site is not increased above the existing greenfield surface water runoff rate, incorporating appropriate sustainable drainage systems (SuDS) where feasible and water management features, with full consideration given to integration of water management. The quality of water passed on to watercourses and the sea must be maintained or improved, and flood risk must not be increased by developments within the district.*"

4.3 Application of the Sequential Test

The flood risk vulnerability classification for all development types is set out in Table 2 of the PPG[3]. The proposed Development has a mixed flood risk vulnerability classification:

- Water Compatible (areas of open space and recreational/sports facilities)
- Essential Infrastructure (transport and utility infrastructure)
- Less Vulnerable (commercial and employment space)
- More Vulnerable (residential use, schools and health facilities)

Flood Risk and Coastal Change PPG states that the lifetime of any development including residential use is at least 100 years in terms of flood risk and coastal change; an understanding of the lifetime is necessary to ensure that appropriate consideration is given to the impacts of climate change as well as the maintenance requirements of new key infrastructure.

The proposed Development is allocated in the Core Strategy Review 2022. The Sequential Test has been undertaken by F&HDC and their advisers as part of the evidence base studies undertaken to inform the new Local Plan and Core Strategy Review 2022 as summarised below.

The key documents that summarise the Sequential Test and wider technical appraisal process undertaken to inform the new Local Plan and Core Strategy Review 2022 include:

- The Strategic Housing Land Availability Assessment (SHLAA) 2015/16[17], which informed the Places and Policies Local Plan (PPLP)[18] that was formally adopted in September 2020;
- High Level Options Report[19] and Growth Options Study Phase Two Report[20] which informed the Core Strategy Review 2022[21].

The Core Strategy Review was also supported by a comprehensive High Level Landscape Appraisal[22] and Sustainability Appraisal Report Regulation 19[23], while considering flood risk as required. The SHLAA exercise in 2015/16 also identified and assessed 179 sites and initially found 120 to be potentially suitable and achievable. Further analysis of these screened sites provided 82 deliverable/developable sites. The remaining sites were classified as 'red' and were assessed as not being suitable due to significant policy constraint (s) such as impacts and/or encroachment on the Kent Downs Area of Outstanding Natural Beauty (AONB), areas of extreme and significant flood risk based on work carried out to inform the SFRA or situated within a Site of Special Scientific Interest (SSSI).

The PPLP Sustainability Appraisal Report Regulation 18 (2018), Section 7, appraised all preferred allocations and reasonable alternatives for development in the PPLP. The approach taken to the SHLAA and allocation of sites for the PPLP was adjudged to have been sound by the planning inspector in 2019/20.

Appendix B of this FRA also includes a recent document[24] produced by F&HDC in January 2021, summarising the LPA evidence in relation to the SHLAA outcomes and the capacity of the existing built-up areas or smaller peripheral sites.

This demonstrates that F&HDC has maintained a current review of potential SHLAA sites available in their district throughout the plan making process and fully examined those that have been submitted and assessed as being suitable for development. The majority of the sites which have not been allocated have constraints relating to their impact on the Kent Downs AONB, internationally and nationally protected habitats and significant flood risk, which is consistent with the highly constrained nature of the district.

Furthermore, F&HDC has stated that there is little or no latent housing land capacity within existing built-up areas or on smaller peripheral sites and that the spatial strategy set out in the Core Strategy Review is the only deliverable option to meet the housing requirements for the district. Sites of nine dwellings or below are already accounted for in the Core Strategy Review trajectory through the windfall allowance, which has been based on evidence of past completions of small sites of this nature across the district.

The F&HDC evidence report (dated January 2021) in Appendix B and the previous High Level Options Report which informed the Core Strategy Review, both concluded that only Sellindge and the surrounding area was suitable for strategic scale development due to environmental, landscape and heritage constraints. The Otterpool Framework Masterplan Area falls within the areas identified in these reports and is deemed suitable for strategic scale development due to the limited areas of flood zones 2 and 3 which are present. Therefore, the four broad site locations within Sellindge and Surrounding area as shown in Figure 14 of Chapter 2 in the High Level Options Report[19] (named as A, B, C and D) were assessed in further detail, as the remaining area is constrained by Flood Zone 2/3, Kent Downs AONB and existing built environment.

The AECOM Phase 2 Growth Options Report[20] concluded that Otterpool Park Framework Masterplan Area that falls within Area B is suitable for a strategic scale development with suitable landscape buffers incorporated to address both the landscape constraints and the limited areas of Flood Zones 2 and 3 present. The remaining three areas (Area A, C and D) have insufficient capacity to fulfil the required entire housing need in the District. The Core Strategy Review Local Plan seeks to provide a minimum 6,097 new homes at

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17 F&HDC (Shepway) Strategic Housing Land Availability Assessment 2015/16, F&HDC (Shepway) 2016
18 Folkestone & Hythe District Places and Policies Local Plan, F&HDC September 2020
19 High level options report, F&HDC (Shepway) District Growth Options Study, AECOM, December 2016
20 F&HDC (Shepway) Growth Options Study, Phase Two Report, AECOM, April 2017
21 F&HDC Core Strategy Review 2022
22 F&HDC (Shepway) High Level Landscape Appraisal, AECOM February 2016
23 F&HDC Proposed Submission Core Strategy Review - Sustainability Appraisal Report, LUC December 2018
24 Update from the Local Planning Authority regarding evidence in relation to the SHLAA and capacity of the existing built up areas or smaller peripheral sites, FHDC EX 051, F&HDC, January 2021

the Otterpool Park Garden Settlement (Core Strategy Review Policies SS6-SS9) and 350 new homes at Phase 2 expansion of Sellindge (Core Strategy Review Policy CSD9) in the Plan Period (2019/20 – 2036/37).

A review of the SFRA and latest EA flood maps has also confirmed that 96% of the amended Application Site is located in Flood Zone 1 (low risk) where the main development fabric is proposed. The remaining 4% of Flood Zone 2 (medium risk) and Flood Zone 3 (high risk) areas are constrained to the existing floodplain corridor of the River East Stour that flows through the northern half of the site.

Therefore, based on the evidence referred to above, it is considered that the proposed Development meets the requirements of the NPPF Sequential Test. However, given the presence of some area of Flood Zone 2 and 3 there is a need to demonstrate that a sequential approach has been undertaken in locating development within the Application Site. The application of Sequential Test and Exception Test for the proposed Development is fully discussed in Section 7.

4.4 Compliance with the local planning policies

To demonstrate compliance with policy SS3 of the Core Strategy Review (2022), this site-specific FRA confirms that no dwellings have been proposed within areas of 'extreme risk' of flooding and that the development proposals meet the requirements of the Sequential Test.

The proposed green and blue Infrastructure described in the SWDS section of this report details proposed SuDS measures, which aim to maximise landscape and biodiversity value to prevent downstream flooding of the River East Stour. This has, and will, continue to be developed as part of an integrated water management solution to avoid any increase in, and where possible reduce, downstream flooding of the East Stour River.

An Outline WCS (ES Appendix 15.2) has also been prepared in conjunction with this FRA & SWDS Report to plan for the supply of water and control water usage, incorporating water efficiency measures, given the district's water scarcity status. This ensures that the design process complies with policies SS7, SS8, CSD4 and CSD5.

In compliance with policy SS8, the Outline WCS (ES Appendix 15.2) identifies water efficiency and demand management measures that could be implemented to minimise water use and maximise the recycling and reuse of water resources where possible. This also provides details on how the water quality will be protected and improved, and how the development complies with the Water Framework Directive and Habitats Directive, including its proposed nutrient neutrality management strategy. The Outline WCS (ES Appendix 15.2) also identifies the water and wastewater services infrastructure requirements, including their current delivery and how this may change because of the proposed Development.

In compliance with policy CSD5, the development supports a sustainable water resource management strategy which will maintain or improve the quality and quantity of surface and ground water bodies as identified within this FRA and Drainage Strategy, in particular the drainage strategy has conceptually designed for the utilisation of the greenfield runoff rate, or less.

5 Potential sources of flooding

5.1 Overview

In line with best practice, this section considers flood risk from the range of possible sources listed in Table 6 and identifies where further discussion and/or mitigation measures are required. A review of known historical flooding is also given to provide context for the desktop assessment.

Table 6: Sources of flooding

Source of Flooding	Description
Flooding from rivers (fluvial)	Floodwater originating from a nearby watercourse when the amount of water exceeds the channel capacity of that watercourse
Flooding from the sea (tidal)	Flooding originating from the sea or a connected waterbody when seawater overflows onto land through extreme tidal conditions, storm surge or breach.
Flooding from surface water (pluvial)	Flooding caused by intense rainfall exceeding the available infiltration and/or drainage capacity of the ground
Flooding from groundwater	Flooding caused when groundwater levels rise above ground level following prolonged rainfall
Flooding from sewers	Flooding originating from surface water, foul or combined drainage systems, typically caused by limited capacity or blockages
Flooding from reservoirs, canals, and other artificial sources	Failure of infrastructure that retains or transmits water or controls its flow.

5.2 Historic flooding

There is no recorded or anecdotal historical flood event data at the existing site. However, further downstream on the River East Stour some distance outside the proposed Development, the town of Ashford is susceptible to flooding as run-off from the surrounding higher ground converges in the town via the River East Stour, the Great Stour, Ruckinge Dyke, Whitewater Dyke and Aylesford Stream. It is understood that the worst-case for flooding in Ashford is when prolonged rainfall increases the baseflow and then a medium intensity storm falls across the catchment.

Ashford is located approximately 8 km downstream of the proposed Development. A document produced by the EA[25] detailing the operation of the Ashford Flood Storage Reservoirs (FSRs) during the winter flood of 2013/14 states Ashford experienced flooding in the mid-1970s, December 1985, January 1986 and November 1986. Such events resulted in the construction of the Hothfield and Aldington Flood Storage Reservoirs on the Great Stour and River East Stour respectively. These two FSRs have been designed to jointly provide a standard of protection of 1 in 100 annual chance flood event in Ashford, but a series of repeated extreme rainfall events in 2000 / 2001, leading to very saturated catchment conditions overtopped the designed spillway of Aldington FSR, causing flooding at three properties flooding downstream at Mersham. Similar repeated rainfall conditions in 2014 also caused the Aldington FSR to reach its full capacity, but it was not overtopped.

In addition to the flood events noted above, the Folkestone and Hythe Surface Water Management Plan[26] (SWMP) reports a combined fluvial and surface water flood event in 1996 with an estimated annual chance of 1 in 500. This flood event mainly impacted the West Hythe area in a different river catchment, to the south east of the proposed Development.

[25] Ashford – Operation of Defences, Environment Agency

[26] Folkestone and Hythe Surface Water Management Plan – Stage 1 JBA, November 2012

5.3 Fluvial

The EA Flood map for Planning is shown in Figure 10 and demonstrates that Flood Zones 2 and 3 follow the route and profile of the River East Stour valley, which runs through the northern half of the proposed Development. These existing Flood Zones are based on the EA's broad-scale national JFLOW modelling outputs, which currently exclude the small site tributaries. Therefore, no flood zones are currently shown for the existing tributary watercourses, which means further site-specific modelling is generally required to better define flood risk from the existing watercourses. Further detail is provided in Section 7.

Three new road bridge crossings are proposed over the River East Stour, to connect the development through the Riverside Park area to the south and west with the northern portion of the proposed Development (represented by green circles on Figure 10). The road bridges span the channel of the watercourses (including a minimum 10m buffer from the top of the riverbank) and as such, they are crossing the floodplain. To ensure the road bridges do not cause constrictions to flow, which could increase flood risk onsite and upstream, the bridges have been further assessed with detailed hydraulic modelling as outlined in Section 7. The modelling has also assessed climate change impacts and cover the key site tributaries where there is currently no flood risk mapping available from the EA.

In conclusion, it is considered that the risk of flooding to the proposed Development from fluvial sources generally **low**, but further modelling is required to confirm flood risk, assess climate change impacts and inform the new road bridge crossings. The risk of fluvial flooding is discussed further in Section 7.

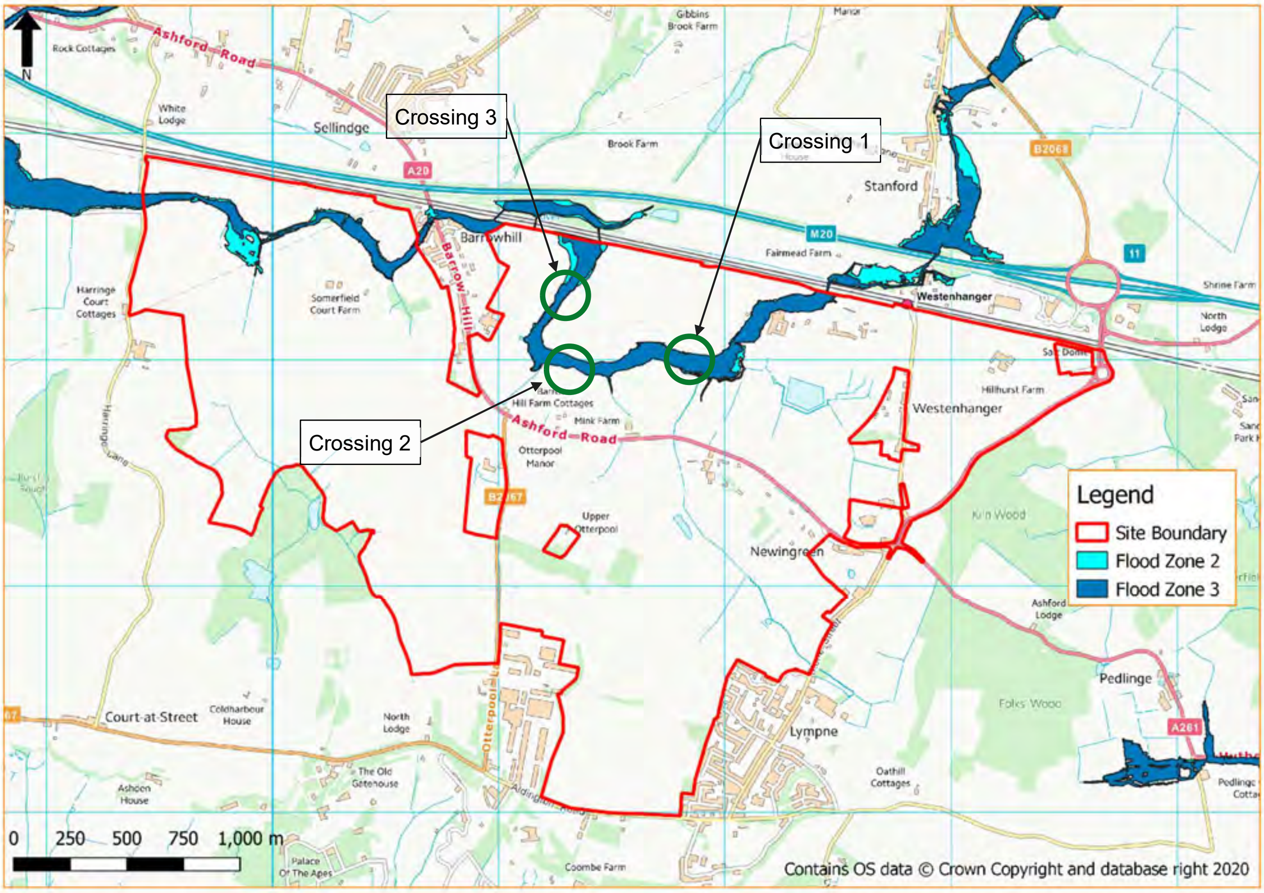


Figure 10: EA Flood Map for Planning © EA, 2020.
(The planning Application Site boundary is outlined in red.)

5.4 Surface water

As a largely greenfield site, rainfall runoff patterns are governed by topography, soil type and the nature of the overlying vegetation. Soilscapes[8], define the underlying soils as loamy with high groundwater, slowly permeable and freely draining.

The EA Risk of Flooding from Surface Water dataset is provided in Figure 11 showing limited areas of localised flooding which predominantly follow the profiles of the existing watercourses. Surface water is also observed to pond against the embankment of the CTRL.

The majority of the site is defined as having 'very low' surface water flood risk (less than a 1 in 1000 annual chance). Areas at low, (between a 1 in 1000 and 1 in 100 annual chance event), medium (between a 1 in 100 and 1 in 30 annual chance event) and high (greater than a 1 in 30 annual chance event) risk correspond with depressions in the topography and represent drainage routes/flow paths, which should be retained as blue and green corridors without any built development, forming a key part of the proposed drainage strategy.

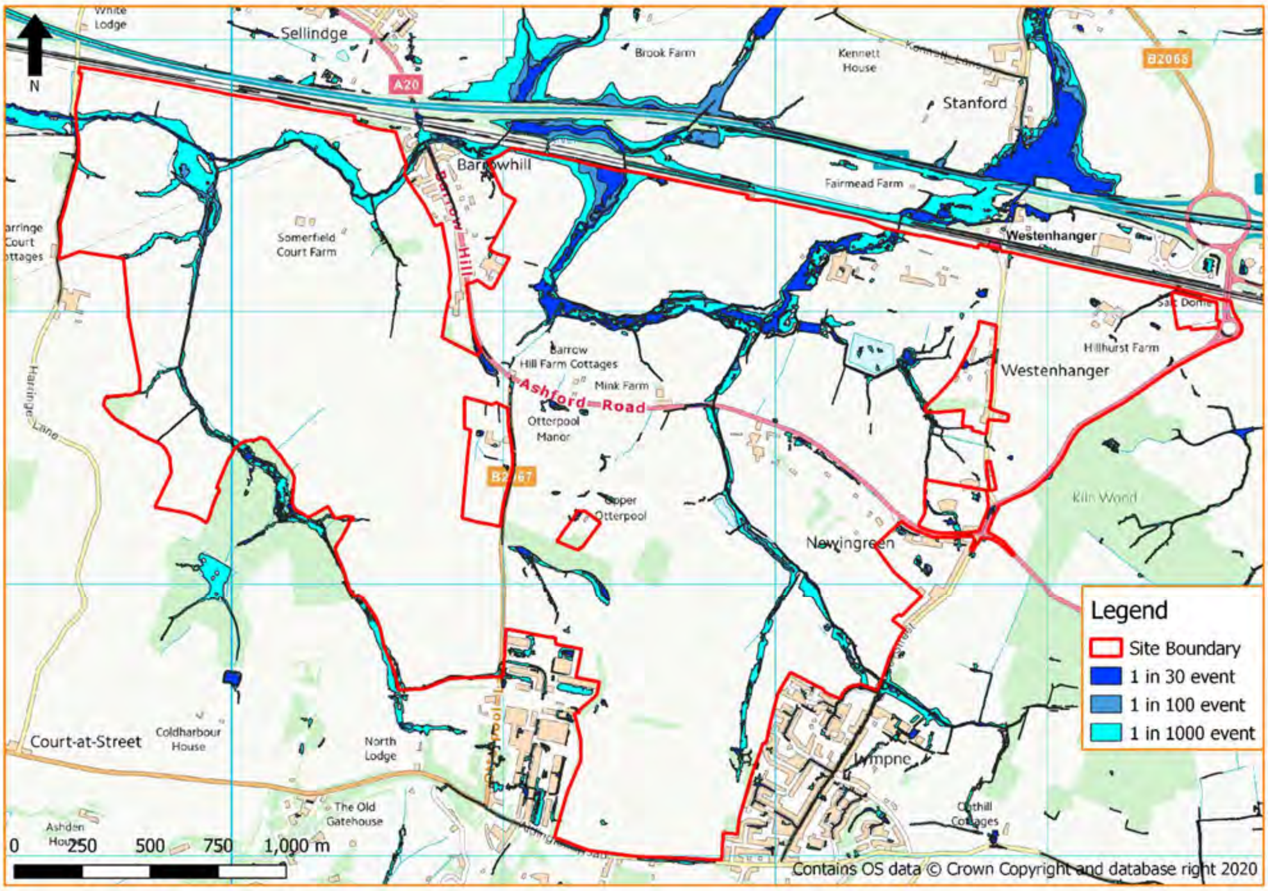


Figure 11: Risk of Flooding from Surface Water Map © EA, 2020.
(The planning Application Site boundary is outlined in red.)

There is no planned development in the key surface water flow paths (as defined by the EA mapping), which predominantly follow the corridors of the existing watercourses on the site, thus aligning with the proposed SuDS features. The areas at identified as surface water flow routes will be safeguarded and improved to form the blue/green corridors within the proposed Development.

In conclusion, the proposed Development will be located away from areas with an elevated risk of flooding from surface water. The proposed surface water drainage strategy discussed in Section 6 will ensure that surface water runoff from the proposed Development is appropriately managed, avoiding flood risk both onsite and offsite. As such, it is considered that the overall risk of flooding from surface water is **low**.

5.5 Groundwater

Groundwater flooding occurs when groundwater rises to the ground surface. This may happen during winter and/or after prolonged or heavy rainstorms. There are generally two forms of groundwater flooding (i) 'clearwater flooding' associated with the water table rising to the surface in areas of permeable bedrock geology such as chalk; and (ii) 'river-groundwater interaction' where river levels interact with permeable superficial deposits within river valleys, flooding areas far from the river without necessarily overtopping raised river banks.

Section 2.2 includes a summary of the underlying baseline geology and hydrogeology. This indicates that the Folkestone Beds Formation and Hythe Beds Formation are classified as Principal Aquifer which are described as layers of rock that have high intergranular and/or fracture permeability. These formations are generally sandstone and convey water of a soft nature with good infiltration rates.

The Sandgate Beds Formation is classified as Secondary A Aquifer, which is described as permeable layers capable of supporting water supplies at a local rather than strategic scale. A small proportion of the site is located upon the Wealden Clay Formation an Atherfield Clay Formation, both of which are classified as unproductive strata described as rock layers with low permeability that have negligible significance for water supply or river base flow.

The Stage 2 SFRA concluded that the Folkestone and Hythe District is generally located within a low-risk area in terms of groundwater flooding and has not specifically identified any risk within the area impacted by the proposed Development.

In conclusion, it is considered that the risk of flooding to the site from groundwater is currently **low**. However, the proposed use of infiltration-based SuDS features in the SWDS, has the potential to cause groundwater levels to rise locally (referred to as groundwater mounding). An assessment has been undertaken to quantify this groundwater mounding flooding risk and is discussed further in Section 8.

5.6 Artificial sources

The site does not lie within an area identified as at risk of flooding from reservoirs by the EA's published maps[27].

The lake in the centre of the racecourse is reported to have been constructed in the 1960s to provide a source of water for irrigating the racecourse. However, no formal records to confirm this have been found, and therefore it is based on a search of readily available information online and anecdotal records. The lake has a surface area of approximately 1.6 ha and is bound by what is assumed to be an earth embankment on all sides. Given the surface area of the lake, a depth of water of just over 1.5m would result in a stored volume of over 25,000m³ thus classifying it as a large, raised reservoir under the Reservoirs Act (2010). Therefore, a bathymetric survey was commissioned to estimate the volume of the lake and provide a resolution to this issue (see Section 9 for further details).

With the exception of the Racecourse Lake, which is assessed in more detail in Section 9, it is considered that the risk of flooding to the proposed Development from artificial sources is **low**.

5.7 Sewers

The 2015 Stage 2 SFRA notes that the majority of sewer networks within the Folkestone and Hythe District are combined sewers. The combined sewers can flood in the case of extreme storms events, which can present a high risk of land and property flooding with water containing raw sewage. Many of the surface water and highway sewers also discharge directly into the local watercourse which increases the risk of surcharging drainage during a storm event.

The Folkestone and Hythe SWMP[24] highlights that sewer networks within certain areas are not suitable to cope with the existing storm events and therefore can cause local surface water flooding. Historic England has

[27] Long Term Flood Risk Map (https://flood-warning-information.service.gov.uk/long-term-flood-risk). 2017. Environment Agency.

highlighted issues of flooding at Westenhanger Castle when sewage is deposited within parts of the scheduled monument.

The sewer network which will serve the proposed Development is being designed to avoid the risk of sewer risk post-development (refer to the WCS (ES Appendix 15.2)). The WCS (ES Appendix 15.2) shows Southern Water's existing sewer network within the site and in the surrounding area and confirms that no additional flows from the proposed Development will be discharged to the existing network due to its limited flow capacity. A new sewer system will be constructed to serve the proposed development, including the diversion of any existing sewers impacted by the development where required.

It is therefore considered that the risk of flooding to the proposed Development from sewers is **low**.

5.8 Conclusions

It is considered that the proposed Development is at a low risk of flooding from all assessed sources but further modelling is required to confirm the spatial distribution of fluvial flood risk, assess climate change impacts and inform the new road bridge crossings.

The management of the surface water runoff from the proposed Development is discussed in Section 6. The risk from fluvial sources (including climate change impacts) are considered in more detail and the proposed mitigation measures discussed in Section 7. The specific issues of groundwater mounding and the risk posed by the racecourse lake are considered further in Section 8 and Section 9, respectively.

6 Surface water management

6.1 Approach to developing the strategy

This section sets out how the surface water drainage strategy was developed, starting from an assessment of the existing site drainage regime and progressing to an identification of needs and constraints, before finally setting out how the site will be drained post development. Figure 12 illustrates the key steps discussed in this section of the report.

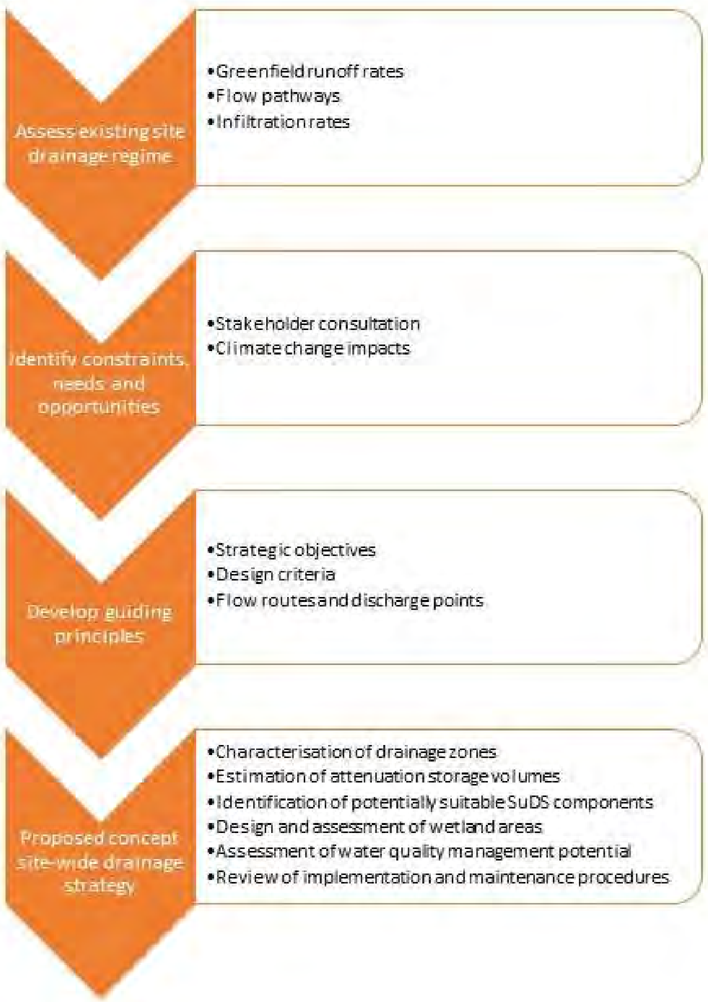


Figure 12: Development of the surface water drainage strategy

6.2 Assess existing site drainage regime

Most of the existing site is currently comprised of arable and horticultural land, which affords the potential for natural infiltration into the soil where local ground conditions allow. As the site is predominately greenfield, it does not currently have a site-wide formal surface water drainage system.

6.2.1 Flow pathways

Figure 13 illustrates the key features of the existing site drainage system along with the ground levels defined by lidar. The surface water runoff from the existing site drains into the River East Stour through several small drainage tributaries, with the River East Stour finally leaving the site via a culvert under Harringe Lane on the north-west boundary. The North Lympne Drain and the Harringe Brook act as natural drains from the south-east and west areas of the site, respectively.

A network of drainage ditches is present within the grounds of the former Folkestone Racecourse, which collects the surrounding surface water, directing flows around the existing Racecourse Lake at its southern boundary, before continuing west towards the North Lympne Drain and the River East Stour. The North Lympne Drain meets the River East Stour downstream of the Racecourse Ditch system.

In addition to the named watercourses, several culverts are present within, and adjacent to, the development area along the River East Stour through the CTRL, Folkestone Racecourse track and along Barrow Hill. Similarly, several other culverts are present on the smaller site drainage tributaries at the existing access crossings.

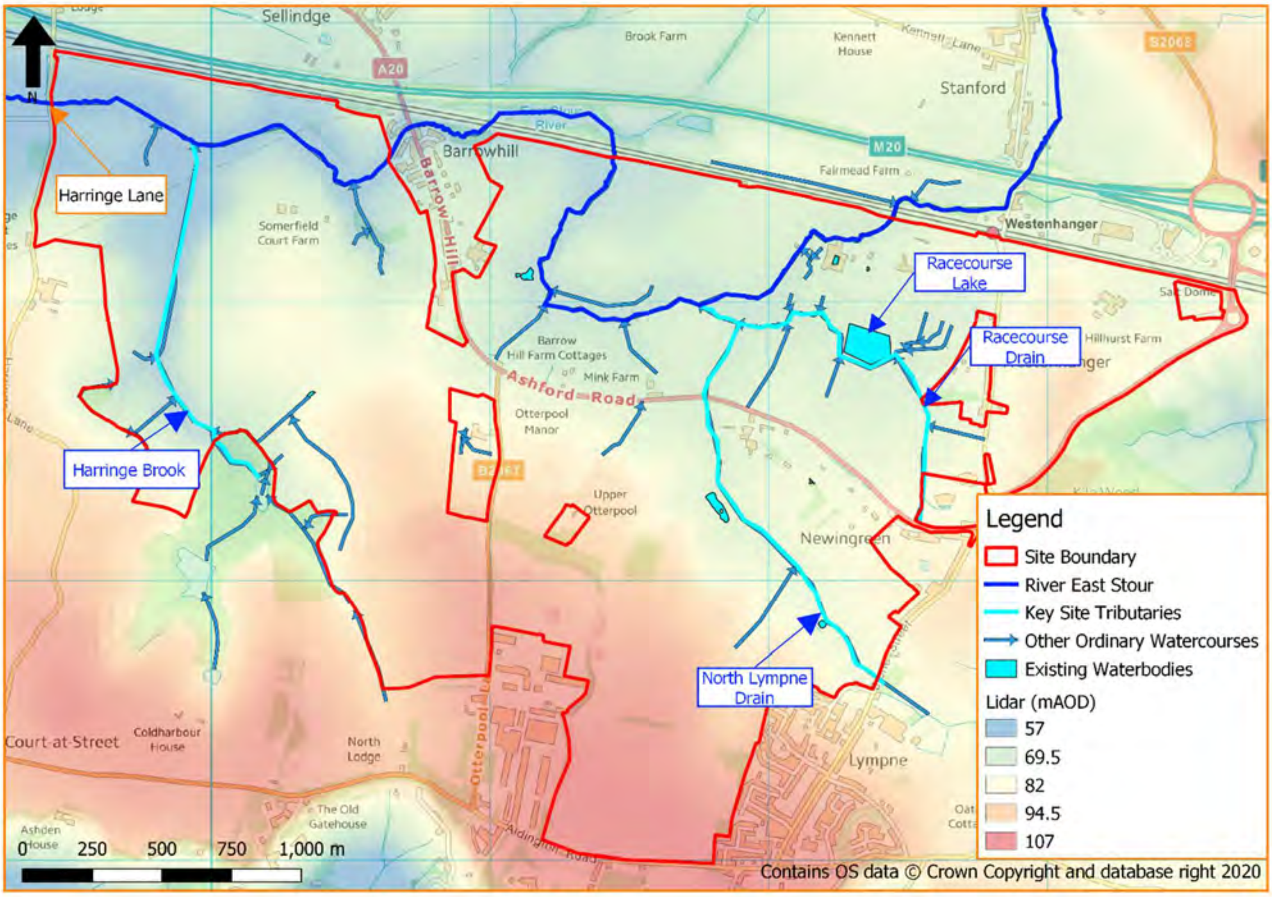


Figure 13: Existing site drainage system.
(The planning Application Site boundary is outlined in red.)

6.2.2 Greenfield runoff rates

An assessment of the greenfield runoff rate is required as a reference point against which the proposed surface water drainage strategy is assessed. To calculate the rates and volumes, FEH catchment descriptors were extracted for the East Stour catchment at Harringe Lane Bridge (NGR 609400, 137700) and used within the Revitalised Flood Hydrograph (ReFH2) model. Results are shown in Table 7. The critical storm duration indicated by the ReFH2 model is nine hours.

Table 7: ReFH2 greenfield runoff rates.

Annual Chance	9-hour critical storm duration	
	Rural Peak Flow Rate (l/s/ha)	Rural Direct Runoff Volume (m³)
1 in 1	0.9	13,630
1 in 30	2.1	35,460
1 in 100	3.0	51,520

6.2.3 Infiltration capacity

An assessment of the infiltration capacity is necessary to determine whether this method of surface water management can be used on the site and if so, to what extent. It will dictate the type and size of SuDS features used. The initial desktop scoping analysis identified that there may be potential for infiltration across a large portion of the site. However, without sufficient rates of ground infiltration across the entire site, maintaining or reducing the total greenfield runoff volumes for the proposed Development situation presents a significant challenge. Nonetheless, the post development peak flood flows will be less than the baseline situation, due to the extra long-term on-site SuDS attenuation storage provided, addressing any downstream flood risk implications.

Following the preliminary review of the soil types described in Section 2.2.1, the areas shown in Figure 14 have been identified as high and medium areas for the potential for infiltration. For the areas with “high potential for infiltration”, soils are classified as *slowly permeable areas* for infiltration. However, within the Newingreen and Barrowhill surrounding area (i.e. in northern, south-eastern and central parts of the site along the principal drainage corridors), it has been assumed that the infiltration potential is non-existent due to the impermeable soils and likely high groundwater levels in these areas.

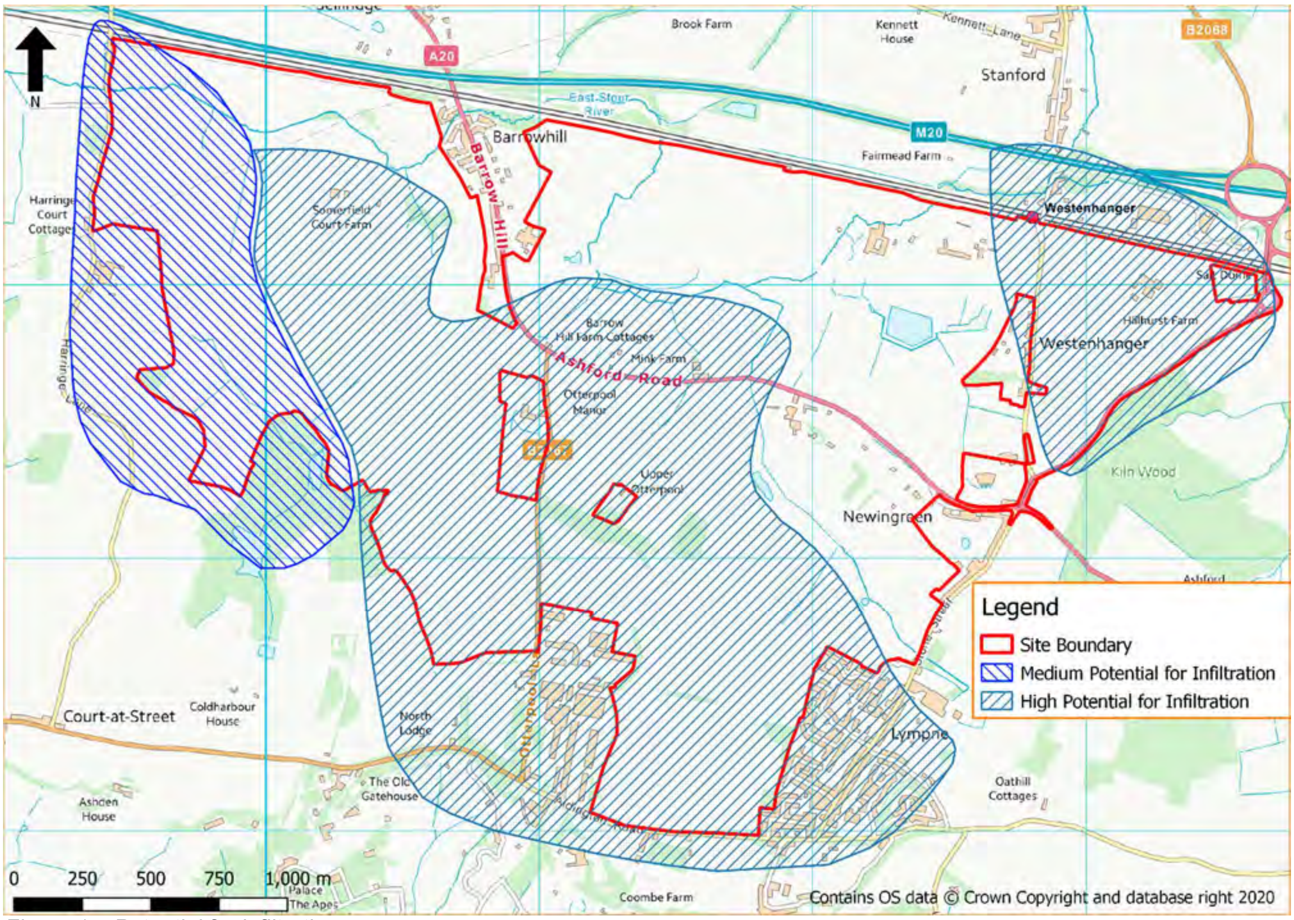


Figure 14: Potential for infiltration.
(The planning Application Site boundary is outlined in red.)

As described in Section 2.2.2, a preliminary Phase 1 and Phase 2 site investigation was undertaken by Arcadis to verify the potential for ground infiltration in some parts of the site. This confirmed that the Hythe Beds Formation is relatively thin on site (based on site investigation data) and underlain by the Atherfield Clay. The top of the Atherfield Clay, therefore, forms the lower bound to the Hythe Beds Formation aquifer, which was found at 6.8 m bgl at BH104. Borehole logs show that the Hythe Beds Formation consists of weathered fractured micritic limestones and weathered coarse sandstones.

Section 2.2.2 also described the observed infiltration rates on site based on the ground investigation carried out by Arcadis[9] and other previous reports[13, 14]. Therefore, the estimated infiltration rates from the preliminary ground investigation have been used to prepare the proposed surface water drainage strategy described below. This allocates an assumed infiltration rate to each drainage zone (i.e., after applying a Factor of Safety) based on the closest or most appropriate trial pit location. At this outline planning stage, a minimum Factor of Safety of 10 or 20 has been applied in most drainage zones to account for the high degree of variability in the observed infiltration rates across the site and ensure sufficient land is allocated for SuDS attenuation storage provision. An increased Factor of Safety of 30 is used in the Barrow Hill drainage zone as a very high infiltration rate has been observed at Phase 1 trial pit TP101, but other nearby Phase 2 trial pit locations (TP201, TP202, and TP203) near to the existing watercourses did not show any infiltration.

Therefore, further ground investigation will be needed during the detailed design stage.

6.3 Identify constraints, needs and opportunities

6.3.1 Stakeholder consultation

The EA, the Lead Local Flood Authority (LLFA), Natural England (NE) and other key stakeholders have been consulted to identify design requirements for the Application Site in regard to flood risk and surface water management. A summary of the responses is provided in the following sections, with additional detail provided in Appendix C.

Environment Agency

Following consultation, the EA provided the following key comments in relation to surface water management:

- Peak flows and volumes discharged to the River East Stour should not increase flood risk downstream, in particular to the Ashford community.
- Whilst the efforts to minimise downstream flood risk by reducing the allowable discharge rate below the current greenfield runoff rates may be beneficial the drainage system must be carefully designed for all rainfall events, including periods of extreme and prolonged wet weather. Half-drain times of the storage features should be considered for accommodating successive rainfall events.
- Consideration should be given to any potential land contamination issues derived from the previous land uses.
- A sufficient treatment train should be in place to ensure no deterioration in the water quality of the River East Stour.
- Any works in, under, over or within 8m of the banks of the River East Stour would require a Flood Risk Activity Permit (FRAP).

Lead Local Flood Authority

Following consultation with Kent County Council as LLFA, the following key comments have been provided in relation to surface water management:

- Development should deliver greenfield runoff on greenfield sites up to a 1 in 100 annual chance event, including an appropriate allowance for climate change and a half-drain time of less than 24 hours. The development also requires allocation for access margins for ordinary watercourses.
- Development should be designed so that there is no flooding within built development areas for the 1 in 30 annual chance event and that there is no property flooding in a 1 in 100 annual chance event, including an appropriate allowance for climate change.

Natural England

NE advised F&HDC in May 2020 that the water quality issues should be assessed through an updated Habitats Regulation Assessment (HRA) as part of the Core Strategy Review. This should include all proposed site allocations (including the proposed Development), which may be served by the existing or new Wastewater Treatment Works (WwTW) within the River Stour Catchment that have the potential to impact Stodmarsh Special Area of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites.

Following discussions with NE, it has been proposed that an additional 30 ha of onsite wetlands (i.e., 17 ha of stormwater treatment wetland and 13 ha of tertiary wastewater treatment wetland) and 35 ha of woodland planting would be provided to mitigate for surplus nitrogen and phosphorus arising from the wastewater and surface water discharges due to the proposed Development.

This issue is discussed in full in the updated Outline WCS (ES Appendix 15.2) and therefore not repeated here. However, some key technical details and benefits (e.g. water quality, flood attenuation) of the proposed wetlands have been discussed in the remaining sections as they are closely interlinked with the integrated flood risk and surface water management strategy.

6.3.2 Future impacts of climate change

Climate change presents a significant challenge to sustainable development. South East England has already experienced a 1 °C increase in average air temperature since the 1960s and latest predictions indicate that the mean annual temperature in the South East could rise by a further 4 °C by the 2080s[28]. While summers are likely to get hotter and drier, winters will get milder and wetter: winter rainfall is predicted to increase by 20-40%, with an associated increase in peak river flow of 38%-101%[29] relative to 1990. Consequently, the risk of flooding from all sources in Folkestone and Hythe District will increase in the future and must be considered in the design of new development now.

Climate change is a key consideration in assessing flood risk, as the minimum design life of the development is 100 years. The NPPF sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change.

To account for climate change and to demonstrate how flood risk will be managed over the lifetime of the development, the 'Upper end' rainfall allowances shown in Table 8 have therefore been adopted in the assessment of surface water drainage requirements. This will demonstrate the development is safe for its lifetime, without increasing flood risk elsewhere and where possible will provide betterment and reduce flood risk.

Table 8: Rainfall intensity increase (Adapted from EA NPPF climate change allowances[30]).

Rainfall Allowance Category	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper End	40%
Central	20%

6.4 Development of the guiding principles

In line with the requirements set out by Folkestone and Hythe District Council and the LLFA, the proposed Development will use SuDS in order to manage surface water across the site. SuDS aim to replicate natural drainage mechanisms where possible and have multiple benefits including, but not limited to, water quality, flood risk and amenity. The following sub sections describe the objectives and criteria have been developed to provide a set of guiding principles for the development of the surface water drainage strategy for the proposed Development.

6.4.1 Strategic objectives

Early consideration of the management of surface water facilitates the opportunity to use SuDS that respond to the local context and character, enriching both the natural and built environment. By fully integrating the management of surface water with the wider development objectives and by considering all space as potentially multifunctional, surface water management systems can be used to enhance development viability through the delivery of the design criteria. This can result in a number of benefits as defined in the SuDS manual[31]:

- An alternative supply of water resources, to improve water security;
- Higher value amenity, recreation and education facilities within public open space;
- Improved habitats and biodiversity;
- Improved climate resilience;
- Improved water quality;

[28] http://ukclimateprojections.defra.gov.uk/, UKCP09, Defra 2009
[29] https://environment.data.gov.uk/hydrology/climate-change-allowances?mgmtcatid=3087, DEFRA, accessed October 2021
[30] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances, Environment Agency July 2020
[31] The SuDS Manual C753. CIRIA, 2015

- Optimised spatial needs for providing SuDS;
- Reduced pressure on sewerage infrastructure and reduced surface water flooding;
- A mechanism for enhancing and defining the quality, character and visual aesthetics of both the built environment and green/ open space;
- A surface water management system that can be easily and cost-effectively maintained; and
- Flood risk reduction or betterment.

6.4.2 Design criteria and overarching considerations

The design works should comply with the established design criteria set out in Appendix D - Otterpool Park Surface Water Management Design Criteria. These criteria were developed with due regard to addressing the following key points:

- Best practice set out in the CIRIA SuDS Manual[31] along with the requirements of local guidance[32] [33];
- The opportunities, constraints and challenges identified through site masterplanning and design development discussions; and
- Key stakeholder requirements, including the EA, the LLFA and NE.

The following overarching design considerations have been applied in developing the concept site-wide surface water drainage strategy. This concept site-wide strategy will be then developed into a detailed surface water drainage strategy and design, as the design moves to the Tier 2 and 3 planning stages. It is envisaged that there would be a suitable planning condition stating that the Tier 2 and Tier 3 design should be in accordance with this FRA & SWDS document.

- To help reduce the volume of surface water discharged to the River East Stour as well as minimising the amount of surface water required to be stored above ground on the site, and contributing to the recharge of groundwater supplies, infiltration areas will be included within the surface water management strategy where the ground is sufficiently permeable. Examples include within the southern portion and the strip of land from Otterpool Lane and Barrow Hill towards the River East Stour whereby the soils and Hythe Beds present the best conditions for sufficient infiltration.
- The attenuation storage requirements for the development have been calculated (Section 6.5.2 and 6.5.3), to ensure the Application Site does not exceed greenfield discharge rates for events up to and including the 1 in 100 annual chance event, including an appropriate allowance for climate change. However, further baseline characteristics (e.g. infiltration rates, groundwater levels) and Tier 2 and Tier 3 development proposals will be required.
- The Tier 1 illustrative masterplan (ES Appendix 4.5) and parameter plans (ES Appendix 4.2) currently have allocated sufficient space to accommodate the required total SuDS storage. Infrastructure delivery plan and detailed masterplan during Tier 2 and Tier 3 stages, will ensure that the required SuDS volume is provided ahead of each respective phase, which may comprise a single drainage zone or combination of several hydraulically linked drainage sub-zones.
- Although there is sufficient space currently allocated within the proposed Development for strategic long-term attenuation storage provision, infiltration is the primary choice for surface water discharges where ground conditions are favourable with permeable soils. Therefore, further site investigations will be undertaken to confirm the infiltration potential during the detailed design stage. Where the results of the investigations indicate that is it appropriate, the surface water drainage design will be modified to maximise the use infiltration in the management of surface water.
- Extra attenuation storage will be provided within certain drainage zones where required to accommodate a much tighter allowable outfall discharge rate of 2 l/s/ha (or lower) for the 1 in 100 annual chance event where higher infiltration rates are prevalent. Sufficient overall baseflow will be maintained in the receiving

[32] Water. Places. People. A Guide for Master Planning Sustainable Drainage into Developments, AECOM/Lead Local Flood Authorities of the South East of England, September 2013

[33] Drainage and Planning Policy Statement, Kent County Council December 2019

watercourse system as per the existing natural condition to avoid any ecological damage and enhance water quality and ecological benefits where possible. Further work will be required to ensure this.

- The final outfall discharge rate will be subject to confirmation that the ground infiltration capacity is favourable and 50% drain-down times are not excessively long thus rendering the storage areas redundant for managing follow-on, smaller storm events.
- Detention Areas will be designed in areas that require a buffer from flood sensitive zones, this includes up to a 30 m wide buffer either side of the River East Stour, throughout the length of the development and in areas where a permanent watercourse is located near to housing parcels, such as the west border of the proposed Development.
- In areas outside of the allocated green infrastructure, other SuDS components will be incorporated to manage surface water on a more local level, such as within housing parcels and business parks. This will include swales, raingardens, soakaways and permeable paving, which will provide localised source control surface water management at the property level. These components may not be accounted for within the wider strategic SuDS attenuation storage requirement calculation, however, they will provide a localised safety factor and extra water quality treatment storage for surface water management.
- Strategic long-term SuDS storage will be designed in order to provide multi-functional benefits, such as increased biodiversity and higher amenity value, while opportunities for multi-functional blue-green infrastructure space (whilst optimising SuDS spatial requirements) will be further explored during the preparation of the Design Code in Tier 2.
- Adequate treatment will be applied to runoff from the different land uses through the application of the SuDS Management Train to ensure that the water quality of receiving surface waters and groundwater is protected.
- Following confirmation of the detailed surface water drainage strategy a maintenance, operation and adoption schedule should be drawn up in consultation with key stakeholders including: the LLFA, Highways Authority, EA, NE, Southern Water or New Appointment Variation (NAV) water company, who will be responsible for both the new onsite Wastewater Treatment and surface water drainage system.
- Site-specific exceedance event flow routes should be established as part of the detailed drainage strategy, this should also confirm that the built development area does not experience any flooding during events up to a 1 in 30 annual chance flood event.
- Additional mitigation measures, such as lining of SuDS and the planting of specific vegetation, may be required within the detailed drainage design to ensure land use legacy issues, such as ground contamination associated with the historic Lympne Airfield, do not negatively impact the water environment.

6.4.3 Flow routes and discharge points

In line with SuDS principles, the destination for surface water runoff that is not collected for reuse should be prioritised in the following order:

a) Infiltration;
b) Discharge to surface waters;
c) Discharge to surface water sewer, highway drain or another drainage system; then
d) Discharge to a combined sewer

The existing drainage pathways, indicated with flow arrows, are shown in Figure 13 in Section 6.2. The spatial requirements for SuDS have been optimised through early masterplanning and design discussions when developing the proposed site-wide drainage strategy by:

- Utilisation of the existing flow routes and maximising ground infiltration to mimic the existing drainage patterns;
- Allocation of attenuation SuDS storage areas in lower lying flatter areas and strategic locations; and
- Encouraging a masterplan design that promotes integrated and multi-functional blue-green infrastructure.

6.5 Proposed concept site wide surface water drainage strategy

Taking into account the constraints, needs and opportunities, and the subsequent development of the guiding principles for the strategy, this section describes how the concept site wide surface water drainage strategy was developed. Appendix E contains a detailed plan which shows the existing watercourses, watersheds and ponds and the proposed conveyance routes, storage ponds, infiltration areas and detention areas. This shows that the majority of the strategic SuDS components will be incorporated within the allocated space for SuDS within the Green Infrastructure space that is present throughout the development. This includes the blue-green corridors between housing parcels that will provide areas for surface water conveyance, treatment, infiltration and long-term storage.

Wetlands, ponds and canal features have been incorporated at selected locations as part of the SuDS train to provide areas for surface water attenuation whilst enhancing ecology, amenity, water resources, water quality and place making.

The opportunities for incorporating source control measures at the development parcels and street level strategies will be maximised including soakaways, permeable paving, rain gardens and swales where appropriate.

Appendix G includes a summary form checklist of the concept site wide drainage which is applicable to the current proposals. This proforma should be revisited as the planning and design progress through Tier 2 and Tier 3.

6.5.1 Characterisation of drainage zones

Preliminary drainage zones are illustrated in Figure 15; identification of these zones reflects the existing site topography and proposed features (e.g. key access and drainage corridors) across the development areas. Each drainage zone is further divided into drainage sub-zones for the purposes of assessment (see also Appendix E and F).

These drainage zones along with their corresponding discharge rates (both existing and proposed) and indicative outfall locations, that have been agreed with the LLFA are presented in Appendix E. This information provides the basis for the concept site-wide surface water drainage strategy at this Tier 1 Outline Planning Application Stage. Further refinements to this will be required as more detailed development layouts and design information become available at Tier 2 and Tier 3 planning stages.

The characteristics of the development areas (based on the information submitted in the Tier 1 application Parameter Plans (ES Appendix 4.2), Development Specification (ES Appendix 4.1) and supporting illustrative masterplan (ES Appendix 4.5) and associated drainage zone details are also described in more detail in Appendix D – Otterpool Park Drainage Zones Details.

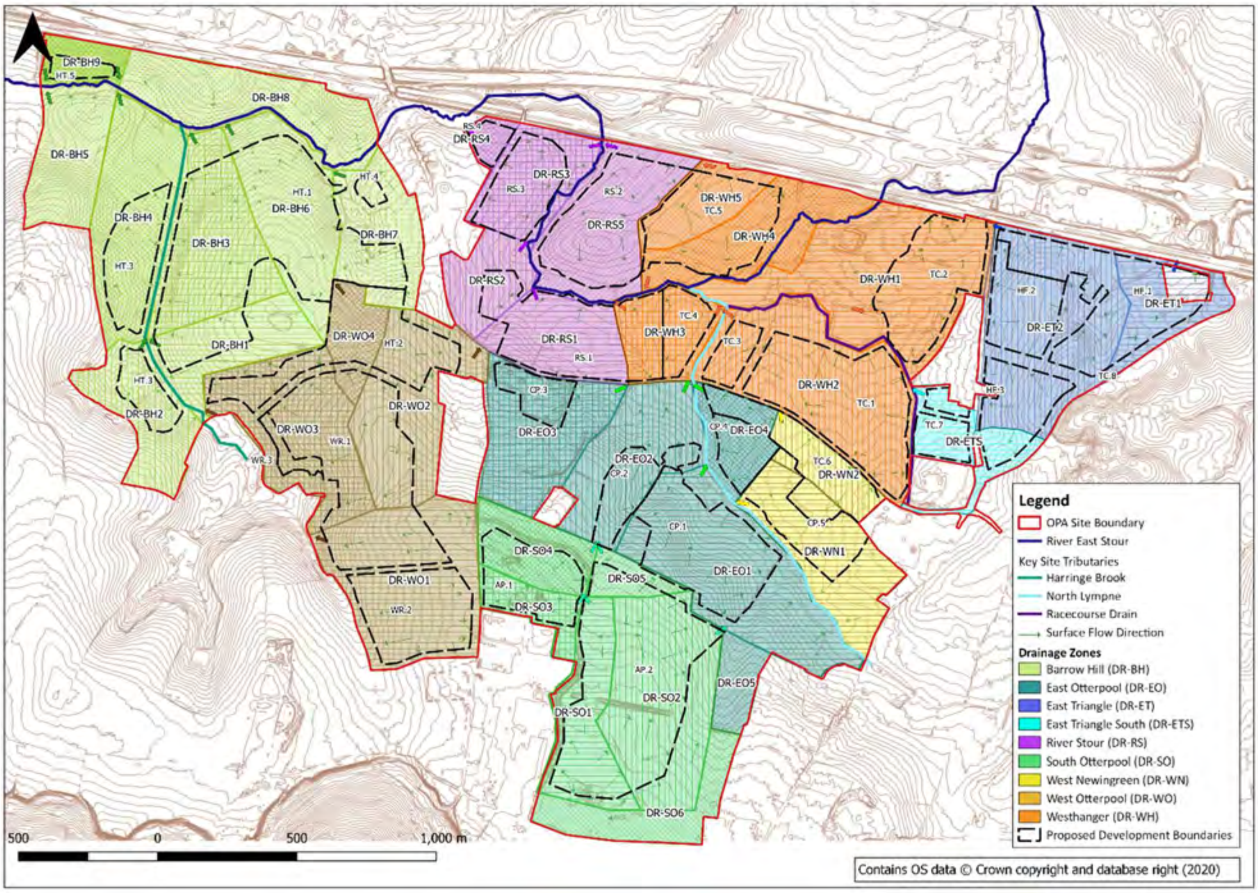


Figure 15: Preliminary drainage zones

6.5.2 Estimation of attenuation storage volumes

Preliminary site investigations identified that infiltration rates vary across the proposed Development. Therefore, the preliminary strategic SuDS storage requirements within each drainage zone have been estimated using the assumed infiltration rates and allowable discharge rates shown in Table 7. These infiltration rates have been derived from the preliminary site investigation results although it is noted that further infiltration testing to refine these will be required prior to the detailed design. The surplus runoff that does not infiltrate into the soil is assumed to drain towards the existing local watercourses present in that drainage zone or further downstream.

The combination of infiltration and attenuation storage provided by the proposed SuDS features will ensure that the proposed Development does not discharge at runoff rates greater than the equivalent existing greenfield rates for the 1 in 1, 1 in 30 and 1 in 100 annual chance events, including an appropriate allowance for climate change.

The preliminary calculations have been performed with Micro Drainage MDSuDS, using the quick storage estimate method with the following parameters:

- Rainfall: FEH Statistical 1 in 30 and 1 in 100 annual chance Summer and Winter Storms;
- Storm Duration: 30-20160 minutes;
- Area: Paved (impermeable) and soft (permeable) areas in each drainage zone;
- Volumetric Runoff Coefficient: Calculated for each drainage zone;
- Greenfield Discharge Rate (l/s): Calculated for each drainage zone;
- Infiltration Rate (m/hr): Calculated for each zone; and
- Climate Change Allowance: +40%.

As set out in Section 6.4.2, storage requirements for potentially a much tighter allowable discharge rate of 2 l/s/ha have also been estimated for the 1 in 100 annual chance event at selected drainage zones, where favourable ground infiltration rates and drain-down times are expected to maximise downstream flood risk reduction benefits following the proposed Development.

The following percentage impervious factors are assumed for the different development types, inclusive of a 10% allowance for urban creep:

- High density housing - 90% paved;
- Medium density housing - 80% paved;
- Low density housing - 70% paved; and
- Non-residential development - 90% paved.

All remaining areas within the development parcels and designated open space are treated as soft landscaped areas.

Table 9 sets out the drainage zone specific characteristics with further details at drainage sub-zone level presented in Appendix E and Appendix F. The assumed average infiltration rate for each drainage zone is based on an average of the infiltration rates at each contributing drainage sub-zone.

Table 9: Key drainage zone characteristics for attenuation storage estimates

Drainage Zone	Area (ha)		Allowable Post-development Discharge*(l/s)			Applied FoS to Infiltration Rate	Reference Testing Location$	Assumed average Infiltration Rate (m/hr)~
	Paved	Soft	1 in 100 annual chance	1 in 30 annual chance	1 in 1 annual chance			
Westhanger	46.98	50.73	293.1	205.2	87.9	-	-	0
East Otterpool#	24.28	54.83	158.2	166.1	71.2	20	TP112, TP108	0.003991
West Newingreen	13.56	10.91	73.4	51.4	22.0	N/A	N/A	0
East Triangle	24.31	15.61	119.8	83.8	35.9	10	BH105	0.000064
East Triangle South	4.89	4.42	27.9	19.6	8.4	10	BH105	0.000064
South Otterpool#	28.58	40.81	138.8	145.7	62.5	20	TP112	0.0000763

Drainage Zone	Area (ha)		Allowable Post-development Discharge*(l/s)			Applied FoS to Infiltration Rate	Reference Testing Location$	Assumed average Infiltration Rate (m/hr)~
	Paved	Soft	1 in 100 annual chance	1 in 30 annual chance	1 in 1 annual chance			
West Otterpool#	40.45	36.80	154.5	162.2	69.5	20	TP110	0.000747
Barrow Hill#	38.60	98.01	273.2	286.9	122.9	33	TP101	0.015552
River Stour	31.37	23.86	165.7	116.0	49.7	N/A	N/A	0
Total@	**253.01**	**335.99**	**1404.6**	**1236.9**	**530.1**			

Footnotes to table:

> **The corresponding greenfield discharge rates in Table 7 have been generally applied to the proposed paved and soft landscaped areas within all drainage zones when estimating the 1 in 1, 1 in 30 and 1 in 100 annual chance allowable post-development discharge rates with the following exception.*
>
> *# 1 in 100 annual chance event post-development discharge rate within East Otterpool, South Otterpool, West Otterpool and Barrow Hill Drainage Zones will be further reduced to 2.0 l/s/ha (i.e. rather than the estimated greenfield rate of 3.0 l/s/ha) to maximise the downstream flood reduction benefits from the anticipated more favourable ground infiltration rates and available attenuation storage from the proposed SuDS features. This will provide a total flow reduction of 362 l/s for the 1 in 100 annual chance event when compared to the current baseline.*
>
> *$Refer to Section 2.2.2 for information on testing locations and results*
>
> *~Rates inclusive of the Factor of Safety*
>
> *@Totals are slightly different to sums of individual values due to rounding effects not shown*

Table 10 and Appendix F summarise the long-term SuDS storage and space requirements (both at drainage zone and drainage sub-zone Levels) along with 50% drain-down times, which will require further appraisal during the detailed design. This table shows that the proposed Development currently has an overall surplus of approximately 17.7ha of SuDS strategic space within the allocated strategic green infrastructure space, assuming the average SuDS storage depth is 1.0m. This equates to approximately 123,900 m^3 of overall surplus storage, assuming only 70% of the available SuDS area is providing effective storage volume after accounting for the side slopes and associated earthworks. This confirms that there is scope to reduce the depth of SuDS storage features, if needed, where there is some surplus storage

However, drainage sub-zones WH2, WH5, WN1, WN2, ET1, ET2, ETS, SO4, WO2, WO4, BH2, BH5 and RS1) will have a small shortfall in SuDS provision (between 0.05ha and 0.8ha or 350m^3 and 5,600m^3) unless the depth of the features is slightly increased. Two alternative strategies exist to mitigate for this shortfall:

- Provision of excess storage in hydraulically connected drainage sub-zones downstream. These downstream drainage sub-zones are required to be constructed ahead of the respective drainage sub-zones for which a shortfall in SuDS storage is predicted.
- Provision of additional attenuation storage at development parcels and roadside swales which are currently excluded in the high-level assessment presented in this report.

The development phasing plan that is to be agreed with the LPA and LLFA during Tier 2 and Tier 3 stages will ensure that the full storage requirement for each phase is met ahead of any upstream development runoff is discharged.

At some drainage zones (Westenhanger, East Triangle, East Triangle South, West Newingreen and River Stour) where infiltration rates are low, the 50% SuDS drain-down time exceeds the recommended limit of 24 hours. However, the volume of SuDS storage provided in other drainage zones is sufficient to result in an overall surplus thus offsetting these longer drain-down times and managing the potential flood risks from any consecutive flood events.

Further long-term attenuation storage (e.g., between 10,000 and 15,000 m^3) could also be made available within the existing Racecourse Lake during such follow-on flood events, as this extra storage is currently excluded in Table 10 and Appendix F. However, this would require temporary pumping into the existing lake from the proposed drainage system because of the existing level differences between the existing base of the lake and Racecourse Drain, and the lake is also fully enclosed by an earth bund. Section 9 provides further details on the existing lake and its former pumping facilities, including potential suggestions on how temporary pumping and active flow management can be used to provide additional long-term flood storage and water reuse as part of the development proposals.

Table 10: Long-term SuDS storage and space requirement at drainage zone level

Drainage Zone	Average Attenuation Storage Requirement, including 40% climate change allowance (m^3)		SuDS Space Requirement with 1.0m Average Depth (ha)		Available Strategic SuDS Space in Application Site (ha)	SuDS Area Surplus/ Shortfall for attenuating 1 in 100 annual chance event (ha)
	1 in 100 annual chance	1 in 30 annual chance	1 in 100 annual chance	1 in 30 annual chance		
Westenhanger	70,835	53,333	9.21	6.93	12.11	2.90
East Otterpool	33,277	23,512	4.33	3.06	7.30	2.97
West Newingreen	20,445	15,407	2.66	2.00	1.49	-1.17
East Triangle	36,548	27,486	4.75	3.57	4.32	-0.43
East Triangle South	7,348	5,526	0.96	0.72	0.89	-0.07
South Otterpool	35,454	25,447	4.61	3.31	7.13	2.53
West Otterpool	63,151	43,659	8.21	5.68	11.16	2.95
Barrow Hill	42,804	30,542	5.56	3.97	9.56	4.00
River Stour	47,318	35,627	6.15	4.63	10.19	4.04
Total	**357,177**	**260,536**	**46.43**	**33.87**	**64.15**	**17.72**

6.5.3 Identification of potentially suitable SuDS components

This section describes how a range of potentially suitable SuDS components have been identified for the different land uses within the proposed Development including:

- Residential parcels;
- Employment parcels;
- Primary and secondary access roads; and
- Green infrastructure.

As well as smaller SuDS components located in these residential and non-residential areas, larger scale strategic SuDS components will be necessary outside of these areas, within the strategic green space, to ensure the design criteria are met. At this stage of the design process, these have been located and sized at a high level through balancing the development masterplanning requirements against the surface water management requirements. The strategic SuDS system for each phase must be in place as part of enabling works, prior to the commencement of phase development construction.

The location of SuDS features takes into consideration tree root protection zones and hedgerow buffer zones to prevent root damage from construction and localised increases in groundwater levels. SuDS features have been generally located within the proposed green infrastructure corridors, away from the existing watercourses and hedgerows. However, where the proposed SuDS features and nutrient mitigation wetlands follow the route of the existing watercourses, suitable landscape buffers will be incorporated. As the masterplan for each phase is developed, opportunities to integrate the SuDS features (e.g. inline ponds, wetland scrapes, natural flood management measures) with the existing watercourses can also be sought in targeted locations if they are considered beneficial, in consultation with the LLFA, EA and NE. For example, some opportunities have been identified along the River East Stour and racecourse drain corridors, as further illustrated in the remaining sections.

Residential Parcels

Residential parcels are comprised of housing, parking, minor tertiary roads, footpaths and pocket parks. Space is often a key design consideration, so ideally a range of SuDS components should be integrated into other uses (including tertiary roads) and can be located below ground where necessary.

Employment Parcels

Employment parcels, town centre and local centre areas can, in some situations, have a higher coverage of impermeable surfaces compared to residential areas with limited green space due to conflicting spatial needs, however in such situations, green roofs and other source control SuDS components (e.g. rain gardens and permeable paving) provide considerable valuable. In addition, provision of sufficient green open space, incorporating larger SuDS features is always encouraged to deliver a high-quality garden settlement development, incorporating greener and attractive tertiary roads. SuDS components serving the main employment parcels should always provide sufficient additional water treatment to remove pollutants associated with transport runoff.

Primary and Secondary Roads

Primary roads should include a grassed filter strip and a swale at least one side of the road but ideally on both sides. Such SuDS components should also be allocated to secondary access roads to provide further green areas to assist in conveying flows and achieve water quality objectives. A swale should be provided ideally at least on one side of the secondary roads. SuDS components serving primary access roads should always provide sufficient additional water treatment to remove pollutants associated with transport runoff.

Strategic Attenuation

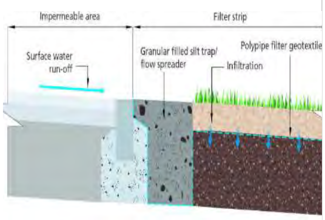
Strategic attenuation storage has been located in larger areas of open space, which will provide SuDS functions for a single drainage zone or multiple drainage zones. Where possible, strategic storage has been integrated into the wider masterplan strategy providing multi-functions and benefits.

Table 11 illustrates the range of SuDS components, which will be used, along with an assessment of their expected benefits and potential application. Benefits shown in brackets are those which can be achieved in addition through good design. However, the extent to which these SuDS components will be used across the site will vary, subject to competing needs, constraints and opportunities within each development phase (i.e. including their financial viability and long-term maintenance and adoption needs).

Therefore, this is only a high-level guide at this stage to inform the Tier 2 and Tier 3 SuDS strategies and designs, allowing sufficient flexibility to choose the exact SuDS components later within each impacted drainage zone.

Table 11: SuDS components and application

SuDS Component		Description and Function	Benefits Provided*	Application			
				Residential Parcels	Employment Parcels	Primary and Secondary Access Roads	Green Infrastructure
Green Roofs		A planted soil layer is constructed on the roof of a building to create a living surface. Water is stored in the soil layer and absorbed by vegetation.	Attenuation, Water Treatment, Biodiversity, Education, Amenity, Microclimate, (Open Space, Water Reuse, Character)	✓	✓		
Soakaways / Infiltration Trenches		Where infiltration is suitable, soakaways allow water to infiltrate into the ground and can be used to drain roofs, roads and other paved areas. At a plot level, soakaways can be set into household gardens.	Attenuation, Water Treatment, Infiltration, (Biodiversity, Amenity)	✓	✓	✓	✓
Permeable Paving		Permeable paving allows surface water to soak through to storage media below. From there it can either infiltrate into the ground where ground conditions are favourable or be discharged down the SuDS train. Permeable paving can be located along non-adoptable roads and in parking areas.	Attenuation, Water Treatment, (Infiltration, Water Re-Use)	✓	✓		

SuDS Component		**Description and Function**	**Benefits Provided***	**Application**			
				Residential Parcels	**Employment Parcels**	**Primary and Secondary Access Roads**	**Green Infrastructure**
Filter Strips		Filter strips are grassed or planted areas that runoff can run across to promote infiltration and cleansing. Filter strips can be located alongside roads and typically require less space that swales.	Water Treatment, Infiltration, (Attenuation, Open Space)	✓	✓	✓	
Swales		Swales are vegetated shallow depressions designed to convey and filter water. These can be 'wet' where water gathers above the surface, or 'dry' where water gathers in a gravel layer beneath. Can be lined or unlined to allow infiltration. Swales can exist alongside roads and within blue/green corridors.	Attenuation, Water Treatment, Biodiversity, Education, Amenity, Microclimate (Open Space, Infiltration, Character),	✓	✓	✓	✓
Bioretention Areas/ Rain Gardens		A vegetated area with gravel and sand layers below designed to channel, filter and cleanse water vertically. Water can infiltrate into the ground below or drain to pipework and be conveyed elsewhere. Bioretention systems can be integrated with tree-pits or gardens and can be in any urban environment.	Attenuation, Water Treatment, Biodiversity, Education, Amenity, Microclimate, (Infiltration),	✓	✓	✓	✓
Underground Storage		Water can be stored in tanks, gravel or plastic crates beneath the ground to provide attenuation.	Attenuation, (Infiltration)	✓	✓		✓

SuDS Component		Description and Function	Benefits Provided*	Application			
				Residential Parcels	Employment Parcels	Primary and Secondary Access Roads	Green Infrastructure
Infiltration and Detention Basins		Infiltration and detention basins are usually dry but during heavy storms they can be wet. Basins can provide infiltration and storage and can be located in areas of open space. Due to them also being 'wet' they can be designed to provide multi-functionality.	Attenuation, Water Treatment, Biodiversity, Education, Amenity, Open Space, Character, Microclimate, (Infiltration),	✓	✓		✓
Wetlands/ Ponds		Wetlands are shallow vegetated water bodies with a varying water level. Specially selected plant species are used to filter water. Water flows horizontally and is gradually treated before being discharged. Wetlands can be integrated with a natural or hardscape environment.	Attenuation, Water Treatment, Biodiversity, Education, Amenity, Open Space, Character, Microclimate, (Infiltration),	✓	✓		✓

6.5.4 Design and assessment of wetland areas

Wetland areas have been designed to manage stormwater and wastewater as part of the integrated water management strategy (see Section 6.5.5 for details on water quality). The proposed wetland locations are shown in Figure 16. Wetland W13 at the northwest corner of the proposed Development is providing additional tertiary treatment to the effluent from the new onsite Wastewater Treatment Works (WwTW), but the remaining wetlands are providing the final treatment for stormwater discharges from the new SuDS system and other open space areas.

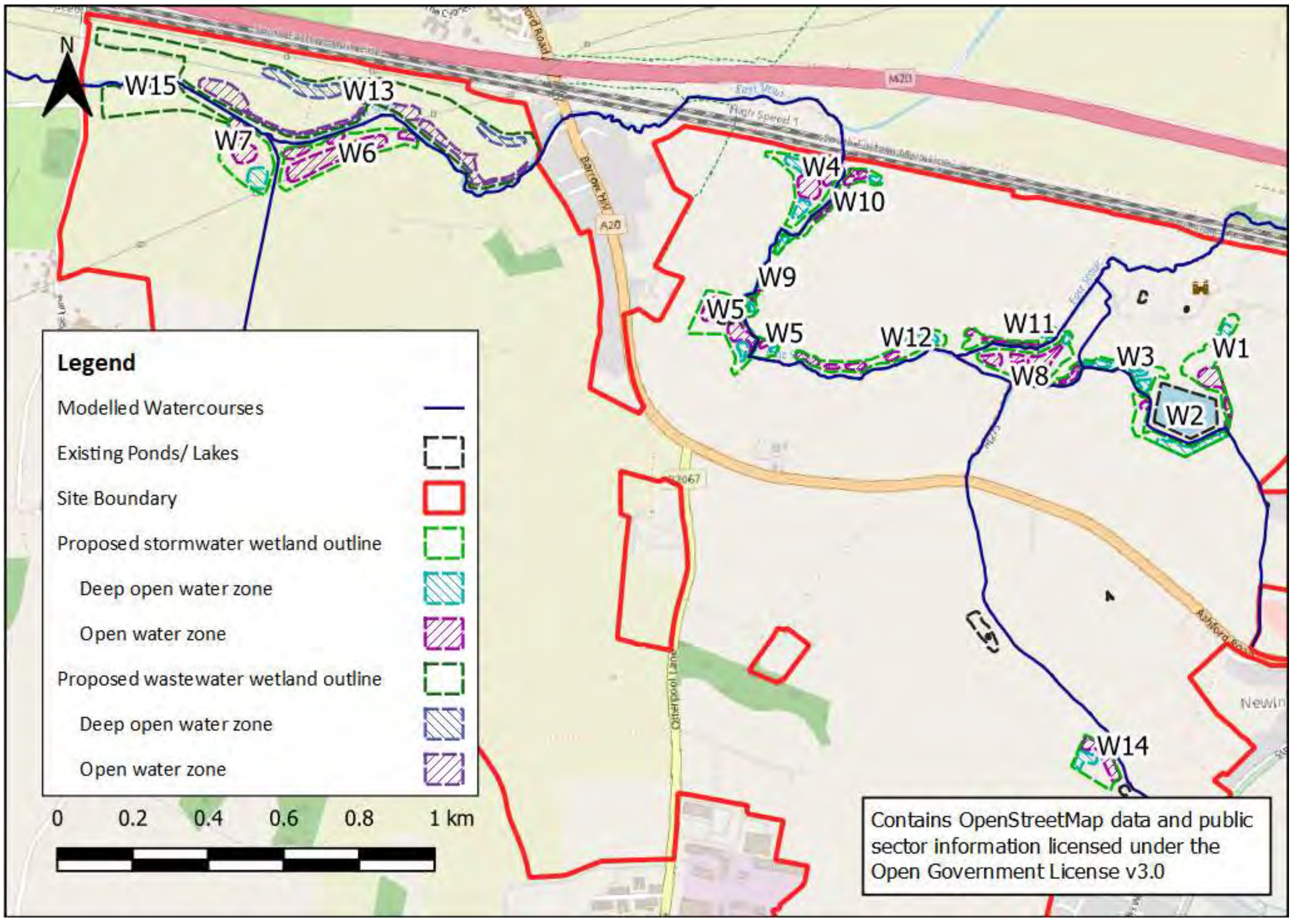


Figure 16: Overview plan of proposed wetlands
(The planning Application Site boundary is outlined in red.)

Example illustrations of the conceptual designs of these stormwater wetlands are shown below in Figure 17 to Figure 19. These stormwater wetlands were assessed using Infoworks ICM hydraulic modelling software to determine hydraulic loading, treatment volume/time, water depths and outflows. Note that the wastewater wetland W13 is not currently included in the ICM model because the main intention of this preliminary modelling exercise was to confirm that the stormwater wetlands were sized appropriately given the spatial variation in hydraulic loading across the proposed Development, and also the critical influence of design storm conditions.

A baseline ICM model was created and the design flows from a 1 in 100 annual chance, 11 hour storm simulated. The results from this modelled were reviewed and adjustments made to ensure that they were in line with results from the fluvial model (Section 7). This comparison was necessary to ensure consistency between the two different model software packages. Following this, the 1 in 30 and 1 in 100 annual chance events (including a 40% climate change allowance) with storm durations of 8 and 12.5 hours were assessed for both baseline and post development cases. These storm durations were chosen so that an assessment of the performance of the surface water drainage system during long and short rainfall events could be made, thus increasing the resilience of the design. Time Series Rainfall (TSR) using the available local rainfall data, covering the period from 1992 to 2019, was also assessed. This confirmed that the proposed initial designs are satisfactory and will provide a robust foundation for subsequent detailed design of the wetlands, to be submitted as part of the reserved matters.

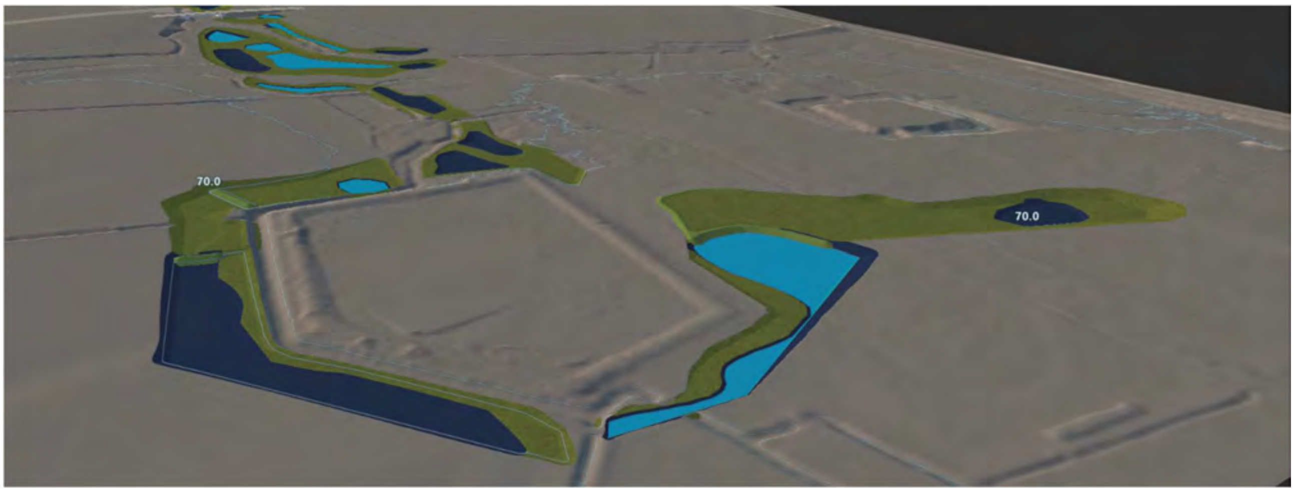


Figure 17 Proposed wetland features near to the existing Racecourse Lake/ Castle Park area
Wetlands shown in green, open water zones shown in light blue and deep open water zones shown in dark blue

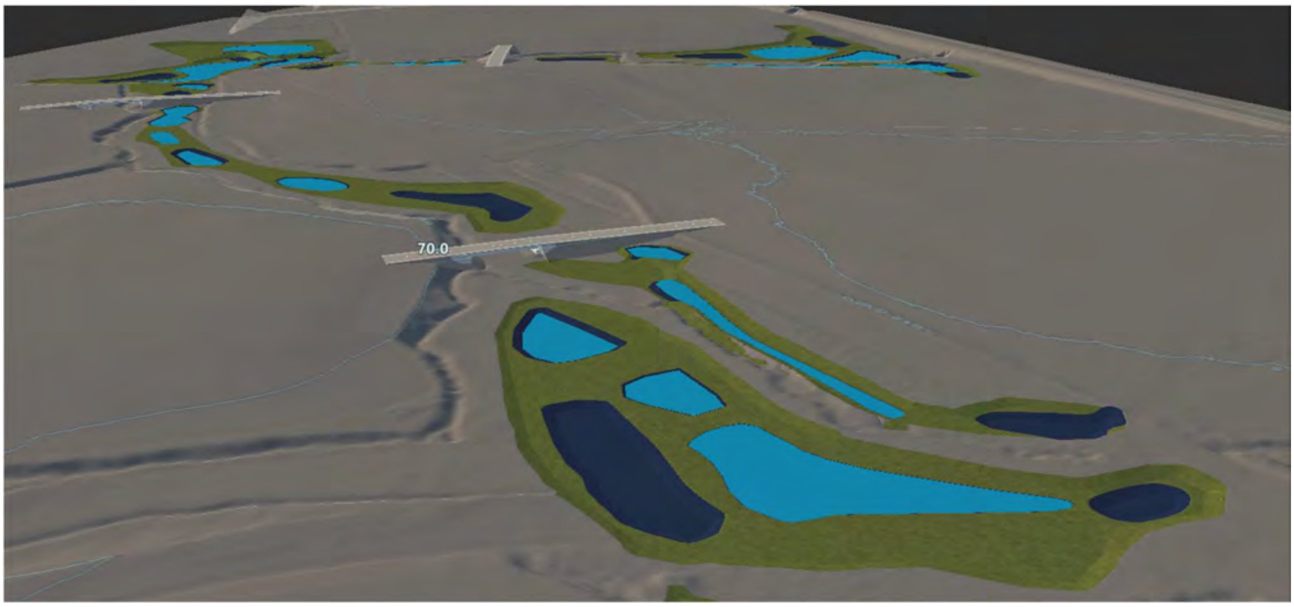


Figure 18 Proposed wetland features at Riverside Park area
Wetlands shown in green, open water zones shown in light blue and deep open water zones shown in dark blue

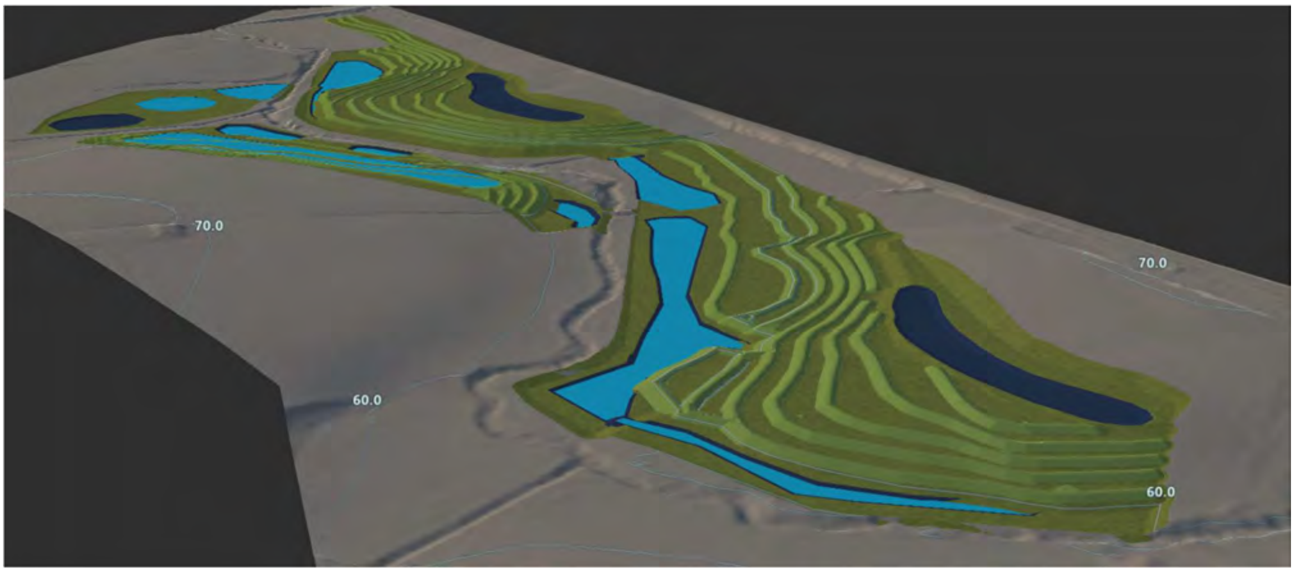


Figure 19 Proposed wetland features at Barrow Hill Park area
Wetlands shown in green, open water zones shown in light blue and deep open water zones shown in dark blue

Figure 20 and Figure 22 show the total flow hydrographs, extracted from the ICM model, on the River East Stour at Harringe Lane bridge for the baseline and proposed design scenarios for a 1 in 100 + 40% climate change annual chance event for 8.0 hour and 12.5 hour storm durations. These hydrographs, indicate a total peak flow reduction of 4.01m^3/s (36%) and 7.07m^3/s (33%) respectively when compared with the corresponding baseline event. There is also a slight reduction in total flood volumes 42,676m^3 (3%) and 43,946m^3 (2%) for the same 8.0hr and 12.5hr storm event over the seven-day period shown in these graphs after the reduced flood peak. The slight decrease in total volume is mainly due to the extra SuDS infiltration and attenuation storage provided with a tighter allowable discharge rate of 2l/s/ha (i.e. compared to 3l/s/ha greenfield rate). The additional flood attenuation storage provided by the proposed wetlands also helps to reduce the peak flood flows.

A sensitivity test was undertaken modelling the wetlands with an initial water level 300mm above the ground level of the wetlands. The effects of this test were to cause a negligible increase of the peak design flows, at the downstream end of the model (by 0.21m^3/s and 0.11m^3/s for the 8.0 hour and 12.5 hour storm durations respectively), keeping them well below the baseline values. The reduction in flood volume slightly eroded, however the percentage reduction from the baseline did not change for both storm durations.

It should be noted that the ICM modelling currently excludes the additional 38l/s of extra effluent discharges to the River East Stour from the proposed onsite WwTW (due to the proposed Development included in the current Tier 1 Outline Planning Application), which can add another 22,982m^3 of Dry Weather Flow volume to the above total post development flood volume. However, even with this extra Dry Weather Flow the total post development flood volume is still less than the baseline flood volume. Furthermore, 38l/s Dry Weather Flow constitutes a very minor proportion of the flood flows in the River East Stour (i.e., 2% of QMED and 0.3% of 1 in 100 annual chance for the 11hr catchment duration) and therefore considered to have a negligible impact on the downstream flood risk.

It should also be noted that this is currently a conservative assessment due to the following key reasons:

- A Factor of Safety between 10 to 33 (see Table 9) has also been currently applied to the infiltration rates where infiltration-based SuDS are considered generally feasible. Therefore, if higher infiltration rates than these modelled values are proven by further detailed site investigation then the predicted post development flood volume discharge to River East Stour will reduce to account for increased infiltration discharge losses to the ground;
- The delayed time response through the extensive sequentially linked upstream SuDS systems (SuDS features at plot, roadside and strategic level) has been discounted in this preliminary modelling exercise because the ICM model did not explicitly represent these discrete features at a level sufficient to enable an accurate assessment of travel time and individual attenuation effects. The MicroDrainage quick storage

estimate methodology applied to derive the total SuDS storage requirement for each post development drainage sub-zone has been input as a lumped storage node in the ICM model along with standard urban drainage modelling methods and a simplistic staged outfall arrangement, limiting the total outflow from the storage node to the required 1 in 30 and 1 in 100 annual chance allowable discharge rate;

- It has been assumed that all permanent waterbodies within each wetland are completely full, prior to the commencement of the storm event; and
- Infiltration discharge losses from the remaining plot level SuDS and roadside swales are currently not modelled in the ICM model.

Therefore, it is expected that the predicted volume decrease may further improve when further detailed modelling is undertaken during Tier 2 and Tier 3 application stages, using the updated site layouts, drainage designs and infiltration rates (with reduced Factor of Safety).

The updated WCS (ES Appendix 15.2) provides further technical detail related to the proposed nutrient mitigation wetlands, including the potential scope to recycling the stored water in the existing Racecourse Lake and proposed wetlands, as part of the integrated water management strategy. As discussed in Section 9, temporary pumping to the Racecourse Lake from the proposed drainage system would be another potential option to increase the long-term attenuation storage provision. Furthermore, a key component of the proposed integrated water management strategy is to minimise any residual increased overall flood volume impacts on the downstream Aldington FSR due to the proposed Development during successive rainfall events in unusually wet periods. Therefore, further modelling, incorporating extra DWF from the onsite WwTW as well updated site layouts, drainage designs and infiltration rates (with reduced Factor of Safety) is recommended to develop the current strategy in Tier 2 and Tier 3 Planning Application Stages.

Figure 20 and Figure 22 also provide the breakdown of:

- Total stormwater inflows to wetlands from the proposed SuDS;
- Total stormwater outflows from the proposed wetlands directly to the watercourses; and
- Total stormwater outflows from the proposed SuDS directly to the watercourses

Figure 21 and Figure 23 then show the proportional distribution of total runoff volume discharged to the watercourses from the SuDS and wetlands in Otterpool Park and other non-Otterpool Park discharges, for the 1 in 100 annual chance event plus 40% climate change, 8 hr and 12.5 hr storm durations. These figures also show the breakdown of total stormwater flows to the watercourses directly from the wetlands and the proposed SuDS.

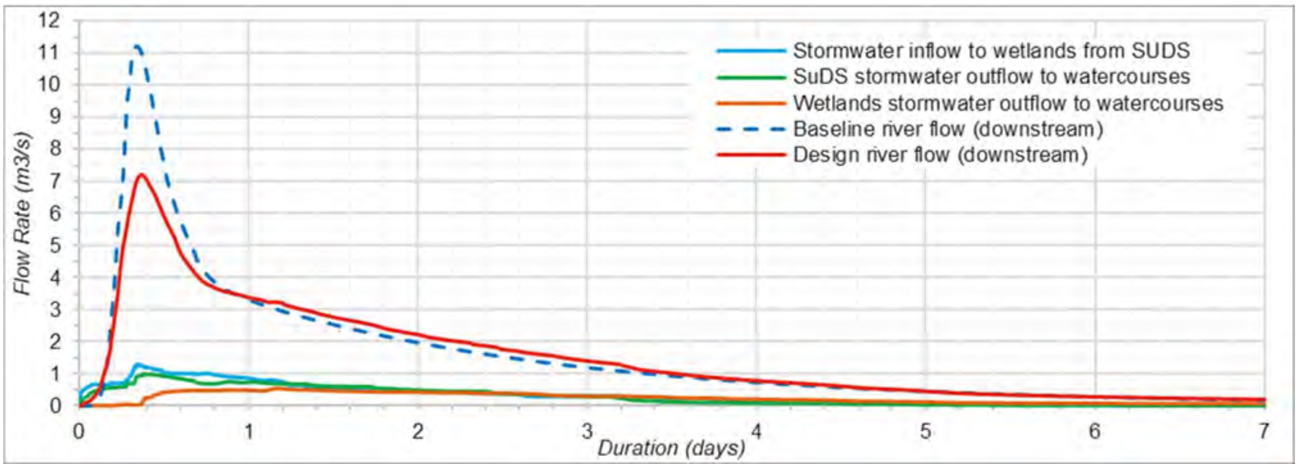


Figure 20: ICM flow hydrographs for 1 in 100 + 40% climate change annual chance 8 hr storm duration event

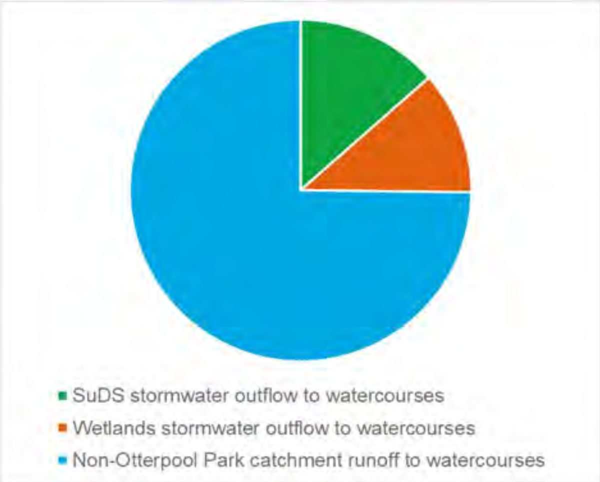


Figure 21: Proportional distribution of runoff volume discharges to watercourses for 1 in 100 + 40% climate change annual chance 8 hr storm duration

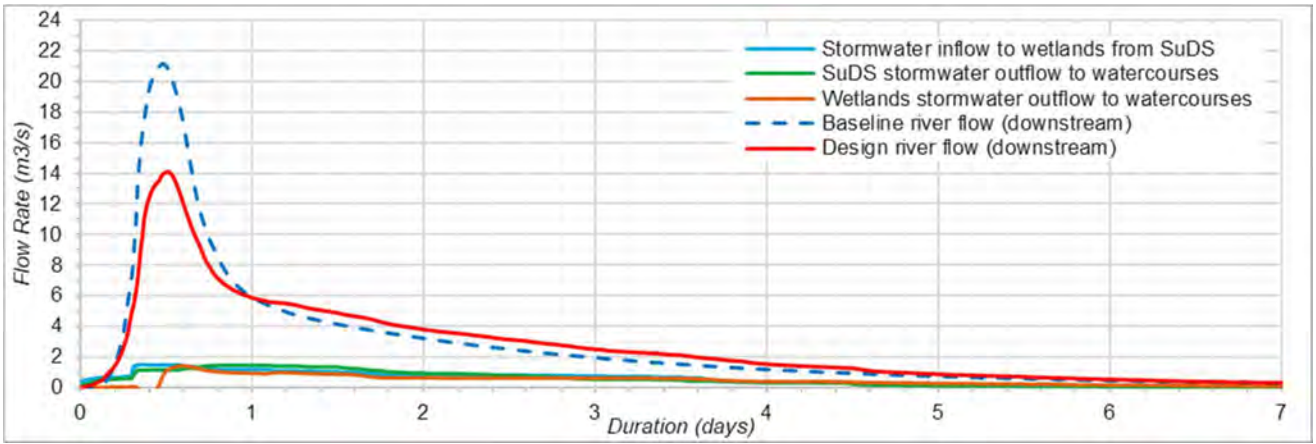


Figure 22: ICM flow hydrographs for 1 in 100 + 40% climate change annual chance 12.5 hr storm duration event

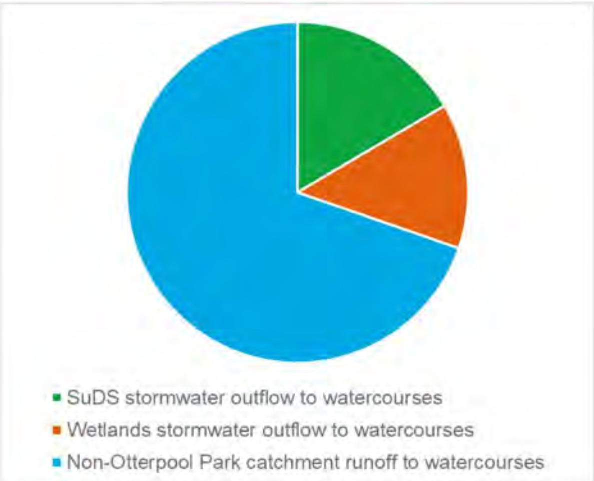


Figure 23: Proportional distribution of runoff volume discharges to watercourses for 1 in 100 + 40% climate change annual chance 12.5 hr storm duration

6.5.5 Assessment of water quality management

The Simple Index Approach, as described in the SuDS Manual[31], has been used to provide a high-level assessment of water quality pollution treatment requirements for the proposed SWDS. The approach involves the use of Pollution Hazard Indices (PHI) for the different proposed land uses and Pollution Mitigation Indices (PMI) for the different SuDS features serving those land uses. Values are assigned for total suspended solids, metals and hydrocarbons and where the PMI is equal or greater than the PHI the SuDS features are considered to provide sufficient treatment for the water they receive. This assessment was undertaken to inform the Water Framework Directive (WFD) assessment and can be found as an appendix to the WCS (ES Appendix 15.2) Report.

Table 12 shows the specific SuDS proposed within each drainage zone. It illustrates the impact of each SuDS tier as well as SuDS treatment train tiers in combination, using the following convention:

- Tier 1 SuDS Treatment Train – swales only;
- Tier 2 SuDS Treatment Train – detention basins only; and
- Tier 3 SuDS Treatment Train – wetlands only.

The assessment assumes that there is no cross-drainage zone interaction, i.e., runoff would only reach a wetland feature if one were located within the drainage zone. This is a precautionary assumption as it does not account for any additional water quality treatment of runoff when there is hydraulic connectivity between the drainage zones.

The results of this high level, precautionary assessment indicates that, in each drainage zone, a combination of Swales and Detention Basins (i.e., Tier 1 and 2 of the proposed SuDS Treatment Train) would be sufficient to treat runoff from all the proposed land uses that have been assessed.

In some drainage zones the proposed SuDS treatment train incorporates a third tier, comprising SuDS wetlands. These would function to manage flood risk and drainage on the site, with a dual benefit of providing additional water quality improvements to discharges received by the River East Stour.

*Table 12: Effectiveness of SuDS treatment train components for each primary land use development type in the different drainage zones**

		Land Use Development Type / Pollution Hazard Indices WQ Parameters								
		Residential			Commercial			Roads		
Drainage Zone	SuDS	*Total Suspended Solids*	*Metals*	*Hydrocarbons*	*Total Suspended Solids*	*Metals*	*Hydrocarbons*	*Total Suspended Solids*	*Metals*	*Hydrocarbons*
Barrowhill	*Tier 1: Swale*	Sufficient	Sufficient	Sufficient	Insufficient	Sufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 2: Detention Basin	Sufficient	Sufficient	Sufficient	Insufficient	Insufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 3: Wetland	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 1 and 2	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient
	Tier 1, 2 and 3	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient
East Otterpool	*Swale*	Sufficient	Sufficient	Sufficient	Insufficient	Sufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Detention Basin	Sufficient	Sufficient	Sufficient	Insufficient	Insufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Wetland	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 1 and 2	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient
	Tier 1, 2 and 3	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient
East Triangle South	*Tier 1: Swale*	Sufficient	Sufficient	Sufficient	Insufficient	Sufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 2: Detention Basin	Sufficient	Sufficient	Sufficient	Insufficient	Insufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 1 and 2	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient
East Triangle	*Tier 1: Swale*	Sufficient	Sufficient	Sufficient	Insufficient	Sufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 2: Detention Basin	Sufficient	Sufficient	Sufficient	Insufficient	Insufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 1 and 2	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient
Newingreen	*Tier 1: Swale*	Sufficient	Sufficient	Sufficient	Insufficient	Sufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 2: Detention Basin	Sufficient	Sufficient	Sufficient	Insufficient	Insufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 1 and 2	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient
River Stour	*Tier 1: Swale*	Sufficient	Sufficient	Sufficient	Insufficient	Sufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 2: Detention Basin	Sufficient	Sufficient	Sufficient	Insufficient	Insufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 3: Wetland	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 1 and 2	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient
	Tier 1, 2 and 3	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient
South Otterpool	*Tier 1: Swale*	Sufficient	Sufficient	Sufficient	Insufficient	Sufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 2: Detention Basin	Sufficient	Sufficient	Sufficient	Insufficient	Insufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 1 and 2	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient
West Otterpool	*Tier 1: Swale*	Sufficient	Sufficient	Sufficient	Insufficient	Sufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 2: Detention Basin	Sufficient	Sufficient	Sufficient	Insufficient	Insufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 1 and 2	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient
Westenhanger	*Tier 1: Swale*	Sufficient	Sufficient	Sufficient	Insufficient	Sufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 2: Detention Basin	Sufficient	Sufficient	Sufficient	Insufficient	Insufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 3: Wetland	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Insufficient	Sufficient	Sufficient	Sufficient
	Tier 1 and 2	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient
	Tier 1, 2 and 3	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient

Sufficient   Insufficient   Proposed SuDS Treatment Train for Drainage Zone

** Refer to Figure 15 for the location of these drainage zones*

It is also highlighted that tertiary treatment will be provided within proposed extra storm wetlands that are specifically designed to achieve nutrient neutrality to protect downstream Stodmarsh Lakes European Sites to satisfy Natural England's requirements. These storm wetlands are generally located towards the final section of the SuDS train (i.e. prior to discharging to the existing watercourses) to specifically intercept and treat the pollutants that occur due to the 5mm 'first flush' (i.e. as a minimum requirement) following a storm event after a dry spell. This will avoid the risk of river pollution and harmful nutrients (e.g. Phosphorus and Nitrogen) impacting the Stodmarsh Lakes due to the proposed Development.

It is therefore concluded that subject to detailed design, sufficient SuDS measures are included in the drainage design for the proposed Development to protect the water quality of receiving watercourses.

Potential construction impacts such as dealing with additional polluted runoff from bare, compacted or muddy surfaces during construction phases (including from haul roads associated with cut and fill / off site infrastructure works) will need careful management to avoid any detrimental impact to the receiving watercourses and aquifers, as well as the long-term effectiveness of the proposed SuDS are compromised. This will be addressed in the Environmental Management Plan and fully covered in the Water Environment Chapter of the Environmental Statement and Outline Code of Construction Practice (ES Appendix 4.17).

6.5.6 Implementation and maintenance

The SuDS strategy will be designed and implemented so that each phase of the development can provide sufficient storage for the surface water that will be generated from that particular phase, as well as working as a wider SuDS network across the phases once the development has been completed. This creates a localised and self-sufficient surface water drainage strategy for each phase, as well as an interconnected larger network.

This report and supporting plans (including the illustrative masterplan (ES Appendix 4.5) and other documentation submitted with the amended Outline Planning Application) demonstrate how the strategic SuDS network will be implemented across the proposed Development. Further information on the detailed design and implementation of blue-green infrastructure for each phase will be provided as part of reserved matters.

The surface water management strategy and its construction sequence will also ensure that any potential construction impacts, such as dealing with runoff from bare, compacted or muddy surfaces including haul roads associated with off-site infrastructure works are accounted for and therefore present a limited flood risk to the construction site.

The Governance and Stewardship Strategy[34] sets out the potential options for long-term ownership and maintenance of SuDS and recommends a ‘Company Limited by Guarantee’ or ‘Community Interest Company’ as the preferred Governance Body to ensure that those assets within the Governance Body are ‘locked’ and safeguarded for use in perpetuity – so any transfer of land ownership should require that specific terms and conditions are met. A Company Limited by Guarantee would be the most flexible option and would not preclude the body being converted to a Community Interest Company at a later date if that were ultimately to be a preference. Assets of a Company Limited by Guarantee could be transferred to other third-party bodies in the longer term, which could include charitable or other bodies as appropriate to the operation and management of assets. For those items which are identified as being the responsibility of the Governance Body (e.g., Strategic parks and open space), long-term stewardship and governance will be undertaken by a new body established for this purpose.

In order to maintain the proposed SuDS and stormwater wetland features (including associated engineering structures), adoption by a body that can maintain the different components will be required so that they continue to function as designed. It is currently envisaged that they will be adopted by a combination of a Governance Body and Severn Trent Connect as the New Appointment Variation company, who will also operate the onsite Wastewater Treatment Facility. However, it should be noted that Southern Water, who is the incumbent sewerage provider, can adopt SuDS in accordance with the Design and Construction Guidance published in 2020[35].

Kent County Council may also retain adoption of certain SuDS features within the adopted highways subject to further detailed discussion.

The onsite WwTW (including the associated wastewater tertiary treatment wetlands system) will be operated and maintained by Severn Trent Connect in perpetuity under the legal and regulatory provisions of the Water Industry Act, while ensuring water quality standards and nutrient mitigation to satisfy Water Framework Directive and Habitat Directive requirements. All proposed centralised rainwater and wastewater recycling measures will also be adopted and maintained by Severn Trent Connect.

Habitat creation and ecology mitigation, including addressing any potential conflicts between accessibility, safety, ecology and water management should be carefully considered and resolved, as part of the design development process of the nutrient mitigation wetlands and stormwater SuDS. For example, Wastewater

[34] Governance and Stewardship Strategy, Quod March 2022 (ES Appendix 4.13)

[35] Design and Construction Guidance for foul and surface water sewers offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England (“the Code”, Approved Version 2.0, March 2020, Water UK

Wetland W13 and the surrounding area is within the mitigation area designated for water voles and reptiles (including a presence of a public footpath), which needs consideration in preparing the design and maintenance plans.

Potential community education and involvement exercises in promoting the biodiversity within Otterpool Park can be linked with the proposed SuDS, wetlands and blue-green infrastructure across the Site. Further discussions will be required with the design teams, LPA and Severn Trent Connect during Tier 2 and Tier 3 stages, in respect of the detailed design of the onsite WwTW, to explore how utilities infrastructure and buildings could be attractively integrated into the landscape, and what role the proposed Otterpool Park community stewardship vehicle will play in managing this area.

An example of this could be using green roofs and green walls on key utility buildings. The early delivery of the onsite WwTW (including associated foul water pumping station in the town centre) is a good example of where a benchmark of great design could be set from the outset and adopt a design-led approach to all utility buildings and structures, which have the potential to undermine the quality of the public realm otherwise. Therefore, SuDS and blue-green infrastructure should be integrated into the wider masterplan strategy, providing multi-functions and benefits

An Operation and Maintenance Manual will be prepared at the reserved matters stage for each phase of the proposed Development that will include the following:

- Location of all SuDS components on the site;
- Brief summary of the design intent, how the SuDS components work, their purpose and potential performance risks;
- Depth of silt that will trigger requirement for removal;
- Visual indicators that will trigger maintenance;
- Maintenance requirements (i.e. the Maintenance Plan) and a maintenance record pro forma;
- Explanation of the objectives of the maintenance proposed and the potential implications of not meeting those objectives;
- Identification of areas where certain activities are prohibited (e.g. stockpiling materials on pervious surface);
- Advice on what to do if alterations are to be made to a development or if service companies need to undertake excavation or other similar works that could affect SuDS; and
- Details of whom to contact in the event that pollution is seen in the system or if it is not working correctly.

The Maintenance Plan should follow the recommended maintenance requirements for each of the SuDS components set out in the CIRIA SuDS Manual. Opportunities to combine landscaping maintenance with SuDS maintenance should be identified to reduce the lifetime costs of the drainage system.

7 Risk of Fluvial Flooding

7.1 Overview

As identified in Section 5, one of the primary risks of flooding to the Application Site comes from fluvial sources associated with the River East Stour and ordinary watercourses referred to as Harringe Brook, North Lympne Drain and Racecourse Drain. The location of the four watercourses and the flow estimation points (FEP) can be seen in Figure 24.

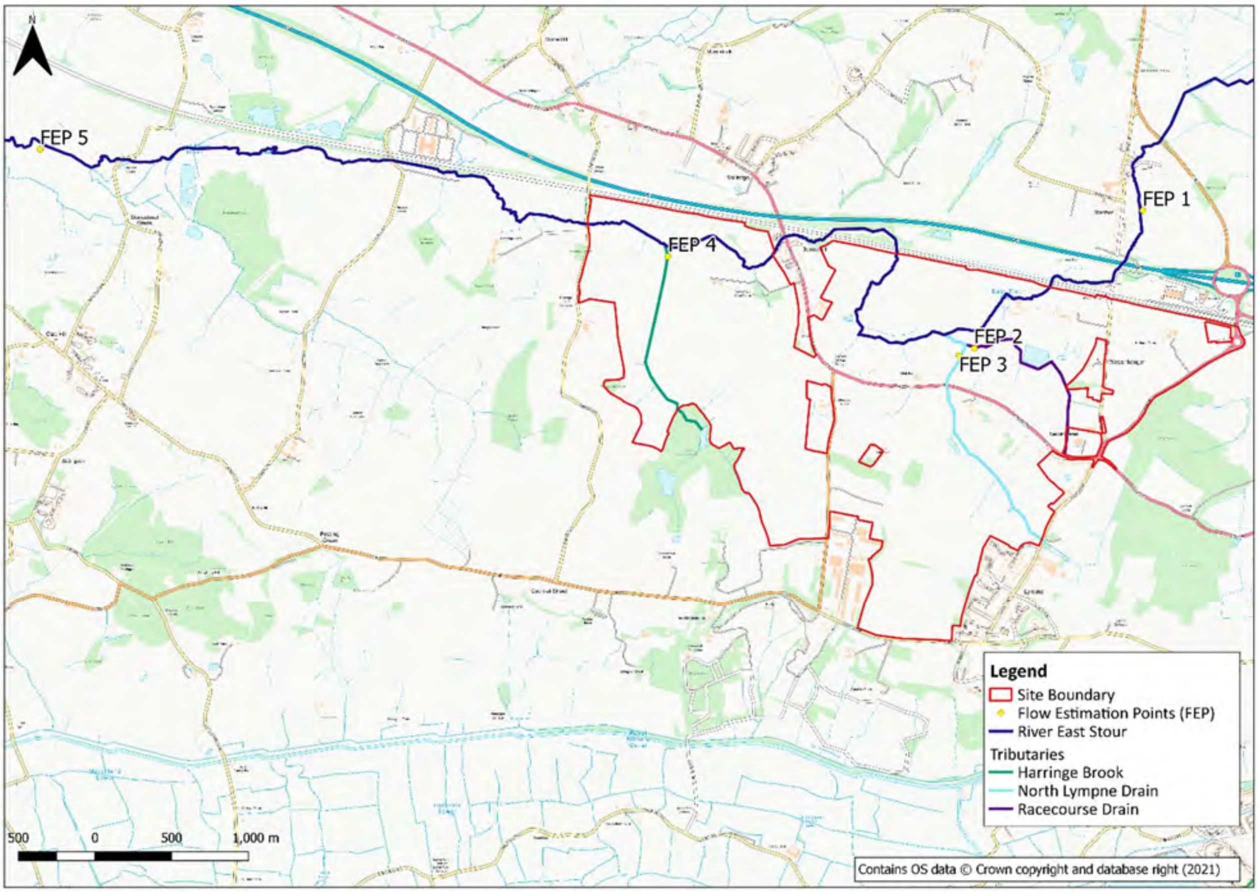


Figure 24: Plan of study area, watercourses and flow estimation points
(The planning Application Site boundary is outlined in red.)

The currently published Flood Map for Planning covering the site is based on a broad-scale national mapping study (JFLOW) that is not deemed suitable for informing a site-specific FRAs. Furthermore, the Flood Map for Planning does not include an allowance for the effects of climate change and the flood extents from the ordinary watercourses have not been mapped. Therefore, bespoke hydraulic modelling has been undertaken to define flood extents for the ordinary watercourses, refine flood extents for the River East Stour and to make an assessment of the likely impacts of climate change.

The hydraulic model has been used to assess the potential impact that the three proposed bridges crossing the River East Stour may have on flood risk in the area and, where necessary, demonstrate that proposed mitigation measures are appropriate.

Further detail on the hydraulic modelling is provided in a report and two technical notes:

- Baseline Flood Modelling Report (Appendix H);
- Baseline Hydrology Update (Appendix I); and
- Proposed Scheme Modelling Technical Note (Appendix J).

7.2 Design flood flow estimation

Peak flows were estimated at the Flood Estimation Points (FEP) shown in Figure 24 for the following flood events:

- 1 in 20 annual chance event (5% Annual Exceedance Probability (AEP));
- 1 in 100 annual chance (1% AEP);
- 1 in 100 annual chance plus a 38% allowance for climate change (1% AEP +38%CC);
- 1 in 100 annual chance plus a 1% allowance for climate change (1% AEP +101%CC); and
- 1 in 1,000 annual chance (0.1% AEP).

In accordance with the EA's latest guidelines on climate change[36] and consultation with the EA, the central allowance to 2115 (38%) has been used to assess the fluvial risk to the proposed Development. The upper end allowance to 2115 (101%) has been used as a sensitivity test for the potentially more extreme effects of climate change.

Flows were estimated using both the Flood Estimation Handbook (FEH) Statistical and ReFH2 methods[37][38]. Given the presence of gauged data records downstream on the Great Stour the Statistical method was preferred. The hydrographs generated by the ReFH2 method were scaled to match the peak flow estimates from the Statistical method for use as inflows to the hydraulic model. The resultant modelled levels were compared against observed levels at Barrowhill gauge and were found to be significantly smaller than the observed levels. Following discussion with the EA, the flows were estimated using a new set of antecedent conditions, as detailed in Appendix I.

A total of six inflows have been applied to the model, including four lumped catchment (FEPs 1-4) and two intervening areas which have been apportioned from FEP5 and distributed across the model as lateral inflows. A summary of the peak flows for the six model inflows is provided in Table 13.

Table 13: Modelled Peak flows

Location	1 in 20 annual chance	1 in 100 annual chance	1 in 100 annual chance +38% climate change	1 in 100 annual chance + 101% climate change	1 in 1000 annual chance
East Stour US (FEP1)	3.19	4.80	6.62	9.64	8.54
Racecourse Drain (FEP2)	0.46	0.72	1.00	1.45	1.33
North Lympne Drain (FEP3)	1.10	1.67	2.30	3.35	3.00
Harringe Brook (FEP4)	1.19	1.90	2.62	3.81	3.50
East Stour Lat1	1.39	2.16	2.98	4.34	3.95
East Stour Lat2	1.90	2.94	4.05	5.91	5.37

[36] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances
[37] Appendix A of 10029956-AUK-XX-XX-RP-CW-0021-P2-Flood Modelling Report, Arcadis 2020
[38] 10029956-AUK-XX-XX-FN-CW-0045-P3-Baseline Hydrology Update, Arcadis 2022

The Flow Estimation Calculation Record is included in Appendix H. The flow estimates have been reviewed and approved as fit for purpose by the EA.

FEH analysis determined that the critical storm duration for the River East Stour catchment is 11 hours and therefore, this has been adopted for the fluvial hydraulic modelling. Section 6.5.4 describes how the ICM model of the surface water system was assessed for storm duration of 8 hours and 12.5 hours to provide a robust understanding of how the drainage system would respond in longer and shorter events. Prior to this, a comparison of the ICM and fluvial model results for the baseline, 11 hour storm duration was made and the ICM model adjusted to ensure that the results were comparable.

7.3 Baseline assessment

The assessment of fluvial flood risk has been undertaken using a newly developed linked 1D Flood Modeller Pro (FMP) 2D TUFLOW hydraulic model. This approach has been taken since it combines the complementary strengths of 1D models (e.g. accurate representation of in-bank flows and channel features such as bridges and culverts) and 2D models (e.g. simulation of complex floodplain flows).

The model represents a 7.4km long reach of the River East Stour from approximately 360m upstream of the M20 to Church Lane, which is approximately 1.4km downstream of the site red line boundary. Three tributaries of the East Stour, referred to as the Racecourse Drain, North Lympne Drain and Harringe Brook have been included in the 1D domain for lengths of 1.4km, 1.7km and 1.1km respectively.

The 1D channel geometry is based on surveyed cross-sections linked to a 2D model domain which uses lidar data to define the topography. Structures, such as weirs, bridges and culverts have been included within the 1D model domain. Further information on the model build can be found in Appendix H and the changes resulting from the updated Cini values are discussed in Appendix I.

The modelled flood extents are comparable to the currently published EA Flood Zones and are shown on drawing 10029956-AUK-XX-XX-DR-CW-0018-P5 in Appendix I. The 1 in 100 annual chance flood event floods a 50-70m wide corridor along the first stretch of channel south of the CTRL (NGR 612450, 137320 to NGR 611440, 137530) and then a 20-60m wide corridor along the second stretch of channel south of the CTRL (NGR 610990, 137630 to 609430, 137710). More extensive flooding is predicted during the 1 in 1000 annual chance event along the River East Stour corridor.

Flood flows for the ordinary watercourses predominantly remain within channel, with three notable exceptions. The culvert conveying the Racecourse Drain beneath the south eastern part of the racecourse does not have sufficient capacity, causing flood water to pass downstream via overland routes for all modelled events. Flooding on the North Lympne Drain is predicted on the upper reaches of the left bank for all modelled events and the left bank of the Harringe Brook is predicted to overtop at the confluence with the River East Stour for events greater than the 1% AEP event.

7.4 Climate change assessment

The effect of climate change on the modelled flood extents is shown in drawing 10029956-AUK-XX-XX-DR-CW-0019-P5 in Appendix I. The 38% central allowance on river flows results in additional fluvial flooding along most the River East Stour, and its tributaries. The 101% upper end allowance on river flows results in a pattern of fluvial flooding which is similar to, but slightly greater than, that predicted for the 1 in 1000 annual chance flood event.

7.5 Sensitivity testing

Sensitivity tests concluded that the model results are not unduly sensitive to changes in the choice of roughness coefficient or the choice of downstream boundary. Further information on the sensitivity testing undertaken as part of the recent update to the baseline hydrology can be found in Appendix I.

7.6 Post-development assessment

7.6.1 Environment Agency consultation

Following consultation, the EA provided the following key comments in relation to flood risk management:

- Peak flows and volumes discharged to the River East Stour should not increase flood risk downstream, in particular to the Ashford community;
- Any works in, under, over or within 8m of the banks of the River East Stour would require a Flood Risk Activity Permit (FRAP);
- Any new development proposal within Flood Zone 3 and 2 would have to be supported by a site-specific FRA;
- EA's latest climate change allowances of 38% (Central) and 101% (Upper End) for the Stour catchment should be applied to the peak river flows.

If access bridges are required over the River East Stour the design should be compliant with the following design criteria:

- The bridge should be clear span across the river and the bridge abutments should not extend into the channel;
- Agreed bridge design should have a minimum of a 10m wide vegetated buffer zone from the top of the river bank as well as a one metre wide mammal ledge above predicted flood levels for all planned bridges;
- The soffit level of the bridge should not be lower than 600mm above the undefended 1 in 100 annual chance plus climate change flood level; and
- The river channel profile should be maintained, ensuring no reduction in capacity.

7.6.2 Proposed mitigation measures

Bridge Crossings

The introduction of the proposed new crossings over the River East Stour has the potential to increase flood risk. The following design and mitigation measures have been adopted in developing the design of all bridge crossings following recent pre-planning consultations held with the EA, LLFA and F&HDC.

Protection of the Riparian Zone – to avoid developing within the riparian zone, all bridge abutments / road embankments will be set back at least 10 m from the existing river bank, including a one metre wide mammal ledge above predicted flood levels for all planned bridges. Dark corridors will be maintained across the protected riparian zone, by minimising artificial lighting. Opportunities to create a lowered river edge providing an enhanced wet margin will be explored on the right bank during Tier 2 and Tier 3 planning application stages, and Tier 1 Green Infrastructure Strategy and supporting Ecology assessments reflect this opportunity.

Ensuring Access Clearance – to facilitate access for the public and for maintenance purposes, a minimum vertical clearance of 2.5m (from the river bank to the bridge soffit) and width of 6m will be maintained on the right bank.

Ensuring Flood Flow Freeboard – the main bridge opening and any smaller openings within the floodplain will provide a minimum freeboard to the soffit of at least 0.6m above the 1 in 100 annual chance flood level inclusive of a 38% allowance for climate change; this is to allow flood flows and any floating debris to safely pass through.

Ensuring Acceptable Crossing Approaches – the gradient of the proposed road approaches to the bridge abutment will have a maximum gradient of 1 in 20 (5%).

Reducing Flood Risk - modelling will demonstrate that there is no increase in flood risk to third parties due to the proposed river crossings and any increase within the proposed Development is appropriately manged; opportunities for any downstream flood risk reduction and environmental enhancement along the river corridor will be encouraged through the wider masterplan proposals.

Environmental Enhancements

As part of the wider masterplan, a number of environmental enhancements will be made along the River East Stour corridor. These include:

- The removal of five culverts that currently pass under the racecourse track. Two of these are on the River East Stour and the other three are part of the Racecourse Drain.
- Creation of extensive wetland areas as part of the Surface Water Drainage Strategy to enhance water quality, ecology and visual amenity (Section 6).
- Creation of an 'on-line' attenuation pond on the Racecourse Drain upstream of the proposed town centre.

Further details of the how the proposed mitigation measures are represented within the hydraulic model can be found in Appendix J. The results of the proposed scheme flood modelling demonstrate that there is no increase in flood risk to third party receptors and any increase in risk is managed within the masterplan. This is evident when looking at comparisons of the modelled flood extents and hydrographs presented in Appendix J.

Flood Volume Compensation

The EA have requested that level-for-level floodplain storage compensation is provided to offset the loss associated with the embankments for the proposed crossings (locations shown in Figure 10). The wetland areas described above will increase the volume of floodwater that can be stored on the floodplain during the 1 in 100 annual chance flood event and provide the necessary compensation for any loss of floodplain storage associated with the construction of the bridge abutments. The wetland areas proposed for flood compensation are not those which will be used to attenuate surface water and therefore there will be no loss of storage capacity during large flood events. Compensation is only required for Crossings 1 and 2. Crossing 3 spans the flood extents and therefore no compensation is required. The existing river channel profile will also be maintained or enhanced to ensure no reduction in flow capacity when designing the three bridge crossings and associated minor river diversion for the Crossing 1.

Calculations are presented in Appendix I that demonstrate that significantly more floodplain storage is created at the same ground levels from which it is lost due to the crossings during the 1 in 100 annual chance event including a 38% climate change allowance.

7.6.3 Assessment of third party impacts

Drawings 10029956-AUK-XX-XX-DR-CW-0018-P5 and 10029956-AUK-XX-XX-DR-CW-0031-P3 show the baseline and proposed flood extents respectively. They demonstrate that flood extents outside the red line boundary remain unchanged by the addition of the proposed Development.

The EA have requested that the assessment demonstrate the proposed Development will not have a detrimental impact on the operation of the Aldington Flood Storage Area (FSA) due to any change in floodplain storage mechanism or increases in river flows and volumes. The modelled hydrographs at the downstream boundary of the model are compared in Appendix J and the figure is reproduced here as Figure 25. This demonstrates that the proposed Development and associated mitigation measures result in a marginal reduction in peak flow by 0.39m^3s^{-1} and overall event volume by 5,227m^3 (0.9%) during the 1 in 20 annual chance flood event. In the 1 in 100 annual chance + 38% climate change event, the peak flow is slightly reduced by 0.65m^3s^{-1} and the timing of the peak is delayed by 0.75hrs. The overall event volume is also slightly reduced by 5,227m^3 (0.8%).

As such it is considered that the proposed alterations to the floodplain will not have a detrimental impact on the operation of the Aldington FSA. The impact of increased urbanisation and the proposed SWDS on third parties is considered in Section 6.

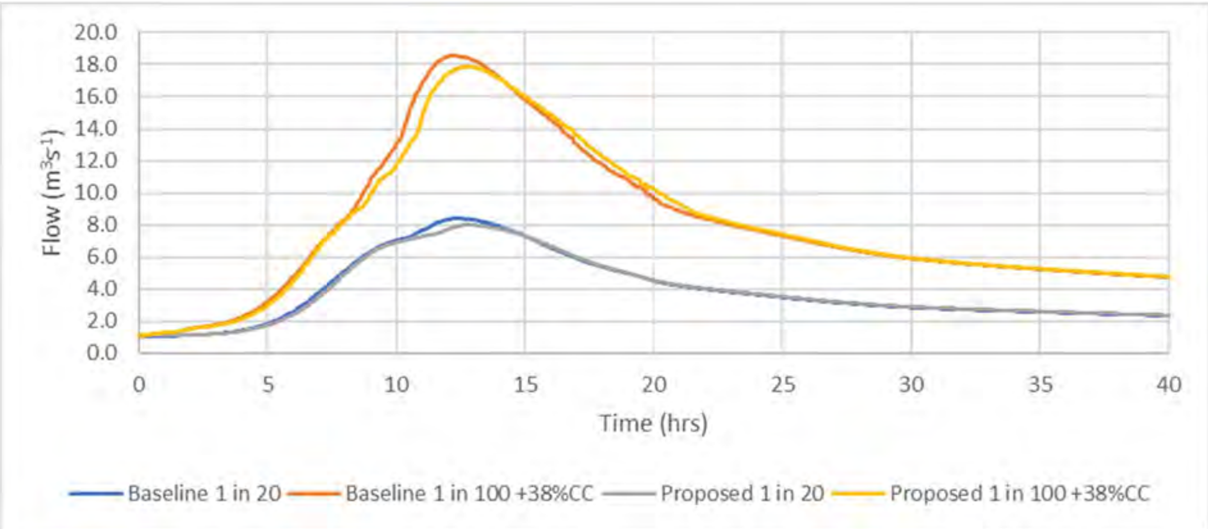


Figure 25: Comparison of modelled flow hydrographs at Harringe Lane bridge.

In summary, the proposed mitigation measures ensure that the proposed Development does not increase flood risk to third parties and offer a marginal betterment whilst also managing the flood risk to the development itself through the appropriate use of mitigation measures.

7.6.4 Safe access and egress

All built development will be located within Flood Zone 1 and, as most of the surrounding area is also located in Flood Zone 1, safe access and egress would be available during an extreme flood event. However, the proposed residential area that is in Flood Zone 1 on the northern side of the River East Stour will require safe access and egress via three new bridge crossings over the River East Stour Flood Zones 2 and 3. These three bridge crossings located at NGR 611760, 137050, NGR 611300, 136990 and NGR 611270, 137230. The modelled post-development flood levels during the 1 in 100 annual chance event inclusive of 38% allowance for climate change at these bridge crossings are summarised in Table 14. This demonstrates that the proposed bridge soffit levels are more than 2.0m above the design flood level (1 in 100 annual chance event plus a 38% allowance for climate change), which will ensure safe access and egress to the residential development north of the River East Stour.

Table 14: Summary of three new crossings over River East Stour (including flood design levels freeboard)

Crossing	Bridge Clear Span (m)	1 in 100 +38%CC Flood Level (mAOD)	Modelled Minimum Soffit Level (mAOD)	Available Freeboard to Soffit (m)
Crossing 1	28	67.08	69.50	2.42
Crossing 2	30	65.44	67.90	2.46
Crossing 3	25	64.08	66.20	2.12

7.6.5 Residual risk

As shown in Table 14, the proposed bridge openings are large (ranging from 25m to 30m) with a freeboard from design peak water level to soffit in excess of 2.0m. Furthermore, all residential and commercial land uses in the River East Stour corridor have been located in the EA's published Flood Zone 1 where a generous SuDS buffer corridor has also been provided in the Flood Zone 1, prior to the Flood Zone 2 and 3 outer limits. Although the risk of blockage at such large structures is low, an assessment of the impact of blockage as part of the detailed design process will provide a robust assessment of residual risk both now, and in the future.

7.7 Application of the Sequential and Exception tests

7.7.1 Sequential approach to proposed Development layout

The masterplanning process has ensured that land use has been located sequentially, with only water-compatible land uses (amenity open space and biodiversity enhancement areas associated with the blue-green corridors) and essential infrastructure situated in the updated Flood Zones 2 and 3.

Additionally, the flood extents (inclusive of a 38% allowance for climate change) have been used to ensure that other land uses are located on land that is free from fluvial flooding during a 1 in 100 annual chance flood event throughout its 100 years design life.

In order to access the proposed residential areas on the northern side of the River East Stour it will be necessary to construct three new bridges. As such, this transport infrastructure will need to be located within Flood Zones 2 and 3. The design of the proposed crossings complies with the EA requirements summarised in Section 7.6.1 and 7.6.2.

The culvert which carries the Racecourse Drain under the eastern side of the racecourse is surcharged for all modelled baseline events with floodwaters flowing across the racetrack and ponding adjacent to the right bank downstream. The baseline flood extents therefore identify flooding close to the area proposed for the town centre in the Phase 1 Development. Management of this risk is discussed below, which shows that the removal of the existing culvert and proposed new on-line attenuation pond will completely remove this existing flood risk whilst providing wider ecology and amenity benefits. Therefore, the removal of the existing culvert and construction of new on-line pond will be implemented as part of the enabling infrastructure for Phase 1 Development.

In line with the concept of the proposed Development as a 'new garden settlement', a high proportion of the site will either be retained open land or comprise new formal and informal open space provision. Approximately 44% of the land area within the proposed Development will comprise strategic open space without accounting for any incidental green areas (10-15% of the total land) within the designated housing areas. Green infrastructure, ecology and water management strategies have been aligned to support well integrated proposals that will help enhance ecosystem performance, increase natural drainage capacity, maximise natural capital benefits whilst minimising flood risk.

The combined strategies aim to support the overarching key green infrastructure principles listed in Figure 26 below.

Figure 26 Green infrastructure principles[39]

Figure 27, together with the mapped baseline and post-development flood extents included in Appendices H, I and J, show that extensive green and blue infrastructure has been incorporated within the proposed Development, by building on the above principles that will also steer the development parcels and buildings away from the predicted flood risk areas.

[39] Otterpool Park Green Infrastructure Strategy, Arcadis March 2022 (ES Appendix 4.11)

Figure 27: Green and blue infrastructure proposals[40]

7.7.2 Exception Test

Essential infrastructure is proposed within Flood Zones 2 and 3a and is therefore the only element of the proposed Development which is required to pass the Exception Test, demonstrating that:

- the development would provide wider sustainability benefits to the community that outweigh the flood risk; and
- the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere and, where possible, reduce flood risk overall.

Given the draft allocation in the future Local Plan as a major and high-quality garden settlement embracing sustainability principles, it is considered that the proposed Development would provide substantial wider environmental and sustainability benefits that outweigh the limited flood risk associated with the three new bridge crossings over the River East Stour. It should be noted that these bridges have large clear spans (ranging from 21m to 26m) as well as over 2.0m flood freeboard to the bridge soffit for the 1 in 100 annual chance (inclusive of 38% climate change allowance) design flood event. No new residential or commercial development are located in the EA's published Flood Zone 2 and 3.

Therefore, the proposed roads or the surrounding residential and commercial development are technically not at flood risk from the River East Stour. The modelling and associated technical work discussed before, shows that up to 370m^3 of floodplain storage volume will be lost due to the proposed bridges and associated road embankments, but over 6,230m^3 of new compensatory volume has been provided, as per the EA's stipulated 'level-for-level compensation' basis (see Appendix J).

Section 7.6.4 provides recommended minimum bridge soffit levels for the crossings to ensure that the proposed Development is safe for its lifetime taking climate change into account, whilst Section 7.6.3 demonstrates that the proposed Development would not increase flood risk elsewhere, whilst aiming to reduce flood risk where possible.

As such it is considered that the proposed Development satisfies the requirements of both parts of the Exception Test.

8 Risk of groundwater flooding

8.1 Overview

Section 0 concluded that the proposed Development is considered to have a low risk of groundwater flooding. This section provides a summary of a preliminary groundwater mounding assessment, which was undertaken to quantify what increase in groundwater level could occur under proposed infiltration features. The technical note detailing the approach and results is included in Appendix K.

The assessment uses the Hantush method to estimate the increase in groundwater level (mounding) beneath a number of proposed SuDS features across the masterplan. Calculations were performed for the combined SuDS areas within each zone and for a selection of individual basins, which are considered to have the greatest risk of groundwater mounding based on the conceptual understanding of the geology of the site.

8.2 Results

The calculations demonstrate that groundwater mounding of between 0.1 - 2.6m could potentially occur, but that in each location tested this increase in groundwater level beneath the SuDS feature was not greater than the depth to groundwater.

Therefore, the risk of groundwater flooding from the concentrated infiltration of proposed SuDS features is low, but further groundwater level monitoring at more vulnerable central and northern parts of the site and pumping testing to confirm the specific yield value of the underlying aquifer is recommended as part of future design work.

9 Risk of Flooding from the Racecourse Lake

9.1 Overview

Section 5.6 identified that the Racecourse Lake is a raised waterbody with an unknown storage volume capacity. Given this uncertainty, an investigation of the capacity of the lake and a qualitative assessment of the risk that it poses to the surrounding area both from overtopping and from a failure of the embankment resulting in the release of the stored water has been undertaken, as described below.

9.2 Lake capacity

A bathymetric survey of the lake was commissioned in July 2020 and an additional survey was also undertaken in October 2021 to verify the spillway level and natural ground level (see Appendix L for the survey data).An elevation-volume relationship was then developed for the lake (see Figure 28 below). As per the requirements of Reservoir Act 1975, the surveyed hard bed levels are used in producing this relationship, thus ensuring that the total estimated volume includes the 1,270m^3 of estimated soft silt in the lake.

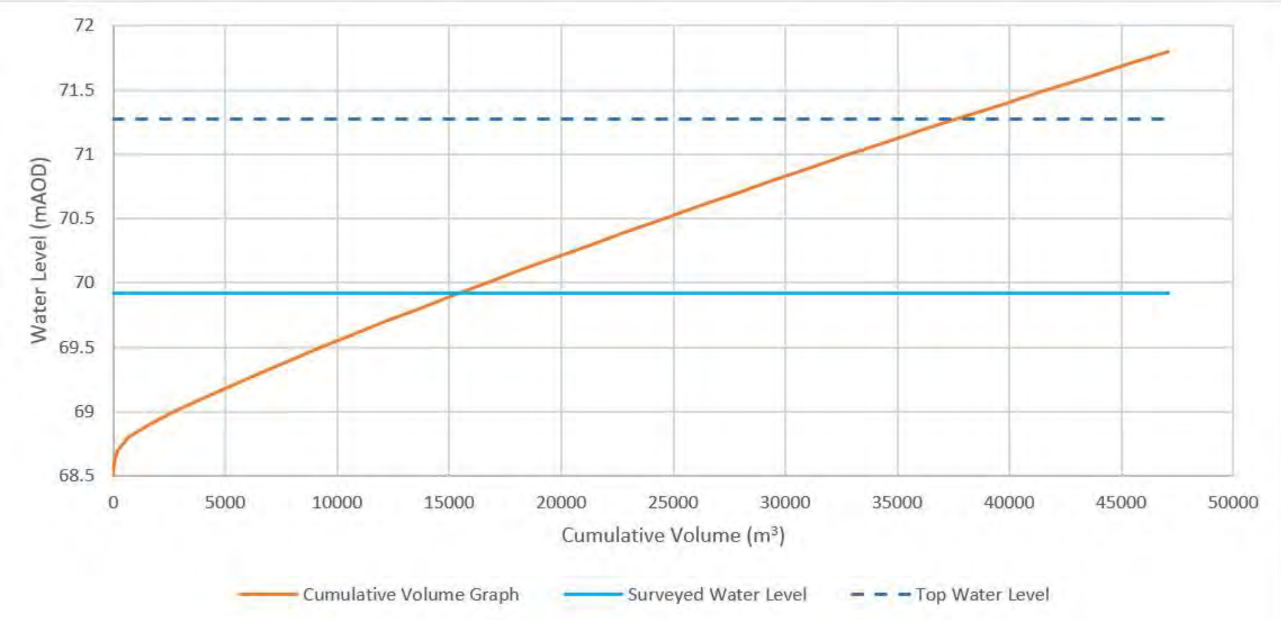


Figure 28: Elevation-volume relationship of the Racecourse Lake

Foot notes to Figure

 # The total theoretical volume in the lake up to the surveyed maximum top level of the existing bund (i.e., 71.77mAOD) is 47,071m^3. However, the retained volume of lake water is estimated to the existing spillway crest level of 71.27mAOD from the Racecourse Drain ditch invert level of 67.85mAOD, downstream of the western bund. As this ditch level is below the base of the lake (68.40mAOD), the entire volume of the lake from the hard bed is included as 'retained volume'.

$ The water level in the lake at the time of survey in July 2020 was 69.92mAOD.

The retained volume of a raised reservoir is defined as the volume above natural ground level with a water level equal to the maximum level that can be reached before spilling or overtopping occurs, referred to as the Top Water Level (TWL). Following discussions with Arcadis reservoir team, the natural ground level was taken as 67.85mAOD at the invert level of the Racecourse Drain slightly downstream of western bund of the lake. This was deemed representative of the original ground level prior to the construction of the existing bund, and representative of the level to which the reservoir could drain should the embankment accidentally fail.

A site inspection undertaken on 31st August 2021 clearly showed an overgrown formal spillway structure at the northern section of the bund, which would allow the lake to overflow in a controlled manner. The existing vegetation was subsequently cleared, and the spillway was resurveyed in October 2021 (see Figure 29), which confirmed that the spillway crest elevation as 71.27mAOD and therefore defines the TWL for the purposes of this volume assessment presented here.

Figure 29 Existing spillway at the northern bund of the racecourse lake

The retained volume at the TWL above the natural ground level has been calculated as 37,570m^3. The Reservoir Act 1975 was set up to promote and oversee the safety of large, raised reservoirs, defined as those with a capacity much greater than 25,000m^3. As the above volume estimate for the Racecourse Lake well exceeds the 25,000m^3 threshold, it would be subject to the safety requirements set out under the Reservoir Act and Otterpool Park LLP was informed accordingly to register the lake with the EA, as a large-raised reservoir structure.

The key reasons why the Racecourse Lake is a large-raised reservoir are:

- The reservoir is retained by an embankment that has been artificially created for the purposes of storing water above natural ground level.
- Calculations carried out by Arcadis as part of this FRA preparation, confirms that the Racecourse Lake can retain 37,570 m^3 of water. This clearly exceeds the current threshold of 25,000 m^3, above which the Reservoir Act defines it as a large-raised reservoir.
- While it is currently understood that the reservoir has no natural catchment, instead being historically filled by abstraction pumping from a nearby source, natural rainfall, and natural groundwater recharge, the reservoir, which is defined as a "non-impounding reservoir", remains a "large-raised reservoir".

Consequently, further consideration and inspection will be required to address the potential implications of this to ensure reservoir safety under the direction of an appointed All Panel Reservoir Engineer (ARPE); This should also consider the potential dam overtopping and breach risk to the proposed residential Development in the surrounding and downstream area.

It is envisaged that as part of the proposed Development (under the direction of the ARPE), a new spillway will be designed and constructed to a new lowered crest level of 70.4 mAOD, which will reduce the retained volume in the lake below the 25,000 m^3 current threshold value. It should be noted however that the Flood and Water Management Act (2010) reduced the threshold of the large raised-reservoir definition to 10,000 m^3 and this has been enacted in Scotland, Wales and Northern Ireland but not in England as of March 2022.

9.3 Qualitative risk assessment

9.3.1 Overtopping

The Racecourse Lake is fully encircled by an earth embankment and no working inflow structures from the adjacent Racecourse Drain or surrounding area were found during the July 2020 and October 2021 surveys or previous site walkovers. It is therefore assumed that the lake is currently fed by a combination of direct rainfall and localised perched groundwater, although it was once filled by artificial pumping from a local abstraction source, which had been decommissioned since 2014, as described below. Consequently, the contributing area for runoff during an extreme storm event is currently limited to the area within the existing embankment. This is considered to reduce the likelihood of the lake embankment being overtopped during an extreme storm although there is some risk of increased localised groundwater inflow ingress from the surrounding area into the lake during saturated ground conditions. Discussion on these risks is presented in the sections below.

The local abstraction licence information obtained from the EA records shows that there was a former abstraction licence at a watercourse at the Folkestone Racecourse (at NGR 611730, 137000), which was effective from 03/03/1966 to 27/02/2017 to abstract water for "spray irrigation – storage" with a licenced daily and annual licenced quantity limits of 909.2m^3 and 36,368m^3 respectively. This location is near to the confluence of the North Lympne Drain and the River East Stour, and Figure 30 shows a photograph of this facility taken in December 2014 when the former pump was decommissioned. Local knowledge suggests that this pump was once used to abstract water from a local well/borehole and pump into the lake ahead of the spring/summer race season using the metal rising main (220mm outside diameter) shown in Figure 31.

There is also a second old pump near to the western lake edge, which has also been decommissioned (see Figure 32). The local knowledge suggests that this pump was used to extract water from the lake to irrigate the racecourse.

Figure 30 Decommissioned former pumping site at the western edge of the racecourse lake

Figure 31 Disused existing metal rising main (220mm outside diameter) at the western edge of the racecourse lake

Figure 32 Disused second existing pump at the western edge of the racecourse lake

The EA has also provided the following information in relation to this licence number, which shows that the maximum abstracted volume was 32,760m^3 in 2003-2004 and no water has been abstracted since 2013. The above abstraction licence has been renewed by the EA in 2020 (i.e., as the F&HDC as the new licensee), but no water is currently being abstracted.

Licence no.	9/40/04/0027/SR
Licencee	Lingfield Park 1991 Ltd
Location	Folkestone Racecourse
Grid Ref	TR 117300 370000

Year	Volume (m3)	Year	Volume (m3)
1999-2000	13,800	2009-2010	1,026
2000-2001	17,240	2010-2011	22,682
2001-2002	34,300	2011-2012	2,653
2002-2003	10,100	2012-2013	6,842
2003-2004	32,760	2013-2014	0
2004-2005	27,530	2014-2015	0
2005-2006	16,170	2015-2016	0
2006-2007	24,088	2016-2017	0
2007-2008	14,103	2017-2018	0
2008-2009	5,500	2018-2019	0

Figure 33 Abstracted volumes supplied by the EA

Available historic maps show that until mid-1960s the Racecourse Drain used to flow through the middle of lake whereas more current Google maps, Ordnance Survey maps and LiDAR data show that this watercourse is now fully diverted around the southern embankment of the lake.

Furthermore, according to the surveyed water level in the lake in July 2020, there is a freeboard of 1.35m, giving 22,126m^3 of further storage prior to any overtopping to occur. Considering that there are no known watercourse inlets or functional pumping facility at the site to fill the lake, it is considered it is extremely unlikely to cause any overtopping from either fluvial water or groundwater. To illustrate this further, the area of the lake at 70.5mAOD level contour (i.e. average level of the surveyed water level and dam crest level) is 16,207m^2.

Therefore, assuming no fluvial inflows and groundwater ingress into the lake, 1,365mm depth of direct rainfall on the lake surface must be fallen to represent 22,126m^3 of surplus available storage above the surveyed water level. Whereas the local rainfall data obtained from the EA for the nearby gauges suggests that the average annual rainfall between 1992 and 2019 period was 790mm. Therefore, dam overtopping risk is very low.

9.3.2 Breach

A preliminary qualitative risk assessment of the potential impact of a failure of the embankment resulting in the release of the stored water has been made using lidar to assess flow pathways. This concluded that breach flood waters would mainly follow the existing natural drainage routes and therefore, the creation of substantial blue-green corridors and wetland features which avoid developing in the floodplain, including further space allocated for SuDS outside the floodplain as per the current development proposals significantly reduces the likelihood of impacting 'more vulnerable' elements of the proposed Development should the embankment breach, resulting in the rapid release of the stored water.

As mentioned above, the existing spillway level will be lowered by 0.87m to a new overflow level of 70.4m AOD (i.e., reducing the future retained total storage volume to 22,944 m^3), consequently lowering the potential breach risk to the surrounding new development areas.

Detailed reservoir inundation mapping has not yet been completed as part of this Tier 1 planning application FRA although it has already been commenced, to inform Tier 2 and Tier 3 application stages. The results of this hypothetical breach analysis will define potential breach flood levels and extents (for the baseline and developed case), to address any residual breach risk associated with the Racecourse Lake. Therefore, this information can be then used to develop the proposed mitigation strategy discussed below.

9.4 Proposed mitigation

The following key actions will be required once the existing lake has been registered with the EA, including an ARPE and a Supervising Engineer have been appointed:

- Follow the process under the Reservoir Act to "declassify" the existing lake from the EA register so that the retained volume is less than 25,000 m^3 and it is no more classed as a "large-raised reservoir". This will include designing and constructing a new spillway with a crest level of 70.4m AOD.
- Complete hypothetical dam breach analysis (based on the available existing survey data and lowered Top Water Level of 70.4 mAOD) and inform developing residual risk management measures for the adjoining and downstream proposed development areas.
- Undertake ongoing inspections to ensure that existing bund and new spillway can be operated safely for the lifetime of the proposed Development.

The existing outflow catchpit chamber and discharge pipes at the northern side of the lake are currently blocked (see Figure 34). These need clearing, and then tracing and the outfall route reinstated to allow any overtopped floodwater, from the existing spillway, to be safely discharged to the receiving watercourses, without causing any flood risk to the existing site or proposed development.

Figure 34 Blocked overflow catchpit chamber at the northern edge of the racecourse lake, near to the existing spillway

As mentioned before, the proposed wetland features and SuDS/green infrastructure corridors around the Racecourse Lake, and in the downstream section of the Racecourse Drain and River East Stour within the proposed Development, will provide additional flood storage and conveyance routes if a dam breach suddenly occurs, to safely pass the escaped flood water into the River East Stour. However, further land raising should be considered in the development parcels, using the breach analysis results to manage the residual flood risk.

As part of the proposed surface water strategy, there is an opportunity to utilise the spare storage capacity available in the racecourse lake during wet rainfall periods and successive flood events, by pumping water into the lake from the proposed SuDS/wetland features, as necessary. Based on the observed water level in the lake (69.92mAOD) and the proposed spillway level of (70.4 mAOD), this can provide additional long-term storage of approximately 7,500 m^3 and therefore, able to reduce downstream flood risk in the River East Stour. The existing 220mm diameter rising main can be potentially reused for this purpose (subject to further investigation of its route and condition by CCTC surveys) as the proposed stormwater wetland W8 is also ideally located to construct a new pumping facility, near to the decommissioned pumping facility. This will require an abstraction licence from the EA, but there is already an unused valid abstraction licence as stated in Section 9.3.1, which can potentially be modified for this purpose.

In addition, the proposed nutrient management strategy includes several interconnected stormwater wetlands downstream of the Racecourse Lake and therefore, some stored water can be released from the lake (as compensatory flow) to maintain sufficient baseflows in these downstream wetlands, during dry summer periods. Similarly, the disused 220mm rising main and associated pumping facility (i.e., after suitable refurbishment) can be potentially used to recirculate the water back from wetland W8 to the Racecourse Lake, if the water levels in the existing lake start to drop substantially.

The existing outlet pipe/pumping chamber associated with the former racecourse irrigation system/second pumping station at the western end of the lake may be reused (in conjunction with a new pump facility) to release the water from the lake into the Racecourse Drain / wetlands, subject to the condition of the existing drainage outlet pipes. Otherwise, a new over pumping arrangement will be required here for this purpose. Alternatively, if deemed beneficial and approved by the ARPE, a new spillway can be constructed at the northwest section where the existing embankment crest and natural ground levels are generally low towards the drainage ditch following the marshy floodplain ground. This area is also clear of any existing vegetation and therefore less sensitive to any ecological impacts due to the construction of spillway and reinforcement works to the embankment. A hydraulic penstock can be potentially integrated to the same spillway structure, which can be used to gradually release the water from the lake instead of constructing a new over pumping facility, to reduce operating costs and carbon footprint. This penstock then also can be used to lower the water levels in the lake to maximise available long-term flood storage capacity ahead of large rainfall events and/or undertake any future maintenance activities in the lake and flow control structures.

Suitable safety measures should be built-in with any potential public recreation activities (e.g. walking, sailing, swimming) should be generally considered within this area, along with suitable ecological mitigation proposals.

10 Conclusions

- Arcadis has prepared a suitable flood risk assessment and surface water drainage strategy for the proposed Development at Otterpool Park demonstrating how the outline development proposals will manage and mitigate flood risk from all sources throughout its lifetime.
- The area of study is located west of Folkestone between the villages of Lympne, Newingreen, and Barrowhill within the district of Folkestone and Hythe.
- The River East Stour flows east to west through the northern part of the site. The Racecourse Drain, Harringe Brook and North Lympne Drain flow into the River East Stour from the south parts of the site.
- Ground conditions were assessed through a combination of desk top study and site investigations all of which concluded that there was notable variation in the underlying geology and ground infiltration rates thus acting as a key influence on the spatial distribution and types of SuDS components within the surface water drainage strategy.
- A three-tier approach to the planning application is to be taken, with each tier sequentially developing the detailed proposals. This FRA relates to the Tier 1 application.
- The proposed Development includes 8,500 dwellings combined with commercial, retail, education, health, community and leisure facilities, parking, landscaping, and public open space. In addition to this, approximately 271 ha of strategic green infrastructure and 20 ha of new infrastructure are included.
- Based on the historical records and initial desktop analysis, it is considered that the proposed Development is at a low risk of flooding from all assessed sources but that further river modelling is required to confirm the impact of the development on fluvial flood risk, assess climate change impacts and inform the new road bridge crossings.
- The currently published flood zones are based on a broad scale mapping approach which is not suitable for a site-specific FRA. Consequently, a bespoke hydraulic model of the River East Stour, Racecourse Drain, Harringe Brook and North Lympne Drain was developed for use in this study.
- The baseline and with proposed Development scenarios were assessed, including climate change impacts. The latter incorporated three bridge crossings over the River East Stour, a series of wetlands / floodplain compensation areas and removal of five existing culverts within the racetrack.
- Modelling confirmed that the proposed Development does not increase fluvial and surface water flood risk to third parties and that the development itself will remain safe for its lifetime, inclusive of the recommended allowances for climate change, whilst aiming to reduce offsite flood risk where possible.
- In line with NPPF vulnerability classifications, the proposed Development is comprised of ‘Water Compatible’, ‘Less Vulnerable’, ‘More Vulnerable’ and ‘Essential Infrastructure’. For the purpose of this assessment, the lifetime of the development is assumed to be a minimum of 100 years.
- The amended outline planning application meets the requirements of the Local Plan Core Strategy (2022) and is in line with the key principles of the NPPF Sequential Test and Sequential Approach, which seeks to steer new development away from the lowest areas of flood risk. This is because that all residential areas (more vulnerable land uses) and commercial/retail areas (less vulnerable land uses) are located in EA Flood Zone 1 (land having less than 1 in 1000 annual chance of flooding).
- The bridge abutments of the proposed three new bridges (essential infrastructure land use) over the River East Stour are partly within the EA Flood Zones 2 (land having between a 1 in 100 and 1 in 1,000 annual chance of flooding) and Flood Zones 3 (land having a 1 in 100 or greater annual chance of river flooding), along with wetlands and blue-green corridors (water compatible land uses). The bridges have been designed as the agreed design criteria with the EA and passed the NPPF Exception Test.
- As a permeable river catchment, the sensitivity testing has demonstrated that a greater flow response is induced when rainstorms coincide with saturated antecedent conditions, highlighting the need to provide additional freeboard and space to accommodate higher flood levels and increased extents when designing bridges and locating the new buildings. The currently adopted precautionary design criteria will accommodate this.
- The EA Flood Map for Surface Water indicates that areas of the site which follow the alignments of the North Lympne Drain, the Harringe Brook and the River East Stour and their tributaries are likely to be at

risk of surface water flooding. Surface water runoff will be sustainably managed to ensure that risks to the site and to third parties are mitigated.

- The current risk of groundwater flooding on the site is low. A preliminary mounding assessment also concluded that there was no increase in risk of groundwater flooding as a result of using infiltration-based SuDS drainage.
- The development proposals will discharge directly into existing watercourses according to the agreed allowable discharge rates. During extreme storm events, it is likely that the sewers in existing and proposed roads will cause some localised flooding due to surcharge road gullies, but no new development will be impacted by this as the development is sufficiently set back and served by new roadside swales, plot-level drainage and strategic SuDS systems, which will be designed to safely manage such exceedance flows.
- The risk posed by a breach in, or overtopping of, the embankment of the existing Racecourse Lake has been investigated. This concluded that the risks to the proposed Development were likely to be low, but the recommended investigations and mitigation measures should be undertaken.
- The capacity assessment also concluded that the retained volume between the existing spillway level (71.27mAOD) at the northern bund and the Racecourse Drain invert level (67.85mAOD) downstream of the western bund as 37,570m^3, exceeding the current 25,000 m^3 threshold specified under The Reservoir Act 1975. Therefore, it would be subject to additional safety and inspection requirements as set out under the Reservoir Act unless the correct steps are followed to declassify the lake, by reducing the retained volume below 25,000 m^3. Further consideration is required to address this and Otterpool Park LLP have started this process at the time of writing.
- A concept site wide surface water drainage strategy has been developed which is comprised of interconnected strategic SuDS storage providing storage, water quality improvements, habitats and amenity functions which are commensurate with SuDS principles. The strategy will maximise infiltration-based SuDS and ensure that the proposed Development discharges all surface water runoff generated within it at the agreed greenfield rates for each drainage zone for events up to and including a 1 in 100 annual chance inclusive of a 40% allowance in rainfall intensity for climate change. The exceedance flows for the events higher than this event will be safely managed within the development by providing some additional capacity within the SuDS system, incorporating suitable overflow arrangements, identifying key exceedance flow paths to safely convey any flood water into the less vulnerable areas (e.g. public open space, wider blue-green corridors) and ultimately the receiving watercourses, avoiding flooding to any buildings. This will be considered at the detailed design stage, in conjunction with the proposed earth-works strategy development (see Section 11).
- The Tier 1 illustrative masterplan (ES Appendix 4.5) and parameter plans (ES Appendix 4.2) currently have allocated sufficient space to accommodate the required total long-term SuDS attenuation storage. Extra attenuation storage will be provided within certain drainage zones where required to accommodate a much tighter allowable outfall discharge rate of 2 l/s/ha (or lower) for the 1 in 100 annual chance event where higher infiltration rates are prevalent.
- Sufficient overall baseflow has been maintained in the receiving watercourse system as per the existing natural condition to avoid any ecological damage and enhance water quality and ecological benefits where possible. The proposed SuDS, wetlands and onsite WwTW dry weather flow will enhance current baseflows/ecology and there are no changes proposed to reduce greenfield rates for 1 in 1 and a 1in 30 annual chance events either.
- The final outfall discharge rate will be subject to confirmation that the ground infiltration capacity is favourable and 50% drain-down times are not excessively long thus rendering the storage areas redundant for managing follow-on, smaller storm events.
- Adequate treatment has bene applied to runoff from the different land uses through the application of the SuDS Management Train to ensure that the water quality of receiving surface waters and groundwater is protected.

11 Recommendations

It is recommended that there would be a suitable planning condition stating that the Tier 2 and Tier 3 design should be in accordance with this FRA & SWDS document. The following further work is recommended in Tier 2 and Tier 3 application stages:

Detailed Surface Water Management Strategy

- To undertake further infiltration testing and establish the extent to which infiltration-based drainage is possible across the site, to undertake further modelling and develop feasible integrated water reuse options and refine long-term attenuation storage requirements presented in the concept site-wide surface water drainage strategy, to address any negative downstream flood risk implications on the River East Stour due to potential increased runoff volume discharges, whilst accounting for ground saturation due to multiple and prolonged storm events;
- To prepare an infrastructure delivery plan and a detailed masterplan to ensure that the required SuDS volume and water quality management train are provided ahead of each respective phase, which may comprise a single drainage zone or combination of several hydraulically linked drainage sub-zones;
- To provide other SuDS components (e.g. swales, raingardens, soakaways and permeable paving) in development parcel areas (including associated primary, secondary and tertiary roads as appropriate) outside of the allocated green infrastructure, to manage surface water on a more local level and provide localised source control surface water management and increase long-term attenuation storage accounting for follow on storm events. It is expected that this extra storage will account for at least 10% of the long-term attenuation storage requirement in each drainage zone within development parcels;
- To maximise opportunities for multi-functional and attractive SuDS to increase long-term storage and wider benefits, whilst optimising the extra land take required for SuDS provision
- The approach described in Chapter 6.5.3, which discusses the applicability of suitable SuDS components per land use, should be suitably captured in the Design Code and Strategic Design Principles (ES Appendix 4.3) Document and Tier 2 Design Codes.
- To confirm adoption arrangements and maintenance requirements, including a production of an Operation and Maintenance Manual plus a Maintenance Plan, based on the guidance given in the SuDS Manual. Opportunities to combine landscaping maintenance with SuDS maintenance should be identified to reduce the lifetime costs of the drainage system;
- To ensure the site drainage and earthworks strategy is sufficiently designed and appropriate exceedance flow routes are provided so as not to cause any property flooding and public nuisance in the development during a 1 in 30 annual chance event and 1 in 100 annual chance event, including 40% climate change and 10% urban creep allowances; and
- To manage potential construction impacts such as dealing with additional polluted runoff from bare, compacted or muddy surfaces during construction phases (including from haul roads associated with cut and fill / off site infrastructure works) and inform the site Environmental Management Plan.

Detailed Flood Risk Mitigation

- To prepare detailed designs for the three new bridges over the River East Stour (including the associated minor river diversion and floodplain compensation measures), informing the detailed masterplans for each development phase and ensuring vulnerable buildings are sited in low-risk EA Flood Zone 1 in line with the guidance given in this FRA and SWDS;
- To prepare detailed plans and designs associated with the removal of five existing culverts, restoration of existing watercourse channels, and creation of wetlands/ponds features in the existing racecourse and Westhanger Park area;
- To prioritise the removal of existing culvert and construction of new online pond feature under the racetrack on the Racecourse Drain in Phase 1 Development, which has also shown to surcharge and cause some limited flooding in the proposed town centre area. This work should take place as advance infrastructure proposals for Phase 1 Development in consultation with the LLFA and EA;

- To assess risk of blockage of proposed new large bridges over the River East Stour, including other small bridges on the Racecourse Drain in Phase 1 Development;
- To monitor groundwater level at more vulnerable central and northern parts of the site and undertaking pumping testing to confirm the specific yield value of the underlying aquifer; and
- To undertake further investigation of the Racecourse Lake (i.e., in consultation with an appointed All Panel Reservoir Engineer) to design and construct a new spillway so that the raised volume in the lake is less than 25,000 m^3. The lake should be maintained and used as an asset to enhance amenity functions and supplement the long-term flood storage and water reuse and recirculation purpose with the proposed Development.

APPENDIX A

Site investigation report

OTTERPOOL PARK

Ground Investigation Factual Report

December 2017

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Otterpool Park

Ground Investigation Factual Report

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Report No UA008926-43--AFS-GLR-G001

Date December 2017

Version control

Version	Date	Author	Changes
00	December 2017	Sam Summers	

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1 INTRODUCTION

Shepway District Council propose to develop a new garden town known as Otterpool Park in the county of Kent, to the south east of Ashford. This ground investigation was commissioned by Shepway District Council, 'the Client', to inform on the ground conditions at the site.

The scope of the ground investigation was determined by Arcadis Consulting (UK) Ltd, and the work was instructed on the 3rd July 2017.

This report provides a factual account of the fieldwork undertaken including engineering descriptions of the various strata encountered, results of *in situ* testing and the subsequent geotechnical and geo-environmental laboratory testing undertaken on samples obtained.

1.1 Limitations

This report has been prepared for the Client in accordance with the terms and conditions of appointment. Arcadis cannot accept any responsibility for any use of or reliance on the contents of this report by any third party. The copyright of this document, including the electronic format and any AGS data, shall remain the property of Arcadis.

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It should be noted that ground conditions between exploratory holes may vary from those identified during this ground investigation; any design should take this into consideration. It should also be noted that groundwater levels may be subject to diurnal, seasonal, climatic variations and those recorded in this report are solely dependent on the time the ground investigation was carried out and the weather before and during the investigation.

1.2 Proposed Development

The proposed development comprises a new garden town which will comprise housing, land for employment, shops, schools and medical centres, as well as extensive open spaces and access to the countryside.

1.3 Existing Information

1. Otterpool Park Garden Town, Site Investigation Plan; Arcadis 2017
2. Otterpool Fusion Plan, Service drawings; Centara, 2017
3. Otterpool Park, UXO Desk study and risk assessment; Zetica 2017

2 SITE DETAILS

2.1 Site Location and Description

The site is situated approximately 6 km southeast of Ashford, Kent at approximate grid reference TR 10982 36516. Figure 2-1 shows the site location.

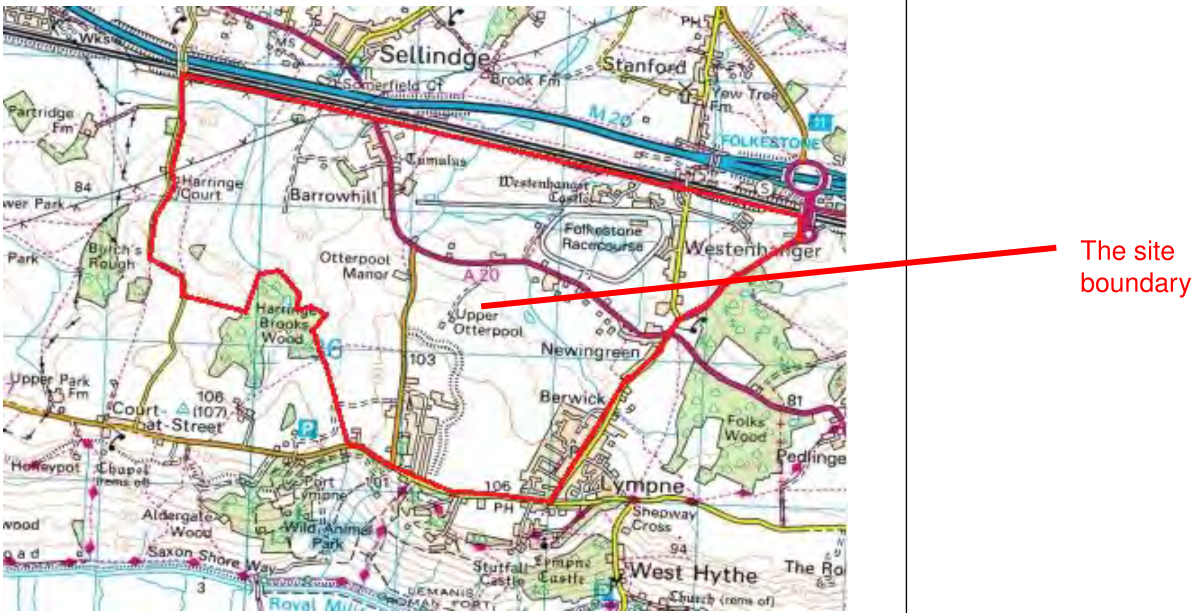


Figure 2-1 Site Location

At the time of the investigation, the site comprised arable and pasture fields, roads and trackways, farms and small clusters of buildings. The old Folkestone Racecourse forms the northeast part of the site. An industrial estate is located in the southern part of the site, and is surrounded by an earth embankment.

The A20 traverses the site in a roughly east to west orientation, and the B2067 traverses the site north to south. There are sporadic ditches and ponds across the site and a dirt-bike track located to the north west of the site.

The M20 and a railway line borders the site to the north, and the site is surrounded by agricultural land in all other directions. Small towns such as Westenhanger, Newingreen and Lympne are located to the east of the site.

Springfiled Wood and Park Wood are located within the site boundary. Rabbit Wood, Harringe Brook Woods and Folks Wood border the site to the west, southwest and east respectively.

The topography of the site slopes downwards towards the north, with an approximate ground elevation of 100 m AOD on the sites southern boundary (B2067) to 65 m AOD on the sites northern boundary (railway line). Barrowhill, which is located in the northwest part of the site, has a ground elevation of 80 m AOD.

With reference to the Environment Agency (EA) ‘What’s in my backyard?’ website [18], there are no active landfills located within 1 km of the site. Two historical landfills were identified to be within 1 km of the site, including one located on site. A summary of the historic landfills is shown in Table 2-1.

Table 2-1 Historical landfills

Landfill Name	Distance from Site	Date of Closure	Waste Description	Waste Control Measures
Lymnpe Industrial park	On-site	Not specified	Inert	Not specified
Quarry Field	430 m southwest	Dec 1962	Inert and Household	Not specified

2.2 Geology

In summary, the published 1:50 000 scale British Geological Survey (BGS) map of the area incorporating the site, Sheet 305 & 306 [1], and the BGS online GeoIndex [17] indicate the site is underlain by superficial deposits of Head (clay and silt) and Alluvium (clay silt, sand and gravel).

The underlying bedrock geology consists of strata from the Folkstone Formation (sandstone), the Sandgate Formation (sandstone, siltstone and mudstone), the Hythe Formation (interbedded sandstone and limestone), the Atherfield Clay Formation (sandy mudstone) and the Weald Clay Formation (mudstone).

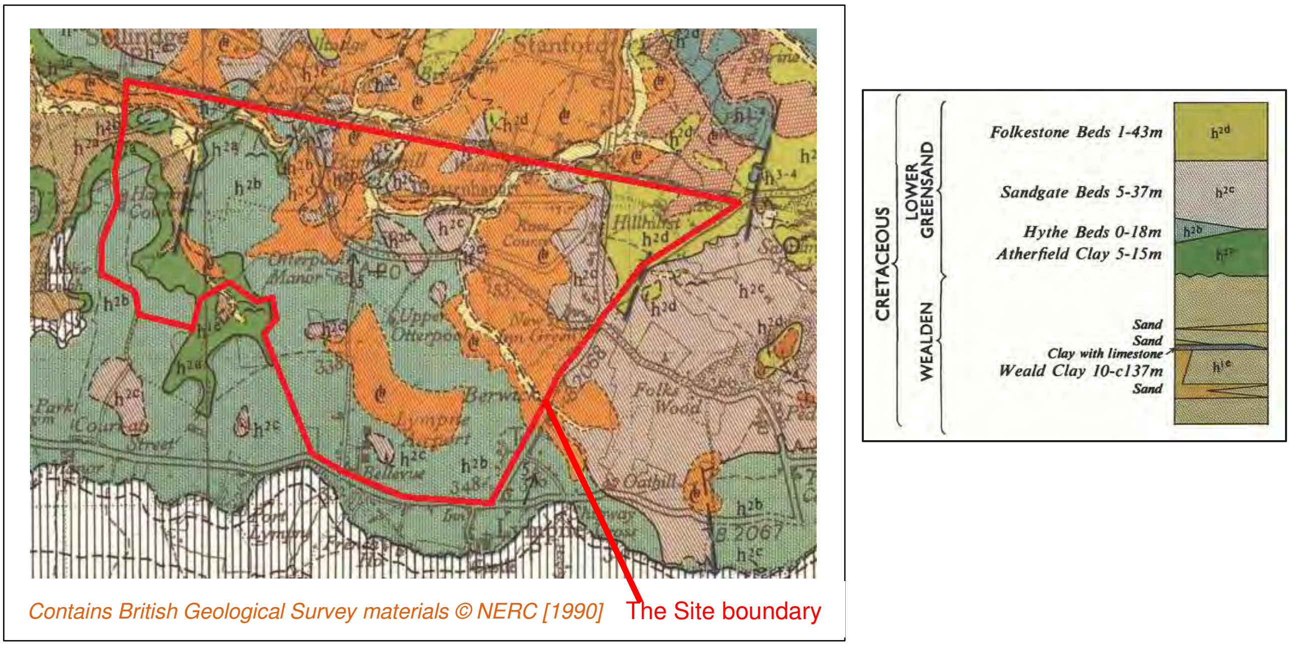
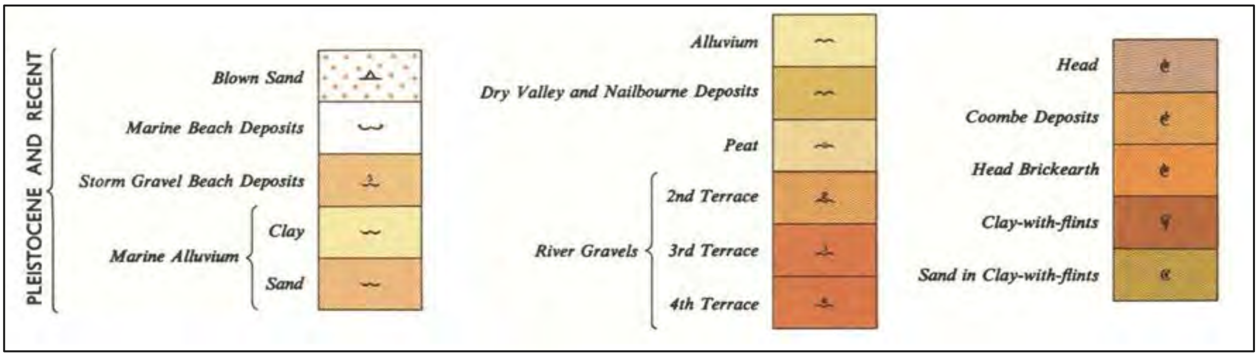


Figure 2-2 Geological Setting



A summary of the anticipated geological sequence is shown in Table 2-2.

Table 2-2 Anticipated geological sequence

Period	Formation	Description
Quaternary	Alluvium	Normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel. A stronger, desiccated surface zone may be present.
	Head	Polymict deposit: comprises gravel, sand and clay depending on upslope source and distance from source. Poorly sorted and poorly stratified deposits formed mostly by solifluction and/or hillwash and soil creep. Essentially comprises sand and gravel, locally with lenses of silt, clay or peat and organic material. In the Bristol area: red or brown silt and stony clay with cobbles of hard rock, eg Carboniferous limestone or sandstone. Argillaceous frost-shattered rock debris either *insitu* or soliflucted. Solifluncted deposits have variable sand/clay content.
Cretaceous	Folkstone Formation	In Sussex, Kent and Surrey the formation comprises medium- and coarse-grained, well-sorted cross-bedded sands and weakly cemented sandstones; elsewhere includes calcareous sandstones. There are no formal divisions in the Weald, but equivalent beds in the west are termed the Child Okeford Sand Member and the Bedchester Sands Member.
	Sandgate Formation	Fine sands, silts and silty clays, commonly glauconitic; some sands limonitic or calcareous; some soft sandstones.
	Hythe Formation	In the western Weald, the formation comprises mainly fine- to medium-grained, sparsely glauconitic sands, sandstones and silts, locally pebbly, with calcareous or siliceous cement in beds or lenses in some areas. Some clay interbeds, including Fuller's Earth. In Kent and eastern Sussex the formation comprises, alternating sandy limestones ("Ragstone") and glauconitic sandy mudstones (Hassock).
	Atherfield Clay Formation	Generally massive yellowish brown to pale grey sandy mudstone throughout most of its outcrop, with an impersistent phosphatic pebble bed with vertebrate bones, gritty sandstone or very shelly sandy mudstone with glauconite, at the base. At the type site on the Isle of Wight, the predominant lithology is blue grey mudstone, variably sandy with calcareous concretions; the formation includes beds of sandstone, clay ironstone and phosphatic nodules. Weathers to a chocolate brown, bluish grey and brown, mottled pinkish brown to orange.
	Weald Clay Formation	Dark grey thinly-bedded mudstones (shales) and mudstones with subordinate siltstones, fine- to medium-grained sandstones, including calcareous sandstone (e.g. Horsham Stone Member), shelly limestones (the so called "Paludina Limestones") and clay ironstones.

Two faults are located on site comprising a north to south trending fault located approximately 800 m east of the site's western boundary. The fault sub-crop is approximately 1 km long and the downthrow is to east. A second north to south trending fault is located on the eastern boundary of the site. The fault sub-crop is approximately 700 m long, and the downthrow is to the west.

In addition to the published data described above, a review of data from BGS online GeoIndex [17] identified four historical boreholes located on site. A summary of the encountered geological sequence in the historical borehole is shown in Table 2-3 and also shown in Appendix C.

Table 2-3 Encountered geological sequence in historical borehole logs

Borehole	Depth (m)	Description
TR13NW83	0.00 – 5.31	Folkstone Beds
TR13NW84	0.00 – 7.39	Hythe Beds
TR13NW31	0.00 – 6.10	Sandgate Beds
	6.10 – 18.00	Hythe Beds
TR13NW44	0.00 – 0.25	Top Soil
	0.25 – 2.15	Medium dense to dense, grey brown, locally glauconitic clayey silty SAND, with occasional flint fragments [HEAD]
	2.15 – 2.70	Medium strong, grey sandstone to borderstone overlying hard RASSTONE beds [HYTHE BEDS]

The Coal Authority website [**Error! Reference source not found.**] indicates no evidence of coal outcrops or mining activities within the immediate vicinity of the site.

2.3 Hydrogeology and Hydrology

The superficial deposits (Alluvium) are classified as a Secondary A aquifer, meaning "*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*".

The superficial deposits (Head) located in the northeast part of the site are classified as a Secondary Undifferentiated aquifer, meaning "this *has been assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type*".

The bedrock deposits (Folkstone Formation and Hythe Formation) are classified as Principal aquifers, meaning "*these are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale*".

The bedrock deposits (Sandgate Formation) are classified as a Secondary A aquifer.

The bedrock deposits (Atherfield Clay Formation and Weald Clay Formation) are classified as Unproductive Strata, meaning "*these are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow*".

The site is not situated in a source protection zone.

The closest surface water feature is the East Stour River, which is located in the northern part of the site and is trending from east to west. A number of small streams and ponds feed into the East Stour River from across the site. A spring is located in the southeast part of the site.

A flood risk zone, level 2 and 3, is located in the northern part of the site. This is associated with East Stour River.

3 FIELDWORK

3.1 General

Ground investigation works were carried out in a single phase between the 14th and 25th of August 2017. Return land gas and groundwater monitoring was conducted over three weekly visits between the 1st and the 15th of September 2017.

The scope of the ground investigation, including the location, scheduled depth and type of exploratory hole undertaken was determined by Arcadis Consulting (UK) Ltd and is summarised in Table 3-1.

The ground investigation methods were undertaken in general accordance with the principles set out in BS EN 1997-2:2005 [7] and with the general practice described in BS5930:2015 [8]. The geo-environmental aspects of the ground investigation complied with the general requirements of BS 10175:2011 [9].

Table 3-1 Initial ground investigation scope

Location ID	Hole Type	Scheduled Depth (m)	Requirements
BH101	RC	10.0	Determine thickness of engineering soils and rock; identify groundwater level; collect representative samples of strata and undertake *in situ* tests
BH101A	OH	10.0	Undertake variable head testing above groundwater level identified in adjacent RC hole
BH102	RC	10.0	Determine thickness of engineering soils and rock; identify groundwater level; collect representative samples of strata and undertake *in situ* tests
BH103	RC	10.0	
BH103A	OH	10.0	Undertake variable head testing above groundwater level identified in adjacent RC hole
BH104	RC	10.0	Determine thickness of engineering soils and rock; identify groundwater level; collect representative samples of strata and undertake *in situ* tests
BH104A	OH	10.0	Undertake variable head testing above groundwater level identified in adjacent RC hole
BH105	RC	10.0	Determine thickness of engineering soils and rock; identify groundwater level; collect representative samples of strata and undertake *in situ* tests
WS101	DS	5.0	Determine thickness of engineering soils; collect representative samples of strata and undertake *in situ* tests
WS102	DS	5.0	
WS103	DS	5.0	
WS104	DS	5.0	
WS105	DS	5.0	

Location ID	Hole Type	Scheduled Depth (m)	Requirements
WS106	DS	5.0	Determine thickness of engineering soils; collect representative samples of strata and undertake *in situ* tests
WS107	DS	5.0	
WS108	DS	5.0	
WS109	DS	5.0	
WS110	DS	5.0	
WS111	DS	5.0	
WS112	DS	5.0	
TP101	TP	2.50	Determine thickness of engineering soils; undertake large scale soakaway testing; collect representative samples of strata and undertake *in situ* tests
TP102	TP	2.50	
TP103	TP	2.50	
TP104	TP	2.50	
TP105	TP	2.50	Determine thickness of engineering soils; collect representative samples of strata and undertake *in situ* tests
TP106	TP	2.50	Determine thickness of engineering soils; undertake large scale soakaway testing; collect representative samples of strata and undertake *in situ* tests
TP107	TP	2.50	
TP108	TP	2.50	
TP109	TP	2.50	
TP110	TP	2.50	
TP111	TP	2.50	Determine thickness of engineering soils; collect representative samples of strata and undertake *in situ* tests
TP112	TP	2.50	Determine thickness of engineering soils; undertake large scale soakaway testing; collect representative samples of strata and undertake *in situ* tests
TP113	TP	2.50	Determine thickness of engineering soils; collect representative samples of strata and undertake *in situ* tests
HD101	HTP	1.20	Determine thickness of engineering soils; collect representative samples of strata and undertake *in situ* tests
HD102	HTP	1.20	
HD103	HTP	1.20	

Notes
TP = trial pitting, HTP = hand excavated trial pit, DS = dynamic sampling, RC = rotary core drilling, OH = open hole drilling

The investigation works were carried out under the supervision of a suitably experienced ground engineer who undertook the logging and reporting of the exploratory holes and *in situ* testing.

3.2 Exploratory Holes

3.2.1 Exploratory Hole Locations

The co-ordinates and elevations of the exploratory hole locations were obtained by the Arcadis supervising engineer using a Trimble VRS NOW GPRS system; with an accuracy of +/-50 mm.

Drawing UA008926-43-GLR-DWG-0001 presented in Appendix A displays the locations of the as-constructed exploratory holes while the co-ordinates and elevation of the ground surface at each exploratory hole are given on the individual logs. The full logs can be seen in Appendix C.

3.2.2 Investigation Methodology

The following methods and techniques were undertaken to construct the exploratory holes. The completed scope of investigation is summarised in Table 3-2 below.

Details of the methods of investigation and associated standards adopted are presented in Appendix B; the exploratory hole records are presented in Appendix C, a key to the notation and symbols used on the logs is presented in Appendix B.

Table 3-2 Summary of completed exploratory holes

Location ID	Hole Type	Start Date	End Date	Final depth (m)	Comment	Termination Reason
BH101	RC	23/08/2017	23/08/2017	10.00	Groundwater not encountered. Installation details: Raised cover with gas bung, GL - 6.00m plain pipe, 6.00 - 10.00m slotted pipe. Backfill details: GL - 0.10m concrete, 0.10 - 5.50m bentonite, 5.50 - 10.00m gravel.	Scheduled depth
BH101A	OH	-	-	-	Abandoned due to groundwater not being encountered in BH101.	n/a
BH102	RC	24/08/2017	24/08/2017	10.00	Groundwater not encountered. Installation details: Flush cover with gas bung, GL - 7.00m plain pipe, 7.00 - 10.00m slotted pipe. Backfill details: GL - 0.10m concrete, 0.10 - 6.50m bentonite, 6.50 - 10.00m gravel.	Scheduled depth
BH103	RC	15/08/2017	17/08/2017	10.00	Groundwater encountered at 1.80m rising to 1.70m after 20 mins. Installation details:	Scheduled depth

Location ID	Hole Type	Start Date	End Date	Final depth (m)	Comment	Termination Reason
					Raised cover with gas bung, GL - 4.00m plain pipe, 4.00 - 10.00m slotted pipe. Backfill details: GL - 0.10m concrete, 0.10 - 3.50m bentonite, 3.50 - 10.00m gravel	
BH103A	OH	-	-	-	Abandoned due to shallow groundwater being encountered in BH103.	n/a
BH104	RC	21/08/2017	21/08/2017	9.95	Groundwater encountered at 4.00m, rising to 3.80m after 20 mins. Installation details: Raised cover with gas bung, GL - 2.00m plain pipe, 2.00 - 9.95m slotted pipe. Backfill details: GL - 0.10m concrete, 0.10 - 1.50m bentonite, 1.50 - 9.95m gravel	Scheduled depth
BH104A	OH	-	-	-	Abandoned due to shallow groundwater being encountered in BH104.	n/a
BH105	RC	22/08/2017	22/08/2017	10.00	Groundwater encountered at 4.20m, rising to 4.00m after 20 mins. Installation details: Flush cover with gas bung, GL - 2.00m plain pipe, 2.00 - 10.00m slotted pipe. Backfill details: GL - 0.10m concrete, 0.10 - 1.50m bentonite, 1.50 - 10.00m gravel	Scheduled depth
WS101	WS	16/08/2017	16/08/2017	3.00	Groundwater not encountered.	Refusal – soils too dense to penetrate
WS102A	WS	17/08/2017	17/08/2017	0.3	Groundwater not encountered.	Rockhead
WS102B	WS	17/08/2017	17/08/2017	0.20	Groundwater not encountered.	Rockhead

Location ID	Hole Type	Start Date	End Date	Final depth (m)	Comment	Termination Reason
WS103	WS	15/08/2017	15/08/2017	5.00	Groundwater seepage encountered at 2.50m.	Scheduled Depth
WS104A	WS	17/08/2017	17/08/2017	0.30	Groundwater encountered at 0.30m, rising to 0.20m after 20 mins.	Refusal – soils too dense to penetrate
WS104B	WS	17/08/2017	17/08/2017	0.15	Groundwater encountered at 0.15m, rising to 0.10m after 20 mins.	Refusal – soils too dense to penetrate
WS104C	WS	17/08/2017	17/08/2017	4.00	Groundwater seepage encountered at 3.90m.	Refusal – soils too dense to penetrate
WS105	WS	14/08/2017	14/08/2017	2.85	Groundwater seepage encountered at 2.40m.	Refusal – soils too stiff to penetrate
WS106	WS	14/08/2017	14/08/2017	3.00	Groundwater seepage encountered at 1.90m.	Rockhead
WS107	WS	15/08/2017	15/08/2017	3.00	Groundwater encountered at 2.80m, rising to 2.00m after 20 mins.	Refusal – soils too dense to penetrate
WS108	WS	15/08/2017	15/08/2017	2.80	Groundwater seepage encountered at 2.40m.	Refusal – soils too stiff to penetrate
WS109	WS	16/08/2017	16/08/2017	3.00	Groundwater seepage encountered at 1.80m. Hole collapsed from 3.00m to 2.00m due to water strike.	Refusal – hole collapse
WS110	WS	16/08/2017	16/08/2017	3.00	Groundwater not encountered.	Refusal – soils too dense to penetrate
WS111	WS	17/08/2017	17/08/2017	0.60	Groundwater not encountered.	Refusal – soils too dense to penetrate
WS112	WS	16/08/2017	16/08/2017	3.50	Groundwater seepage encountered at 2.90m.	Refusal – soils too dense to penetrate

Location ID	Hole Type	Start Date	End Date	Final depth (m)	Comment	Termination Reason
TP101	TP	15/08/2017	15/08/2017	2.00	Large scale soakaway conducted.	Rockhead
TP102	TP	14/08/2017	14/08/2017	2.50	Large scale soakaway conducted.	Scheduled depth
TP103	TP	18/07/2017	18/07/2017	2.50	Large scale soakaway conducted.	Scheduled depth
TP104	TP	16/07/2017	16/07/2017	2.80	Large scale soakaway conducted.	Scheduled depth
TP105	TP	21/08/2017	21/08/2017	2.50	Large scale soakaway abandoned due to stability issues.	Scheduled depth
TP106	TP	22/08/2017	22/08/2017	2.50	Large scale soakaway conducted.	Scheduled depth
TP107	TP	15/08/2017	15/08/2017	2.70	Large scale soakaway conducted.	Scheduled depth
TP108	TP	17/08/2017	17/08/2017	2.00	Large scale soakaway conducted.	Rockhead
TP109	TP	21/08/2017	21/08/2017	2.30	Large scale soakaway conducted.	Scheduled depth
TP110	TP	22/08/2017	22/08/2017	2.50	Large scale soakaway conducted.	Scheduled depth
TP111	TP	15/08/2017	15/08/2017	2.10	Large scale soakaway abandoned due to land owner issue.	Rockhead
TP111A	TP	22/08/2017	22/08/2017	0.40	Large scale soakaway abandoned due to shallow refusal.	Rockhead
TP112	TP	16/08/2017	16/08/2017	1.60	Large scale soakaway conducted.	Rockhead
TP113	TP	17/08/2017	17/08/2017	3.10	Large scale soakaway abandoned due to made ground.	Obstruction
HD101	HTP	21/08/2017	21/08/2017	1.20	No visual or olfactory evidence of contamination.	Scheduled depth
HD102	HTP	21/08/2017	21/08/2017	1.20	No visual or olfactory evidence of contamination.	Scheduled depth
HD103	HTP	21/08/2017	21/08/2017	1.20	No visual or olfactory evidence of contamination.	Scheduled depth

Notes
TP = trial pitting, HTP = hand excavated trial pit, DS = dynamic sampling, RC = rotary core drilling

3.2.3 Dynamic Sampling

Dynamic sampling was completed using a track-mounted sampling rig capable of driving windowless sampling tubes using a hydraulic hammer drive head to advance window sample tubes into the ground.

The time to drive the sampling tubes was recorded together with a description of the recovered materials by the supervising engineer or the lead driller.

Photographs of the materials recovered are presented with the appropriate hole log. To enable a representative photographic record, the samples were split prior to the photograph and subsequently destructively logged.

Due to the method of investigation, the materials recovered within the sampler apparatus were generally disturbed and were assessed as complying with Class 3 to Class 5 of BS EN 22475-2. Sub-samples of the material recovered in the liners were taken to enable representative laboratory testing. Generally small disturbed samples were taken at each change in stratum and at depths deemed appropriate by the supervising engineer.

Standard penetration tests (SPT) were undertaken using the track mounted rig at 1.0 m centres, and 1.5 m centres below 5.0m until the termination depth of the hole. Cone penetration tests (CPT) were undertaken where SPTs were deemed inappropriate.

3.2.4 Rotary Drilling

Rotary core drilling was undertaken using a track mounted multi-utility drilling rig. The drilling used standard PWF double-tube core barrels with a T6-116 type of bit and casing to produce core of 116 mm diameter. The boreholes were advanced using a compressed air flush.

Where the specified core recovery was not achieved, the length of core run was reduced on subsequent core runs until recovery improved.

Recovered cores were retained in appropriately sized semi-rigid plastic liner and placed in wooden core boxes for transport and logging. Photographs of each core box showing the recovered cores are presented with the appropriate rotary borehole log.

Sub-samples of core were removed from the core runs at intervals specified by Arcadis Consulting (UK) Ltd for subsequent laboratory testing, the location of the sub samples was indicated by placing wood sections to represent the core removed.

3.2.5 Trial Pitting/Trial Trenches

Trial pits (TP) were undertaken using a mechanical excavator. Hand excavated pits (HTP) were conducted with hand tools.

For the machine excavated pits, a JCB 3CX backhoe wheeled excavator was used and pits were entirely logged from the surface and arisings.

Samples of the material recovered in the trial pits were taken to enable representative laboratory testing. Generally small disturbed samples were taken at each change in stratum and at 0.5 m intervals thereafter in clay soils; and bulk samples were taken at 1 m intervals where the sand and gravel content of the soil was assessed as significant.

Photographic records of the trial pit elevation and arisings were taken and are presented with the associated trial pit log.

3.3 *In situ* Testing

3.3.1 Penetration Testing

3.3.1.1 Standard Penetration Tests

Standard penetration tests (SPT) were carried out as required in the investigation scope and in accordance with the methods given in the standard procedures presented within Appendix B. Generally, tests were undertaken at regular intervals throughout the borehole to provide a profile of the soil's resistance with depth and a disturbed soil samples was recovered from the SPT split-spoon tool or a disturbed sample was taken over the range of the test interval.

A summary of the SPT equipment used at each location is presented in Table 3-3.

Table 3-3 Test Hammer Calibrations

Location ID	SPT Hammer Reference No.	Energy Efficiency Ratio, E_r %	Comment
BH101-105	AR1704	68	
WS101-113	DT15183 17	55	

3.3.2 Hydraulic Tests

3.3.2.1 Water Permeability Tests in Open Systems

Permeability tests were carried out in those borehole installations listed in Table 3-4. The tests were carried out in general accordance with the requirements and methods given in BS EN ISO 22282-1:2012 [10] and BS EN ISO 22282-2:2012 [11]. Data sheets presenting the test information are presented with the corresponding exploratory hole record within Appendix C. The tests adopted either the Falling Head (FH) or Rising Head (RH) configuration as noted below.

Table 3-4 Summary of open system variable head permeability tests

Location ID	Test Type	Test Section top (m)	Test Section base (m)	Permeability k (ms^{-1})	Comment/limitations
BH101	FH	6.00	10.00	n/a	Test abandoned due to inability to produce head of water
BH103	FH	4.00	10.00	1.22×10^{-5} 4.57×10^{-6}	Tests carried out in temporary standpipe

				5.35×10^{-6}	
BH104	FH	2.00	9.95	1.01×10^{-6}	Tests carried out in temporary standpipe
				4.77×10^{-7}	
BH 105	FH	2.00	10.00	2.24×10^{-7}	Tests carried out in temporary standpipe
				1.28×10^{-7}	
WS112	FH	1.00	3.50	2.49×10^{-8}	Test carried out in temporary standpipe

3.3.2.2 Soakaway Tests

The soil infiltration rate was determined by conducting a soakaway tests in accordance with the methodology described in BRE 365 [4]. The tests were conducted in trial pits dug to the anticipated soakaway depth. Summary information of the tests is presented Table 3-5 while detailed test sheets are presented with the relevant trial pit log in Appendix C.

Table 3-5 Summary of trial pit soakage tests

Location ID	Depth of pit (m)	Time to empty (minutes)	Soil Infiltration Rate *f* (ms^{-1})	Comment/limitations
TP101	2.0	50	1.44×10^{-4}	Test pit filled only once due to time constraints
TP102	2.5	>240	n/a	Cannot be calculated due to lack of soakage
TP103	2.50	>120	n/a	Cannot be calculated due to lack of soakage
TP104	2.80	>240	n/a	Cannot be calculated due to lack of soakage

TP106	2.50	>240	n/a	Cannot be calculated due to lack of soakage
TP107	2.70	>240	n/a	Cannot be calculated due to lack of soakage
TP108	2.0	>240	8.69×10^{-6}	25% not attained, results are extrapolated
TP109	2.50	>240	n/a	Cannot be calculated due to lack of soakage
TP110	2.50	>240	4.15×10^{-6}	25% not attained, results are extrapolated
TP112	1.60	60	4.90×10^{-5}	Test pit filled only twice due to time constraints
	1.50	120	3.58×10^{-5}	

3.3.3 VOC Head Space Screening

The presence of Volatile Organic Compounds (VOC) within the ground was determined using a photoionization detector (PID) to detect the 'headspace' vapours emitted by the compounds. The method is applicable to a wide range of compounds that have sufficiently high volatility to be effected liberated from the soil or water matrix in normal temperature and pressure ranges.

The headspace test was undertaken on the freshly extracted soil core sample at regular intervals of 1.0 m by placing a small amount of material into a screw-top glass jar so that the jar was not more than half-full. The jar opening was covered with an aluminium foil sheet and the lid screwed on to form an air-tight seal. The sample and jar were then shaken for about 15 seconds to break-up and disperse the soil before resting the sample for about 5 minutes.

To assess the headspace vapour, the jar lid was removed and the PID inlet tube was inserted through the foil into the headspace area. The PID reading recorded was the highest response observed in the first 10 seconds. The screening results are presented on the relevant exploratory holes logs within Appendix C.

The testing was undertaken using a MiniRAE 2000 PID with a 10.6 eV lamp, which was calibrated regularly throughout the day.

3.4 Installations and Post-Fieldwork Monitoring

3.4.1 Installations

Installations to enable long term land gas and / or groundwater monitoring of the site were constructed in those boreholes selected by Arcadis Consulting (UK) Ltd and the details are summarised in Table 3-6 and are also provided on the relevant borehole logs.

Table 3-6 Summary exploratory hole installations

Location ID	Installation Type	Response Zone Top m bgl	Response Zone Base m bgl	Comment/limitations
BH101	SP50	6.00	10.00	Raised cover with gas bung, GL - 6.00m plain pipe, 6.00 - 10.00m slotted pipe.
BH102	SP50	7.00	10.00	Flush cover with gas bung, GL - 7.00m plain pipe, 7.00 - 10.00m slotted pipe.
BH103	SP50	4.00	10.00	Raised cover with gas bung, GL - 4.00m plain pipe, 4.00 - 10.00m slotted pipe.
BH104	SP50	2.00	9.95	Raised cover with gas bung, GL - 2.00m plain pipe, 2.00 - 9.95m slotted pipe.
BH105	SP50	2.00	10.00	Flush cover with gas bung, GL - 2.00m plain pipe, 2.00 - 10.00m slotted pipe.

Notes: SP50 = 50 mm ID standpipe

3.4.2 Post-fieldwork Monitoring

Post-field work monitoring was undertaken on separate visits on the 31st of August, 8th of September and 15th of September 2017. In all, three weekly visits to the site were made to record land gas emissions and groundwater levels.

During the first monitoring visit (31/08), after completion of the land gas emission monitoring, all wells were purged by removing three well volumes of groundwater and *in situ* groundwater monitoring and sampling was undertaken.

Where installations were purged dry, monitoring and sampling was conducted on groundwater recovered following recharging of groundwater in installations. Parameters measured during *in situ* monitoring were pH, dissolved oxygen, conductivity and redox potential.

On the second visit (07/09), after completion of the land gas emission monitoring, rising and falling head testing was conducted within the standpipes.

The results of the land gas/ groundwater monitoring and variable head testing are presented within Appendix E.

4 LABORATORY TESTING

4.1 General

Geotechnical and geo-environmental chemical testing was undertaken on selected samples obtained from the exploratory holes. The testing was scheduled by the geotechnical and/or geo-environmental engineer and the testing was undertaken by an Arcadis approved testing laboratory.

4.2 Geotechnical Laboratory Testing

The geotechnical tests detailed in Table 4-1 were carried out in accordance with either BS1377:1990: Parts 1 to 8 [14]; BRE SD 1:2005 [5]; or other methods as listed in Table 4-1. The complete results of the geotechnical laboratory testing are presented in Appendix F.

Table 4-1 Summary of geotechnical test data

Test	Method	No of Determinations
Moisture content	BS1377 Pt2-3.2	32
4-point liquid and plastic limit	BS 1377 Pt2-4.3 & 5.3	17
Particle Size Distribution - Wet sieving	BS1377 Pt2-9.2	16
Particle Size Distribution - Sedimentation	BS1377 Pt2-9.4	6
Dry Den/MC (2.5kg Rammer Method 1 Litre Mould)	BS1377 Pt4-3.3	6
pH, water soluble sulphate; total sulphate, total sulphur, chloride, nitrate, magnesium	BS1377 Pt3 & BRE CP2/79	12

4.3 Geo-Environmental Laboratory Testing

Geo-environmental tests were undertaken on soil, groundwater and prepared leachate specimens obtained from the samples collected from the site. Testing was carried out for the contaminants detailed in
Table 4-2, Table 4-3 and **Error! Reference source not found.**.

The results of the chemical laboratory testing are presented in Appendix G. Details of the test methodology is presented with the test results.

Table 4-2 Summary of geo-environmental test data – soil matrix

Test type	Method	No of Determinations
Metals (As, B, Cr, Cd, Cu, Pb, Hg, Ni, Se, Zn),, pH, Cyanide Free & Total	Induced Coupled Plasma Optical Emission Spectroscopy (ICP-OES)	34
Speciated Polycyclic Aromatic Hydrocarbon compounds (PAH)	Gas Chromatography –Mass Spectrometry (GC-MS)	34
Total Petroleum Hydrocarbon Criteria Working Croup (TPH CWG)	Gas Chromatography – Flame Ionisation Detector (GC-FID)	16
VOCs & SVOCs		1
Fractional Organic Carbon		34
Phenol (total), Cresol, Chlorinated Phenols		34

Table 4-3 Summary of geo-environmental test data – groundwater matirx

Test type	Method	No of Determinations
Metals (As, B, Cr, Cd, Cu, Pb, Hg, Ni, Se, Zn), pH, Speciated PAH, Cyanide Free & Total	Induced Coupled Plasma Optical Emission Spectroscopy (ICP-OES)	7
PAHs	Gas Chromatography –Mass Spectrometry (GC-MS)	7
TPH CWG	Gas Chromatography – Flame Ionisation Detector (GC-FID)	7

5 REFERENCES

General References

1. British Geological Survey. 1990. Folkstone & Dover. England and Wales Sheet 305 & 306. Bedrock and Drift Deposits. 1:50 000. BGS Keyworth, Nottingham.
2. TRL. 2004. Dynamic cone penetrometer tests and analysis. TRL Technical Report PR IN 277-04. Transport Research Laboratory, Crowthorne, England.
3. Jones C R and Rolt J. 1991. Operating instructions for the TRL dynamic cone penetrometer. 2nd Edition Information Note. Transport Research Laboratory, Crowthorne.
4. Building Research Establishment. 2016. Soakaway Design. BRE Digest DG365. BRE, Watford.
5. Building Research Establishment. 2005. Concrete in aggressive ground. BRE Special Digest 1. 3rd Edition. BRE, Watford.

National Standards

6. BS EN 1997-1. 2004. Eurocode 7: Geotechnical Design. Part 1 General Rules. British Standards Institution, 2013 (revised text).
7. BS EN 1997-2. 2007. Eurocode 7: Geotechnical Design. Part 2 Ground Investigation and testing. British Standards Institution, 2010 (revised text).
8. BS 5930. 2015. Code of practice for ground investigations. British Standards Institution.
9. BS 10175. 2011. Investigation of potentially contaminated sites – Code of practice. British Standards Institution.
10. BS EN ISO 22282-1:2012. Geotechnical investigation and testing – Geohydraulic testing. Part 1: General Rules. British Standards Institution.
11. BS EN ISO 22282-2:2012. Geotechnical investigation and testing – Geohydraulic testing. Part 2: Water permeability tests in a borehole using open systems. British Standards Institution.
12. BS EN ISO 22282-5:2012. Geotechnical investigation and testing – Geohydraulic testing. Part 5: Infiltrometer tests. British Standards Institution.
13. BS EN ISO 22282-6:2012. Geotechnical investigation and testing – Geohydraulic testing. Part 6: Water permeability tests in a borehole using closed systems. British Standards Institution.
14. BS 1377. 1990. Method of test for soils for civil engineering purposes. Published in 9 Parts. British Standards Institution,
15. BS EN ISO 17892-1: Geotechnical investigation and testing – Laboratory testing of soil – Determination of water content. British Standards Institution.
16. BS EN ISO 17892-2: Geotechnical investigation and testing – Laboratory testing of soil – Determination of bulk density. British Standards Institution.

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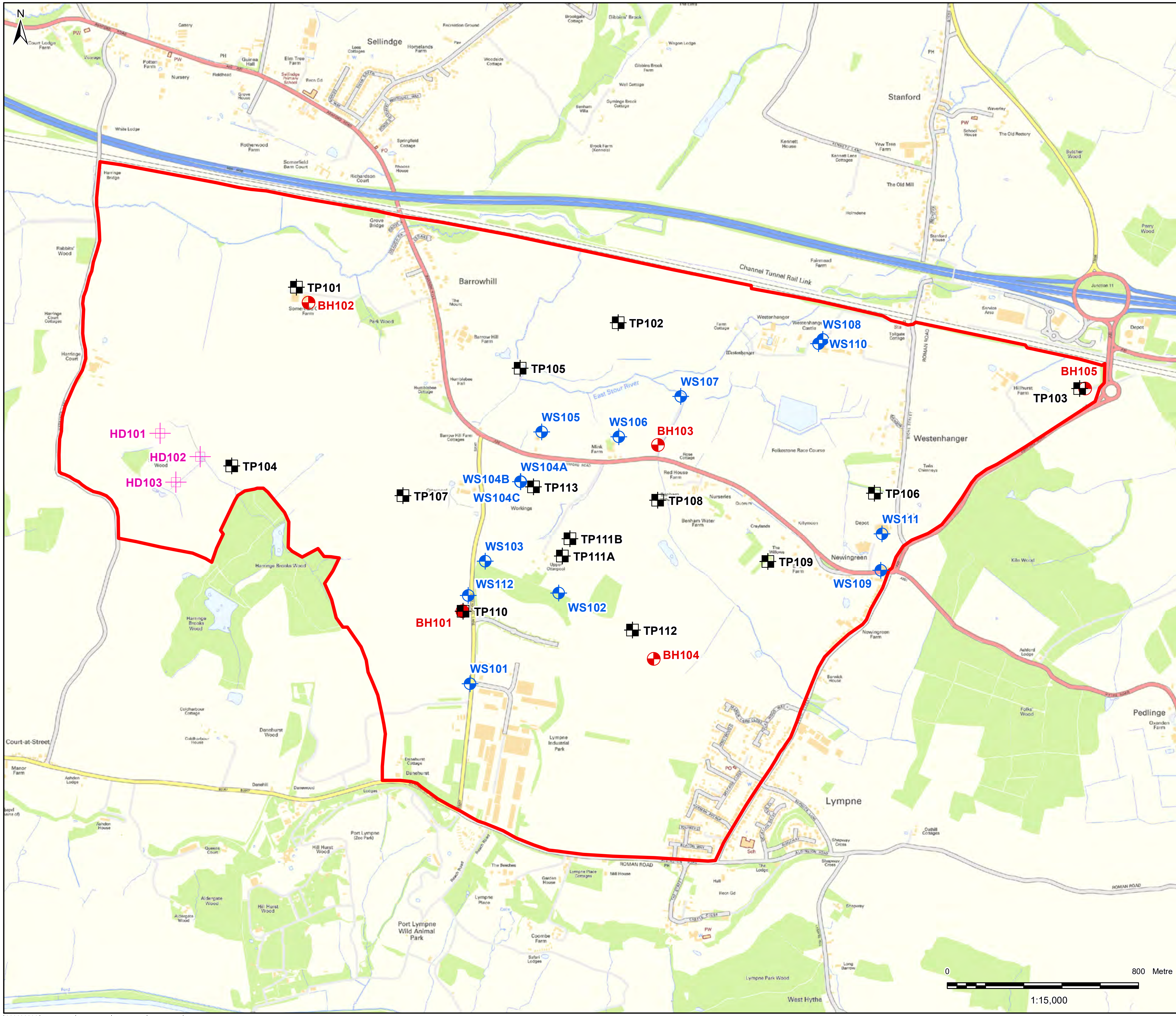
APPENDIX A

DRAWINGS

Drawing 5005-UA008926-UP31-S2-03-Ground Investigation Layout Plan



LEGEND

- Site Boundary
- Rotary Boreholes
- Hand Dug Pits
- Trial Pit Locations
- Window Sample Locations

Rev	Date	Description	Drawn	Check	Approv
3	30/11/17	ISSUE 3	GS	JR	JV
2	27/09/17	ISSUE 2	DS	JR	AP
1	25/09/17	ISSUE 1	SS	JR	AP

Client Folkestone Hythe & Romney Marsh Shepway District Council www.shepway.gov.uk

PROJECT:

OTTERPOOL PARK

Address

Folkestone, Kent, UK

ARCADIS Design & Consultancy for natural and built assets

Registered office: Arcadis House 34 York Way London N1 9AB

Coordinating office: 10 Medawar Road Surrey Research Park Guildford GU2 7AR

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TITLE:

GROUND INVESTIGATION LAYOUT PLAN

Designed	J.RAVEN	Date 30-11-17	Signed	
Drawn	D.SAWICKA	Date 30-11-17	Signed	
Checked	J.RAVEN	Date 30-11-17	Signed	
Approved	J.VENN	Date 30-11-17	Signed	
Scale:	1:15,000	Datum:	AOD	
Original Size:	A3	Grid:	OS	
Suitability Code:	S2	Project Number:	UA008926	

Suitability Description: Issued for Information

Drawing Number: 5005-UA008926-UP31-S2

Revision: 03

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APPENDIX B

STANDARD PROCEDURES

B0 General Principles

This ground investigation was undertaken in general accordance with the principles of BS EN 1997-1 [1] and BS EN 1997-2 [2] and the advice given in BS5930:2015 [8], which, provides complimentary guidance on the application of the primary standards. Where the requirements of the ground investigation specification differ from these primary standards, the investigation methodology was adapted as required and specific notes regarding methods and techniques employed were made in the appropriate report sections.

B1 Buried Services

Service clearance was undertaken in accordance with Arcadis' common operating practice COP SA1. This document details the methods and safe working practices used to undertake excavations safely. Prior to breaking ground, services plans were consulted, and the area scanned using a Cable Avoidance Tool (CAT) with detected signals marked on the ground. For all investigation positions, other than for machine excavated trial pits, hand excavated inspection pits are completed to 1.20 m bgl prior to the use of drilling and boring plant.

B2 Sampling requirements

The selection of sample types and sampling techniques has been chosen to take account of the soil fabric, size and quality of sample required based on whether the soils mass properties or the intact material properties of the ground are to be determined in subsequent laboratory tests. BS EN ISO 22475-1 [4] describes three generic sample groups that are:

a. Sampling by drilling. Generally a disturbed sample recovered from the drilling tool or digging equipment, typically meeting Class 3 to Class 5 requirements, with the recovered material being stored in bulk bags or sealed jar or tub containers.
b. Sampling by sampler. Typically referred to as open tube or drive sampling in which a tube with a sharp cutting edge is driven into the ground either by static thrust or dynamically driven to give a relatively undisturbed sample of Class 1 or Class 2 but may result in a Class 3 sample.
c. Block sampling. Cylindrical large diameter samples or cuboid hand-cut samples usually relatively undisturbed Class 1 and Class 2.

The open-tube sampling equipment used on the site was of a type and design that conformed to BS EN ISO 22475-1. For the purpose of this ground investigation block sampling was not required.

Generally samples were assessed on site and any unexpected deterioration in sample quality was reported to the ground engineer by the lead drilling technician.

Sufficient and representative samples were taken to allow the geo-mechanical properties of the ground to be adequately characterised and to enable the sequence of soil strata to be described by an engineering geologist or geotechnical engineer.

Where samples have been taken for chemical tests the drilling method attempted to adopt dry drilling over the sampling range that generally was achieved by the use of drill casing to separate and isolate the upper soil layers and exclude groundwater. Cross-contamination was further reduced by regular cleaning of sampling tools. Sample integrity was maintained by sealing samples immediately on collection and storing the samples in a temperature controlled cool box. Samples were despatched from the site at the end of the shift on which they were collected or as required in the project specification. Details of best practice storage, preservation and decontamination measures undertaken are given below:

Task	Soil	Groundwater	Ground Gas
Storage	Glass jars and vials supplied by the laboratory were used for the collection of soil samples to be analysed for volatile compounds. Plastic one-litre tubs were used to collect soil samples for metals analysis.	Glass vials supplied by the laboratory were used for the collection of samples to be analysed for volatile compounds. Samples to be analysed for lower volatility compounds were stored in laboratory prepared glass bottles.	1.4L Canisters supplied by the laboratory.
Preservation	Filling of sample containers as far as practicable to minimise headspace and low storage temperature to minimise the potential for volatilisation and biodegradation of petroleum hydrocarbon compounds prior to analysis.		Not required.
Decontamination	Disposable gloves were worn and changed between sample collection to prevent cross-contamination.	Groundwater samples were collected using dedicated disposable tubing / bailers, that were changed between monitoring well locations in order to prevent cross-contamination.	Disposable gloves were worn and changed between sample collection to prevent cross contamination.
Transport	Samples stored in dedicated sample boxes provided by the laboratory. Sample details and analytical requests were recorded on the laboratory chain of custody form included with samples, prior to dispatching to laboratory for analysis. Samples were dispatched to the laboratory on the day of sampling.		

B3 Sample description

Sample description was undertaken by the Arcadis site geologist in accordance with BS 5930: 2015. The descriptions of the individual samples were used to identify the sequence of strata at the exploratory hole location and from which representative exploratory hole logs were drawn.

B4 *In situ* testing

In situ geotechnical tests were undertaken taking account of the investigation scope and requirement to attain the appropriate parameters required in the geotechnical design. The tests were undertaken in accordance with the requirements of the relevant parts of BS EN ISO 22476 [5, 6, 7] and other methods as follows:

Standard penetration testing

Standard penetration tests were carried out in accordance with BS EN ISO 22476-3, BS EN 1997-2 and the national Annex to BS EN 1997-2. The test records are presented on the borehole logs as blow counts for each increment with the N-value as the total number of blows of the four main test increments.

Where the N-value exceeds a total of 50 blows, the test reports the penetration in millimetres for the last test increment recorded, and the N value is indicated as greater than 50,

e.g. 4,5/12,14,18, 6 for 10 mm

indicates that the seating blows (4 and 5) were completed and that the test terminated in the 4th increment after penetrating 10 mm.

Where the seating blows exceeded 25 blows for less than 150 mm; the test was stopped and the rods remarked after which, the main drive was continued. The test is then reported as the number of blows in each seating drive for the recorded penetration with the results of the main drive given as above,

e.g. 14/11 for 45 mm/12,14,16, 8 for 10 mm.

In certain circumstances where groundwater in-flow may affect the test, particularly in fine sand or silt, low SPT blow counts may be recorded. Where the SPT blow count was very low, N values of 5 or less, the test was, at the discretion of the site engineer, continued for a further 300 mm, recording blows for each 75 mm increment. **This is not** a standard penetration test value, it does however give an indication of potential disturbance to the ground.

B5 Data transfer format

The data collated during the ground investigation has been organised and managed using the "AGS data format" that allows data transfer between different disciplines and organisations in accordance with BS 8574 [9].

B6 References

1. BS EN 1997-1. 2004. Eurocode 7: Geotechnical Design. Part 1 General Rules. British Standards Institution, 2013 (revised text).
2. BS EN 1997-2. 2007. Eurocode 7: Geotechnical Design. Part 2 Ground Investigation and testing. British Standards Institution, 2010 (revised text).
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5. BS EN ISO 22476-1:2015. Geotechnical investigation and testing – Field testing – Part 1: Electrical cone and piezocone test. British Standards Institution
6. BS EN ISO 22476-2. Geotechnical investigation and testing – Field testing – Part 2: Dynamic Probing. British Standards Institution
7. BS EN ISO 22476-3 2005. Geotechnical investigation and testing – Field testing – Part 3: Standard penetration test. British Standards Institution
8. BS 5930: 2015. Code of practice for ground investigation. British Standards Institution.
9. BS 8574. Code of practice for the management of geotechnical data for ground engineering projects.
10. BS 1377-9. 1990. Methods of test for soils for civil engineering purposes. Part 9: In-situ tests. British Standards Institution.
11. TRL. 2004. Dynamic cone penetrometer tests and analysis. TRL Technical Report PR IN 277-04. Transport Research Laboratory, Crowthorne, England.

B7 Exploratory Hole Key

Key to Exploratory Hole Symbols and Abbreviations

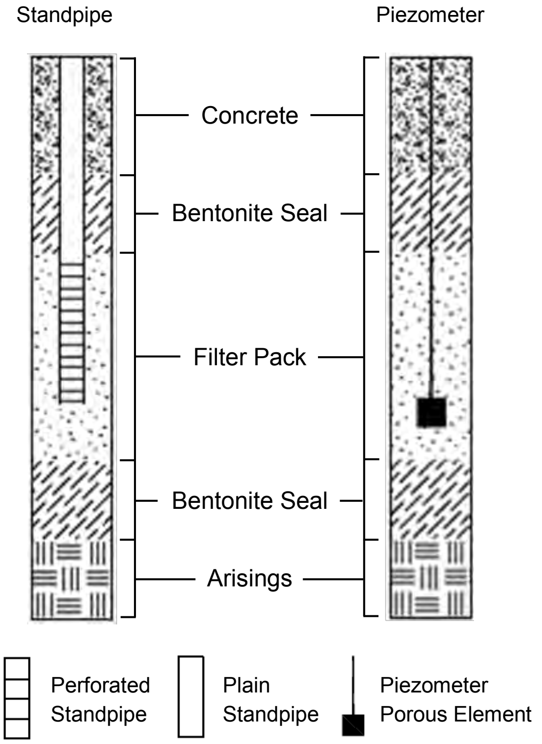
SAMPLE TYPES

B	Bulk disturbed sample	ES	Environmental soil sample	U	Undisturbed sample
C	Core sample	EW	Environmental water sample	UT	Undisturbed thin wall sample
CBR-D	Disturbed sample from CBR test area	G	Gas sample	W	Water sample
CBR-U	Undisturbed sample from CBR test area	L	Liner sample		
D	Small disturbed sample	SPT	SPT split spoon sample		

IN-SITU TESTING

SPTs	Standard Penetration Test (using a split spoon sampler)
SPTc	Standard Penetration Test (using a solid 60 degree cone)
N	Recorded SPT ‘N’ Value *
-/-	Blows/Penetration (mm) after seating blows totalling 150 mm
MX	Mexi Probe Test (records CBR as %)
HV	Hand Shear Vane Test (undrained shear strength quoted in kPa)
PP	Pocket Penetrometer Test (kg/m^3)
( )	Denotes residual test value
PID	Photo Ionisation Detector (ppm) *
Kf/Kr	Permeability Test (f = falling head, r = rising head quoted in ms^{-1})
HPD	High Pressure Dilatometer Test (pressure meter)
PKR	Packer / Lugeon Permeability Test
CBR	California Bearing Ratio Test

INSTALLATION & BACKFILL DETAILS



ROTARY CORE DETAILS

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation (% of intact core >100 mm)
FI	Fracture Spacing (average fracture spacing; in mm, over indicated length of core) * *
NI	Non-Intact Core
AZCL	Assumed Zone of Core Loss

GROUNDWATER

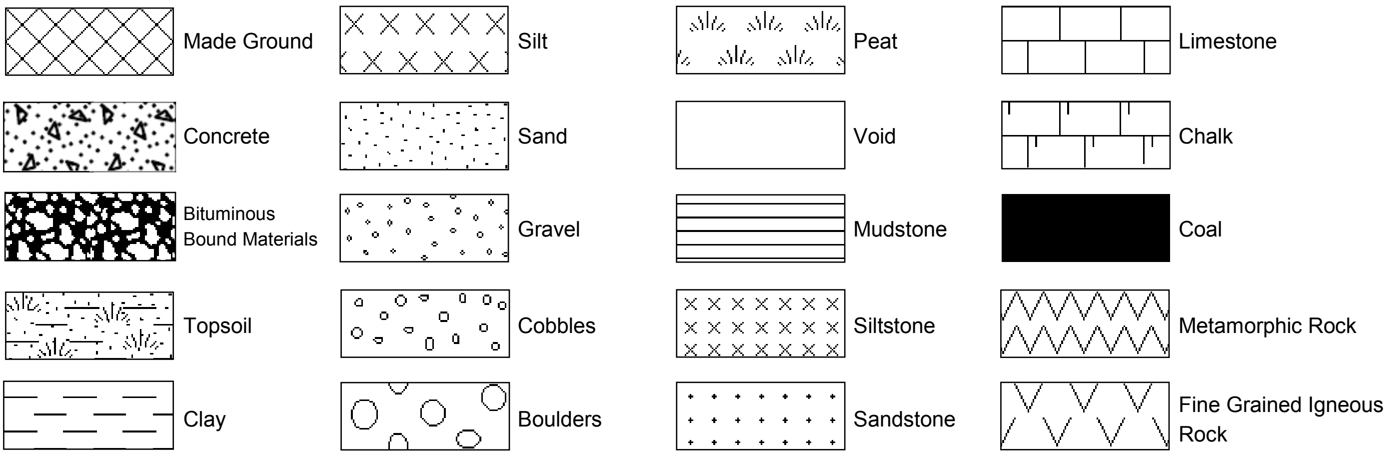
Groundwater strike

Standing water level after 20 minutes; 1st, 2nd etc (number denotes level order)

STRATUM BOUNDARIES

Unit boundary

STRATA LEGENDS - Note: Composite strata types are shown by combining symbols



* Where a single value is quoted this is the uncorrected ‘N’ value for a full 300 mm test drive following a seating drive of 150mm. Where the full test drive penetration is not achieved the number of blows is quoted for the penetration below the test total of 300mm, e.g.: 50/75.

* * The minimum, average and maximum are shown e.g. 5/45/125.

APPENDIX C

EXPLORATORY HOLE LOGS

ARCADIS Rotary Borehole Log

BH101

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**101.23**	**23/08/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**610950.08**	**136019.06**	**23/08/2017**	**Sheet 1 of 1**

SAMPLES Depth	Type/No.	TESTS Type/No.	Results	TCR% SCR% RQD%	FI (min ave max)	Flush Rtn%	Water Strikes	PROGRESS Date Time	Casing Water	STRATA Description	Legend	Depth (Thickness)	Level	Install/Backfill
										TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.		0.10	101.13	
0.30	ES1									Firm brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular, fine to coarse quartz. [HEAD DEPOSITS]		(1.50)		
0.50	ES2													
0.50 - 0.75	B3													
0.75 - 1.00	B4													
1.00	ES5													
		SPT(S)	N=11 (1,1/2,3,3,3)											
										Medium dense brownish green clayey fine to coarse SAND. Locally trending to very sandy CLAY. [HEAD DEPOSITS]		1.60	99.63	
2.00	D7	SPT(S)	N=29 (2,2/4,6,8,11)											
2.00	ES6											(2.40)		
3.00	D9	SPT(S)	N=25 (2,2/6,4,7,8)											
3.00	ES8													
										Loose to medium dense yellow and brown slightly silty slightly gravelly fine to coarse SAND. Gravel is angular to subangular, fine to coarse quartz and sandstone. Residual soil. [SANDGATE FORMATION]		4.00	97.23	
4.50	D11	SPT(S)	N=5 (1,2/1,1,2,1)											
4.50	ES10											(2.00)		
		SPT(S)	N=11 (2,1/2,2,3,4)											
				70 48 33						Medium strong to strong slightly to moderately weathered fractured grey micritic LIMESTONE. Fractures are very closely to closely spaced (30 - 100mm), and appear in two sets; subhorizontal open rough and stepped, and subvertical open rough and stepped to undulating. [HYTHE FORMATION]		6.00	95.23	
										Low recovery below 7.00m due to high intensity of perpendicular fractures.				
				56 13 0	30 65 100							(4.00)		
				0 0 0								10.00	91.23	

DRILLING TECHNIQUE Depth Top	Depth Base	Type	FLUSH DETAILS From	To	Rtn %	Flush Type	WATER OBSERVATIONS Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	HOLE/CASING DIAMETER Hole Dia.	Depth	Casing Dia.	Depth	WATER ADDED From	To	Volume (ltr)
0.00	1.20	Inspection Pit	1.20	10.00		Air Mist							139	5.50					
1.20	10.00	Rotary Core											116	10.00					

Remarks

1. Groundwater not encountered. 2. Installation details; Raised cover with gas bung, GL - 6.00m plain pipe, 6.00 - 10.00m slotted pipe. 3. Backfill details; GL - 0.10m concrete, 0.10 - 5.50m bentonite, 5.50 - 10.00m gravel. 4. Terminated at scheduled depth.

Termination Depth: 10.00m

AGS Arcadis Cymru House St Mellons Business Park Cardiff CF3 0EY

Unless otherwise stated: Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mAOD).

Equipment Used	Contractor	Logged By	Checked By
Commachio 305	**Arcadis Consulting (UK) Ltd**	**SAS**	**IP**

Rotary Borehole Log — BH102

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**73.39**	**24/08/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**610306.52**	**137311.61**	**24/08/2017**	**Sheet 1 of 1**

SAMPLES Depth	Type/No.	TESTS Type/No.	Results	TCR% SCR% RQD%	FI (min ave max)	Flush Rtn%	Water Strikes	Date Time	Casing Water	STRATA Description	Depth (Thickness)	Level
0.30	ES1									TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.	(0.20) 0.20	73.19
0.50	ES2									Firm brown sandy CLAY. Sand is fine to medium. [HEAD DEPOSITS] Slightly gravelly below 0.50m.		
0.50 - 0.75	B3											
0.75 - 1.00	B4											
1.00	ES5											
1.20 - 2.00	B6	SPT(S)	N=7 (2,1/2,2,1,2)								(1.80)	
2.00	ES7	SPT(S)	N=7 (1,1/2,1,2,2)								2.00	71.39
2.00 - 3.00	B8									Loose brown slightly clayey silty fine to medium SAND. Local patches of greenish brown coarse SAND. [HEAD DEPOSITS]	(1.00)	
3.00	ES9	SPT(C)	N=9 (2,2/2,3,2,2)								3.00	70.39
										Loose yellow and brown slightly silty fine to coarse SAND. Local bands of brown silt. Residual soil. [SANDGATE FORMATION]	(1.50)	
4.00	D11	SPT(S)	N=7 (1,2/2,1,2,2)									
4.00	ES10											
											4.50	68.89
										Very stiff brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular, fine to coarse mudstone and siltstone. Residual soil. [SANDGATE FORMATION]		
		SPT(C)	N=35 (3,4/8,9,8,10)								(2.60)	
6.50	D13	SPT(C)	N=29 (2,6/7,7,8,7)									
6.50	ES12											
											7.10	66.29
				100 90 87						Medium strong to strong slightly to moderately weathered fractured grey micritic LIMESTONE. Fractures are very closely to closely spaced (25 - 120mm), and appear in two sets; subhorizontal open rough and stepped, and subvertical open rough and stepped to undulating. [HYTHE FORMATION]		
				90 61 43	25 75 120						(2.90)	
				0 0 0						No recovery below 9.00m due to drilling induced fractures.		
											10.00	63.39

DRILLING TECHNIQUE Depth Top	Depth Base	Type
0.00	1.20	Inspection Pit
1.20	10.00	Rotary Core

FLUSH DETAILS From	To	Rtn %	Flush Type
1.20	10.00		Air Mist

WATER OBSERVATIONS Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed

HOLE/CASING DIAMETER Hole Dia.	Depth	Casing Dia.	Depth
139	4.20		
116	10.00		

WATER ADDED From	To	Volume (ltr)

Remarks

1. Groundwater not encountered. 2. Installation details; Flush cover with gas bung, GL - 7.00m plain pipe, 7.00 - 10.00m slotted pipe. 3. Backfill details; GL - 0.10m concrete, 0.10 - 6.50m bentonite, 6.50 - 10.00m gravel. 4. Terminated at scheduled depth.

Termination Depth: 10.00m

Rotary Borehole Log — BH103

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	UA008926	70.30	15/08/2017	1:50
Client: Shepway District Council	Easting (OS mE): 611768.10	Northing (OS mN): 136716.11	End Date: 17/08/2017	Sheet 1 of 1

Samples and Tests

Depth	Type/No.	Test Type/No.	Results
0.30	ES1		
0.50	D3		
0.50	ES2		
0.50 - 0.75	B4		
0.75 - 1.00	B5		
1.00	D7		
1.00	ES6	SPT(S)	N=4 (1,1/1,1,1,1)
2.00	D9	SPT(S)	N=19 (1,1/3,4,6,6)
2.00	ES8		
2.50	D11		
2.50	ES10		
		SPT(S)	N>50 (25 for 20mm/50 for 55mm)

Drill Log

TCR% / SCR% / RQD%	FI (min / ave / max)
75 / 53 / 11	40 / 105 / 170
92 / 84 / 71	
80 / 61 / 21	10 / 45 / 80
97 / 89 / 75	70 / 140 / 210
33 / 33 / 33	

Strata

Description	Depth (Thickness)	Level
TOPSOIL; Crop over soft brown sandy clay. Sand is fine to medium.	(0.20) 0.20	70.10
Very soft to soft greenish brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to angular, fine to coarse sandstone and quartz. [ALLUVIUM DEPOSITS] Very gravelly below 0.80m.	(0.80) 1.00	69.30
Firm becoming stiff brownish grey slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular, fine to coarse sandstone and limestone. [ALLUVIUM DEPOSITS]	(1.50) 2.50	67.80
Medium dense to dense greyish green slightly silty very gravelly fine to coarse SAND. Gravel is angular, fine to coarse limestone. Residual soil. [HYTHE FORMATION]	(0.30) 2.80	67.50
Medium strong to strong moderately weathered fractured grey micritic LIMESTONE. Fractures are very closely to closely spaced (40 - 170mm), and subhorizontal open rough and stepped. [HYTHE FORMATION] Fractures are open to tight below 4.80m. Fractures are very closely to closely, locally extremely closely spaced (10 - 80mm) below 5.50m. Band of completely weathered limestone from 6.10 - 6.20m. Band of completely weathered limestone from 6.80 - 7.00m. Fractures are closely to medium spaced (70 - 210mm) below 7.00m. Completely weathered below 8.50. Strong and slightly weathered below 9.50m.	(7.20) 10.00	60.30

Drilling Technique

Depth Top	Depth Base	Type
0.00	1.20	Inspection Pit
1.20	10.00	Rotary Core

Flush Details

From	To	Rtn %	Flush Type
1.20	10.00		Air Mist

Water Observations

Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed
17/08/2017 00:00	1.80	20	1.70	3.00	1.70

Hole/Casing Diameter

Hole Dia.	Depth	Casing Dia.	Depth
139	2.80		
116	10.00		

Water Added

From	To	Volume (ltr)

Remarks
1. Groundwater encountered at 1.80m rising to 1.70m after 20 mins. 2. Installation details; Raised cover with gas bung, GL - 4.00m plain pipe, 4.00 - 10.00m slotted pipe. 3. Backfill details; GL - 0.10m concrete, 0.10 - 3.50m bentonite, 3.50 - 10.00m gravel. 4. Terminated at scheduled depth.

Termination Depth: 10.00m

AGS — Arcadis Cymru House, St Mellons Business Park, Cardiff, CF3 0EY

Unless otherwise stated: Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mAOD).

Equipment Used	Contractor	Logged By	Checked By
Commachio 305	Arcadis Consulting (UK) Ltd	SAS	IP

ARCADIS Rotary Borehole Log

BH104

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**94.56**	**21/08/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**611750.54**	**135820.10**	**21/08/2017**	**Sheet 1 of 1**

SAMPLES Depth	SAMPLES Type/No.	TESTS Type/No.	TESTS Results	DRILL LOG TCR% SCR% RQD%	FI (min ave max)	Flush Rtn%	Water Strikes	PROGRESS Date Time	Casing Water	STRATA Description	Legend	Depth (Thickness)	Level	Install/ Backfill
										TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.		(0.20) 0.20	94.36	
										Weak to medium strong completely weathered fractured grey micritic LIMESTONE. Recovered as slightly sandy cobbly angular fine to coarse GRAVEL of limestone. [HYTHE FORMATION]		(1.30) 1.50	93.06	
		SPT(S)	N>50 (2,4/18,22,10 for 30mm)	40 35 24						Medium strong to strong slightly to moderately weathered fractured grey micritic LIMESTONE. Fractures are very closely to closely spaced (10 - 30mm), and subhorizontal open rough and stepped. [HYTHE FORMATION]		(1.00) 2.50	92.06	
		SPT(S)	N>50 (4,10/18,25,7 for 10mm)							Dense green gravelly fine to coarse SAND. Gravel is angular, fine to coarse sandstone and quartz. Completely weathered SANDSTONE. [HYTHE FORMATION]		(2.00) 4.50	90.06	
4.00 - 5.00	B1	SPT(S)	N=32 (6,7/8,8,7,9)											
		SPT(S)	N>50 (4,7/53,0 for 0mm)							Very dense green slightly clayey gravelly fine to coarse SAND. Gravel is angular, fine to coarse sandstone and quartz. Completely weathered SANDSTONE. [HYTHE FORMATION]		(2.30) 6.80	87.76	
		SPT(S)	N=30 (4,4/7,6,8,9)											
7.00 - 8.00	B2									Very stiff dark grey sandy CLAY. Sand is fine to coarse. Completely weathered MUDSTONE. [ATHERFIELD CLAY FORMATION]		(1.20) 8.00	86.56	
		SPT(S)	N>50 (25,0 for 0mm/50 for 60mm)							Extremely weak dark grey slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular, fine to coarse mudstone. Completely weathered MUDSTONE. [ATHERFIELD CLAY FORMATION]		(1.95) 9.95	84.61	
		SPT(S)	N>50 (16,9 for 30mm/27,23 for 40mm)											

DRILLING TECHNIQUE

Depth Top	Depth Base	Type
0.00	0.20	Inspection Pit
0.20	1.50	Rotary Open Hole
1.50	9.95	Rotary Core

FLUSH DETAILS

From	To	Rtn %	Flush Type
0.20	9.96		Air Mist

WATER OBSERVATIONS

Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed
21/08/2017 00:00	4.00	20	3.80	8.00	4.00

HOLE/CASING DIAMETER

Hole Dia.	Depth	Casing Dia.	Depth
139	6.50		
116	9.95		

WATER ADDED

From	To	Volume (ltr)

Remarks
1. Groundwater encountered at 4.00m, rising to 3.80m after 20 mins. 2. Installation details; Raised cover with gas bung, GL - 2.00m plain pipe, 2.00 - 9.95m slotted pipe.
3. Backfill details; GL - 0.10m concrete, 0.10 - 1.50m bentonite, 1.50 - 9.95m gravel. 4. Terminated at scheduled depth.

Termination Depth: 9.95m

AGS Arcadis Cymru House St Mellons Business Park Cardiff CF3 0EY

Unless otherwise stated: Depth (mm), Diameter (mm), Time (hhmm), Thickness (m), Level (mAOD).

Equipment Used	Contractor	Logged By	Checked By
Commachio 305	**Arcadis Consulting (UK) Ltd**	**SAS**	**IP**

ARCADIS Rotary Borehole Log

BH105

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**79.97**	**22/08/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**613555.53**	**136952.23**	**22/08/2017**	**Sheet 1 of 2**

SAMPLES Depth	Type/ No.	TESTS Type/ No.	Results	Water Strikes	STRATA Description	Depth (Thickness)	Level
					TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.	(0.20) 0.20	79.77
0.30	ES1				MADE GROUND; Lean mix CONCRETE.	0.30	79.67
0.50	ES2				Firm orange brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular, fine to coarse limestone and quartz. [HEAD DEPOSITS]	(0.45) 0.75	79.22
0.50 - 0.75	B3						
0.75 - 1.00	B4				Medium dense orange slightly gravelly very clayey fine to coarse SAND. Gravel is angular to subangular, fine to coarse limestone and quartz. [HEAD DEPOSITS]	(1.25)	
1.00	ES5						
		SPT(S)	N=14 (1,2/4,3,3,4)				
2.00	D7	SPT(S)	N=28 (1,4/6,7,7,8)			2.00	77.97
2.00	ES6				Medium dense grey very silty fine to medium SAND. Locally very clayey. [HEAD DEPOSITS]	(1.50)	
3.00	D9	SPT(S)	N=30 (2,5/7,6,8,9)				
3.00	ES8					3.50	76.47
					Very dense becoming very dense dark grey fine to medium SILT and SAND. Completely weathered SILTSTONE. [SANDGATE FORMATION]		
4.00	D11	SPT(S)	N=57 (5,8/10,15,18,14)	▼ ▽			
4.00	ES10					(2.00)	
5.00	D12						
		SPT(S)	N=22 (4,5/5,4,6,7)			5.50	74.47
					Stiff becoming hard dark grey slightly gravelly sandy SILT. Sand is fine to coarse. Gravel is angular, fine to coarse siltstone. [SANDGATE FORMATION]		
6.00	D13						
7.00	D14	SPT(S)	N=49 (6,8/9,11,15,14)			(4.50)	
		SPT(S)	N=41 (3,4/6,7,10,18)				
9.00	D15						
		SPT(S)	N>50 (25 for			10.00	69.97

DRILL LOG: TCR% SCR% RQD% | FI (min ave max) | Flush Rtn% — PROGRESS: Date Time | Casing Water — Legend — Install/ Backfill

DRILLING TECHNIQUE Depth Top	Depth Base	Type	FLUSH DETAILS From	To	Rtn %	Flush Type
0.00	1.20	Inspection Pit	1.20	10.00		Air Mist
1.20	10.00	Rotary Core				

WATER OBSERVATIONS Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed
23/08/2017 00:00	4.20	20	4.00	5.50	4.00

HOLE/CASING DIAMETER Hole Dia.	Depth	Casing Dia.	Depth	WATER ADDED From	To	Volume (ltr)
139	5.50					
116	10.00					

Remarks
1. Groundwater encountered at 4.20m, rising to 4.00m after 20 mins. 2. Installation details; Flush cover with gas bung, GL - 2.00m plain pipe, 2.00 - 10.00m slotted pipe.
3. Backfill details; GL - 0.10m concrete, 0.10 - 1.50m bentonite, 1.50 - 10.00m gravel. 4. Terminated at scheduled depth.

Termination Depth: 10.00m

AGS Arcadis Cymru House St Mellons Business Park Cardiff CF3 0EY

Unless otherwise stated: Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mAOD).

Equipment Used	Contractor	Logged By	Checked By
Commachio 305	**Arcadis Consulting (UK) Ltd**	**SAS**	**IP**

ARCADIS Rotary Borehole Log

BH105

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**79.97**	**22/08/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**613555.53**	**136952.23**	**22/08/2017**	**Sheet 2 of 2**

SAMPLES		TESTS		DRILL LOG			Water Strikes	PROGRESS		STRATA				
Depth	Type/ No.	Type/ No.	Results	TCR% SCR% RQD%	FI (min ave max)	Flush Rtn%		Date Time	Casing Water	Description	Legend	Depth (Thickness)	Level	Install/ Backfill
			50mm/33,17 for 20mm)											

DRILLING TECHNIQUE			FLUSH DETAILS			
Depth Top	Depth Base	Type	From	To	Rtn %	Flush Type
0.00	1.20	Inspection Pit	1.20	10.00		Air Mist
1.20	10.00	Rotary Core				

WATER OBSERVATIONS					
Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed
23/08/2017 00:00	4.20	20	4.00	5.50	4.00

HOLE/CASING DIAMETER				WATER ADDED		
Hole Dia.	Depth	Casing Dia.	Depth	From	To	Volume (ltr)
139	5.50					
116	10.00					

Remarks

1. Groundwater encountered at 4.20m, rising to 4.00m after 20 mins. 2. Installation details; Flush cover with gas bung, GL - 2.00m plain pipe, 2.00 - 10.00m slotted pipe.
3. Backfill details; GL - 0.10m concrete, 0.10 - 1.50m bentonite, 1.50 - 10.00m gravel. 4. Terminated at scheduled depth.

Termination Depth: 10.00m

AGS
Arcadis Cymru House
St Mellons Business Park
Cardiff
CF3 0EY

Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mAOD).

Equipment Used	Contractor	Logged By	Checked By
Commachio 305	**Arcadis Consulting (UK) Ltd**	**SAS**	**IP**

ARCADIS Dynamic Sample Log

WS101

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**102.28**	**16/08/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**610984.97**	**135716.41**	**16/08/2017**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA				
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend	Depth (Thickness)	Level	Install/ Backfill
0.05 - 0.15	ES1	0.05	PID	<1ppm		TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets. Rare fragments of tile and brick.		(0.20) 0.20	102.08	
0.50 - 0.55 0.50 - 0.70 0.50 - 0.70 0.70 - 1.00 0.70 - 1.00 1.00 - 1.05	ES2 B10 D6 B11 D7 ES3	0.50 1.00	PID PID	<1ppm <1ppm		MADE GROUND; Dark greenish brown slightly gravelly sandy CLAY with rare cobbles of concrete. Sand is fine to coarse. Gravel is angular to rounded, fine to coarse flint, brick and concrete.		(1.00) 1.20	101.08	
1.20 - 1.80 1.80 - 1.90 1.90 - 2.00	B12 D8 ES4	1.20 1.20 1.50	SPT(S) PID PID	N=11 (1,2/2,2,3,4) <1ppm <1ppm	0	Medium dense greenish brown clayey SAND. Sand is fine to coarse. [HEAD DEPOSITS]		(0.80) 2.00	100.28	
2.00 - 2.80 2.80 - 2.90 2.90 - 3.00	B13 D9 ES5	2.00 2.00 2.50 3.00 3.00	SPT(S) PID PID SPT(S) PID	N=13 (1,2/2,3,4,4) <1ppm <1ppm N>50 (4,2/2,10,38,0 for 0mm) <1ppm	0 0	Medium dense orangish brown clayey SAND. Sand is fine to coarse. [HEAD DEPOSITS]		(1.00) 3.00	99.28	

DRILLING TECHNIQUE

From	To	Technique
0.00	1.20	Inspection Pit
1.20	3.00	Window Sample

WATER OBSERVATIONS

Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed

HOLE/CASING DIAMETER

Hole Dia.	Depth	Casing Dia.	Depth
116	3.00	0	0.00

BACKFILL

Top	Base	Backfill
0.00	0.20	Arisings
0.20	3.00	Bentonite

Remarks
1. Groundwater not encountered. 2. Terminated at 3.00m due to refusal.

Termination Depth: 3.00m

HCL House St Mellons Business Park Cardiff CF3 0EY

Unless otherwise stated: Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando Terrier	**Arcadis Consulting (UK) Ltd**	**LKW**	**IP**

ARCADIS Dynamic Sample Log

WS102A

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**94.65**	**17/08/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**611356.29**	**136095.88**	**17/08/2017**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA				Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend	Depth (Thickness)	Level	
0.00 - 0.20 0.00 - 0.20	D2 ES1	0.10	PID	<2 ppm		TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets. Limestone rockhead encountered at 0.30m.		(0.30) 0.30	94.35	

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	0.30	Inspection Pit							300	0.30	0	0.00	0.00	0.29	Arisings

Remarks

1. Groundwater not encountered. 2. Terminated at 0.30m due to refusal on rockhead.

Termination Depth: 0.30m

Unless otherwise stated:
Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando Terrier	**Arcadis Consulting (UK) Ltd**	**LKW**	**IP**

ARCADIS Dynamic Sample Log

WS102B

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**94.65**	**17/08/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**611356.28**	**136095.87**	**17/08/2017**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA				
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend	Depth (Thickness)	Level	Install/ Backfill
						TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets. Limestone rockhead encountered at 0.20m.		(0.20) 0.20	94.45	

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	0.20	Inspection Pit							300	0.20	0	0.00	0.00	0.21	Arisings

Remarks

1. Groundwater not encountered. 2. Terminated at 0.20m due to refusal on rockhead.

Termination Depth: 0.20m

AGS
HCL House
St Mellons
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Cardiff
CF3 0EY

Unless otherwise stated:
Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando Terrier	**Arcadis Consulting (UK) Ltd**	**LKW**	**IP**

Dynamic Sample Log

WS103

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**94.59**	**15/08/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**611049.65**	**136228.45**	**15/08/2017**	**Sheet 1 of 1**

SAMPLES

Depth	Type/ No.
0.10 - 0.20	ES1
0.20 - 0.35	D5
0.50 - 0.55	ES2
0.50 - 0.70	B15
0.50 - 0.70	D6
0.70 - 0.90	B13
0.70 - 0.90	D7
1.00 - 1.05	ES3
1.10 - 1.20	D8
1.20 - 1.70	B14
1.70 - 1.80	ES4
1.80 - 2.00	D9
2.00 - 2.80	B16
2.80 - 3.00	D10
3.00 - 3.20	B17
3.20 - 3.80	B18
3.80 - 4.00	D11
4.00 - 4.80	B19
4.80 - 5.00	D12

TESTS

Depth	Type/ No.	Results	Water Strikes
0.10	PID	<1ppm	
0.40	PID	<1ppm	
0.90	PID	<1ppm	
1.20	SPT(S)	N=16 (2,2/3,4,5,4)	0
1.20	PID	<1ppm	
1.50	PID	<1ppm	
2.00	SPT(S)	N=16 (3,3/4,4,4,4)	0
2.00	PID	<1ppm	
2.50	PID	<1ppm	
3.00	SPT(S)	N=4 (1,1/1,1,1,1)	0
3.00	PID	<1ppm	
3.20	PID	<1ppm	
3.50	PID	<1ppm	
4.00	SPT(S)	N=4 (1,1/1,1,1,1)	0
4.00	PID	<1ppm	
4.50	PID	<1ppm	
5.00	SPT(S)	N=8 (1,2/2,2,2,2)	0
5.00	PID	<1ppm	

STRATA

Description	Depth (Thickness)	Level
TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.	0.35 (0.35)	94.24
Firm brown slightly gravelly CLAY. Gravel is sub-rounded to sub-angular, fine to coarse flint and limestone. [HEAD DEPOSITS]	0.90 (0.55)	93.69
Stiff greenish brown slightly gravelly CLAY. Gravel is sub-rounded to sub-angular, fine to coarse flint and limestone. [HEAD DEPOSITS]	1.20 (0.30)	93.39
Stiff greenish brown mottled orange sandy CLAY. Sand is fine to medium. [HEAD DEPOSITS]	2.00 (0.80)	92.59
Medium dense brown slightly clayey SAND. Sand is fine to medium. [HEAD DEPOSITS]	3.20 (1.20)	91.39
Loose orange mottled cream clayey SAND. Sand is fine to medium. [HEAD DEPOSITS]	4.00 (0.80)	90.59
Soft orange mottled red sandy CLAY. Sand is fine to medium. [HEAD DEPOSITS]	5.00 (1.00)	89.59

DRILLING TECHNIQUE

From	To	Technique
0.00	1.20	Inspection Pit
1.20	5.00	Window Sample

WATER OBSERVATIONS

Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed

HOLE/CASING DIAMETER

Hole Dia.	Depth	Casing Dia.	Depth
116	5.00	0	0.00

BACKFILL

Top	Base	Backfill
0.00	0.20	Concrete
0.20	1.00	Bentonite
1.00	5.00	Gravel

Remarks

1. Groundwater seepage encountered at 2.50m. 2. Terminated at scheduled depth.

Termination Depth: 5.00m

HCL House St Mellons Business Park Cardiff CF3 0EY

Unless otherwise stated: Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando Terrier	**Arcadis Consulting (UK) Ltd**	**LKW**	**IP**

ARCADIS Dynamic Sample Log

WS104A

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**82.61**	**17/08/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**611159.6**	**136549.0**	**17/08/2017**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA				
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend	Depth (Thickness)	Level	Install/ Backfill
		0.30	PID	<1ppm		MADE GROUND; Black slightly clayey sub-rounded to angular fine to coarse GRAVEL of tarmac, concrete and limestone.		(0.30) 0.30	82.31	

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	0.30	Inspection Pit	17/08/2017 08:55	0.30	5	0.20	0.00	0.00	300	0.30	0	0.00	0.00	0.30	Arisings

Remarks

1. Groundwater encountered at 0.30m, rising to 0.20m after 20 mins. 2. Terminated at 0.30m due to refusal

Termination Depth: 0.30m

AGS
HCL House
St Mellons
Business Park
Cardiff
CF3 0EY

Unless otherwise stated:
Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando Terrier	**Arcadis Consulting (UK) Ltd**	**LKW**	**IP**

ARCADIS Dynamic Sample Log

WS104B

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**82.49**	**17/08/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**611158.8**	**136550.1**	**17/08/2017**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA				
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend	Depth (Thickness)	Level	Install/ Backfill
					▼	MADE GROUND; Grey clayey sub-rounded to angular fine to coarse GRAVEL of tarmac, concrete and limestone.		(0.15) 0.15	82.34	

DRILLING TECHNIQUE

From	To	Technique
0.00	0.15	Inspection Pit

WATER OBSERVATIONS

Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed
17/08/2017 12:10	0.15	5	0.10	0.00	0.00

HOLE/CASING DIAMETER

Hole Dia.	Depth	Casing Dia.	Depth
300	0.15	0	0.00

BACKFILL

Top	Base	Backfill
0.00	0.15	Arisings

Remarks

1. Groundwater encountered at 0.15m, rising to 0.10m after 20 mins. 2. Terminated at 0.15m due to refusal.

Termination Depth: 0.15m

ARCADIS Dynamic Sample Log

WS104C

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**82.44**	**17/08/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**611153.3**	**136615.9**	**17/08/2017**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA				
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend	Depth (Thickness)	Level	Install/ Backfill
0.10 - 0.20	D6					TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.		(0.20)		
0.10 - 0.20	ES1	0.20	PID	<1ppm				0.20	82.24	
						MADE GROUND; Lean-mix CONCRETE.		0.30	82.14	
						Soft locally stiff creamy brown gravelly CLAY. Gravel is sub-angular to angular, fine to coarse limestone. [HEAD DEPOSITS]				
0.50 - 0.55	ES2	0.50	PID	<1ppm						
0.50 - 0.70	B12									
0.50 - 0.70	D7									
0.70 - 1.00	B13									
0.70 - 1.00	D8	1.00	PID	<1ppm						
1.00 - 1.05	ES3									
1.20 - 1.80	B14	1.20	SPT(S)	N=4 (1,1/1,1,1,1)	0					
		1.50	PID	<1ppm						
1.80 - 1.90	ES4									
1.90 - 2.00	D9									
2.00 - 2.80	B15	2.00	SPT(S)	N=18 (1,1/1,3,5,9)	0					
		2.00	PID	<1ppm				(3.70)		
		2.50	PID	<1ppm						
2.80 - 2.90	ES5									
2.90 - 3.00	D10									
3.00 - 3.90	B16	3.00	SPT(S)	N=7 (1,1/2,2,1,2)	0					
		3.00	PID	<1ppm						
		3.50	PID	<1ppm						
3.90 - 4.00	D11					Creamy brown mottled grey colouration.				
		4.00	SPT(S)	N>50 (25,0 for 0mm/50,0 for 0mm)	0			4.00	78.44	
		4.00	PID	<1ppm						

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	1.20	Inspection Pit							116	4.00	0	0.00	0.00	0.20	Concrete
1.20	4.00	Window Sample											0.20	1.00	Bentonite
													1.00	4.00	Gravel

Remarks

1. Groundwater seepage encountered at 3.90m. 2. Terminated at 4.00m due to refusal.

Termination Depth: 4.00m

AGS HCL House St Mellons Business Park Cardiff CF3 0EY

Unless otherwise stated: Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando Terrier	**Arcadis Consulting (UK) Ltd**	**LKW**	**IP**

ARCADIS Dynamic Sample Log

WS105

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**70.00**	**14/08/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**611285.92**	**136769.95**	**14/08/2017**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA			
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Depth (Thickness)	Level	Install/ Backfill
0.10 - 0.23	ES1	0.15 0.25	PID PID	<1ppm <1ppm		TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.	(0.25) 0.25	69.74	
0.50 - 0.55 0.50 - 0.55 0.50 - 0.70 0.70 - 1.00	D5 ES2 B9 B10					Firm to stiff grey mottled orange slightly sandy CLAY. Sand is fine [HEAD DEPOSITS]	(0.65) 0.90	69.10	
1.00 - 1.05 1.20 - 1.40	ES3 B11	1.20	SPT(S)	N=17 (1,1/3,4,4,6)	0	Stiff greenish grey mottled orange slightly sandy CLAY. Sand is fine to coarse. [HEAD DEPOSITS]	(0.50) 1.40	68.60	
		1.50	PID	<1ppm		Soft grey mottled orange slightly sandy SILT. Sand is fine to medium. [HEAD DEPOSITS]	(0.20) 1.60	68.40	
1.80 - 2.00 1.80 - 2.00 2.00 - 2.25	D6 ES4 B12	2.00	SPT(S)	N=27 (3,4/4,5,9,9)	0	Stiff to very stiff grey mottled orange sandy SILT. Sand is fine to medium. [HEAD DEPOSITS]	(0.65) 2.25	67.74	
2.25 - 2.75 2.50 - 2.55	B13 D7	2.25 2.60 2.70	PID PID PID	<1ppm <1ppm <1ppm		Stiff dark greenish brown mottled black slightly sandy SILT. Sand is fine to coarse. [HEAD DEPOSITS] Bands of thinly laminated orange SAND.	(0.45) 2.70	67.30	
2.75 - 2.85 2.75 - 2.85	B14 D8	2.85	SPT(S)	N>50 (5,5/11,13,17,9 for 15mm)	0	Very stiff black slightly gravelly sandy SILT. Sand is fine to coarse. Gravel is angular, fine to coarse siltstone. Residual soil. [SANDGATE FORMATION]	(0.15) 2.85	67.14	

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00 1.20	1.20 2.85	Inspection Pit Window Sample							116	2.85	0	0.00	0.00 0.20 1.00	0.20 1.00 2.85	Concrete Bentonite Gravel

Remarks

1. Groundwater seepage encountered at 2.40m. 2. Terminated at 2.85m due to refusal.

Termination Depth: 2.85m

ARCADIS Dynamic Sample Log

WS106

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**69.87**	**14/08/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**611608.35**	**136750.44**	**14/08/2017**	**Sheet 1 of 1**

SAMPLES Depth	SAMPLES Type/No.	TESTS Depth	TESTS Type/No.	TESTS Results	Water Strikes	STRATA Description	Depth (Thickness)	Level
0.10 - 0.20	ES1	0.10	PID	<1ppm		TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.	(0.30)	
		0.30	PID	<1ppm			0.30	69.57
0.50 - 0.55 0.50 - 0.70 0.50 - 0.70	ES2 B7 D5					Firm light brown sandy CLAY. Sand is fine to coarse. [HEAD DEPOSITS]	(0.60)	
0.90 - 1.00 0.90 - 1.00 1.00 - 1.10 1.20 - 1.40	B8 D6 ES3 B9	0.90 1.20	PID SPT(S)	<1ppm N=8 (1,1/2,2,3,1)	0	Firm orange and brown sandy CLAY. Sand is fine to medium. [HEAD DEPOSITS]	0.90 (0.50)	68.97
1.40 - 2.00 1.80 - 1.90	B10 ES4	1.40 2.00 2.00	PID SPT(S) PID	<1ppm N=22 (1,7/8,5,5,4) <1ppm	0	Stiff to very stiff orange and brown brown mottled grey slightly sandy CLAY. Sand is fine. [HEAD DEPOSITS]	1.40 (0.90)	68.47
2.30 - 3.00	B11	2.30	PID	<1ppm		Firm brownish white clayey subangular to angular fine to coarse GRAVEL of limestone. Residual soil. [HYTHE FORMATION]	2.30 (0.70)	67.57
		3.00	SPT(S)	N>50 (9,15/50 for 20mm)	0		3.00	66.87

DRILLING TECHNIQUE

From	To	Technique
0.00	1.20	Inspection Pit
1.20	3.00	Window Sample

WATER OBSERVATIONS

Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed

HOLE/CASING DIAMETER

Hole Dia.	Depth	Casing Dia.	Depth
116	3.00	0	0.00

BACKFILL

Top	Base	Backfill
0.00	0.20	Concrete
0.20	1.00	Bentonite
1.00	3.00	Gravel

Remarks

1. Groundwater seepage encountered at 1.90m. 2. Terminated at 3.00m due to refusal.

Termination Depth: 3.00m

AGS HCL House St Mellons Business Park Cardiff CF3 0EY

Unless otherwise stated: Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando Terrier	**Arcadis Consulting (UK) Ltd**	**LKW**	**IP**

ARCADIS Dynamic Sample Log

WS107

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**68.45**	**15/08/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**611867.54**	**136919.17**	**15/08/2017**	**Sheet 1 of 1**

SAMPLES Depth	SAMPLES Type/No.	TESTS Depth	TESTS Type/No.	Results	Water Strikes	STRATA Description	Depth (Thickness)	Level	Install/ Backfill
0.10 - 0.15	ES1	0.10	PID	<1ppm		TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.	(0.30)		
0.10 - 0.30	D5	0.30	PID	<1ppm			0.30	68.15	
0.50 - 0.55	ES2					Loose orange and brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded to subangular, fine to coarse limestone. [ALLUVIUM DEPOSITS]			
0.50 - 0.70	B10								
0.50 - 0.70	D6								
0.70 - 1.00	B11	0.80	PID	<1ppm			(1.10)		
0.70 - 1.00	D7								
1.00 - 1.05	ES3								
1.20 - 1.40	B12	1.20	SPT(S)	N=8 (1,2/2,2,2,2)	0				
1.40 - 1.60	B13	1.40	PID	<1ppm			1.40	67.05	
1.60 - 1.80	ES4					Firm to stiff orange and brown mottled grey slightly sandy CLAY. Sand is fine to medium. [HEAD DEPOSITS]			
1.80 - 2.00	B8						(0.80)		
2.00 - 2.20	B14	2.00	SPT(S)	N=13 (1,2/3,3,3,4)	0				
2.00 - 2.80	B15	2.00	PID	<1ppm					
		2.20	PID	<1ppm			2.20	66.25	
						Medium dense to dense green slightly clayey SAND. Sand is fine to coarse. [HEAD DEPOSITS]	(0.80)		
2.80 - 3.00	B9								
		3.00	SPT(S)	N=42 (5,7/7,8,9,18)	0		3.00	65.45	
		3.00	PID	<1ppm					

DRILLING TECHNIQUE

From	To	Technique

WATER OBSERVATIONS

Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed
15/08/2017 10:30	2.85	20	2.00	0.00	0.00

HOLE/CASING DIAMETER

Hole Dia.	Depth	Casing Dia.	Depth
116	3.00	0	0.00

BACKFILL

Top	Base	Backfill
0.00	0.20	Concrete
0.20	1.00	Bentonite
1.00	3.00	Gravel

Remarks

1. Groundwater encountered at 2.80m, rising to 2.00m after 20 mins. 2. Terminated at 3.00m due to refusal.

Termination Depth: 3.00m

AGS HCL House St Mellons Business Park Cardiff CF3 0EY

Unless otherwise stated: Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used

Contractor **Arcadis Consulting (UK) Ltd**

Logged By

Checked By **IP**

ARCADIS Dynamic Sample Log — WS108

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	UA008926	73.99	15/08/2017	1:50
Client: Shepway District Council	Easting (OS mE): 612461.34	Northing (OS mN): 137157.15	End Date: 16/08/2017	Sheet 1 of 1

SAMPLES Depth	Type/ No.	TESTS Depth	Type/ No.	Results	Water Strikes	STRATA Description	Legend	Depth (Thickness)	Level	Install/ Backfill
0.05 - 0.15	ES1	0.05	PID	<1ppm		TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.		(0.20) 0.20	73.79	
0.20 - 0.40	D7	0.20	PID	<1ppm		Soft to firm orange and brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded to subangular, fine to coarse flint. [HEAD DEPOSITS]		(0.25) 0.45	73.54	
0.50 - 0.55	ES2	0.50	PID	<1ppm		Firm orange and brown slightly sandy gravelly CLAY. Sand is fine to coar. Gravel is subangular to angular, fine to coarse limestone and flint. [HEAD DEPOSITS]		(0.75)		
0.50 - 0.70	B11									
0.50 - 0.70	D5									
0.70 - 1.00	B12									
0.70 - 1.00	D6	1.00	PID	<1ppm						
1.00 - 1.05	ES3									
1.20 - 2.00	B15	1.20	SPT(S)	N=8 (1,2/2,2,2,2)	0	Firm to stiff grey mottled orange sandy CLAY. Sand is fine to medium [HEAD DEPOSITS]		1.20	72.79	
		1.20	PID	<1ppm						
1.60 - 1.70	D8									
1.80 - 2.00	ES4							(1.20)		
2.00 - 2.40	B13	2.00	SPT(S)	N=48 (4,5/8,8,17,15)	0					
		2.00	PID	<1ppm						
2.20 - 2.30	D10									
2.40 - 2.80	B14	2.50	PID	<1ppm		Stiff to very stiff grey mottled orange very sandy CLAY. Sand is fine to coarse. [HEAD DEPOSITS]		2.40 (0.40)	71.59	
2.70 - 2.80	D9	2.80	SPT(S)	N=39 (4,4/5,8,11,15)	0			2.80	71.19	

DRILLING TECHNIQUE

From	To	Technique
0.00	1.20	Inspection Pit
1.20	2.80	Window Sample

WATER OBSERVATIONS

Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed

HOLE/CASING DIAMETER

Hole Dia.	Depth	Casing Dia.	Depth
116	2.80	0	0.00

BACKFILL

Top	Base	Backfill
0.00	0.20	Concrete
0.20	1.00	Bentonite
1.00	2.80	Gravel

Remarks

1. Groundwater seepage encountered at 2.40m. 2. Terminated at 2.80m due to refusal.

Termination Depth: 2.80m

AGS — HCL House, St Mellons Business Park, Cardiff CF3 0EY

Unless otherwise stated: Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando Terrier	Arcadis Consulting (UK) Ltd	LKW	IP

ARCADIS Dynamic Sample Log

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**83.26**	**16/08/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**612704.14**	**136191.38**	**16/08/2017**	**Sheet 1 of 1**

SAMPLES Depth	SAMPLES Type/No.	TESTS Depth	TESTS Type/No.	TESTS Results	Water Strikes	STRATA Description	Depth (Thickness)	Level	Install/Backfill
0.05 - 0.15	D4	0.10	PID	<1ppm		TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.	(0.20) 0.20	83.06	
0.10 - 2.00	ES1								
0.30 - 0.40	ES2	0.30	PID	<1ppm		MADE GROUND: Soft brown mottled black slightly sandy clayey subrounded to subangular fine to coarse GRAVEL of limestone, flint and quartz.	(0.50) 0.70	82.56	
0.50 - 0.70	B10								
0.50 - 0.70	D5								
0.70 - 1.00	B11								
0.70 - 1.00	D6	0.80	PID	<1ppm		Soft brownish grey mottled orange CLAY. [HEAD DEPOSITS]	(0.50) 1.20	82.06	
1.00 - 1.05	ES3								
1.20 - 1.80	B12	1.20	SPT(S)	N=4 (1,1/1,1,1,1)	0	Soft to firm blueish grey mottled orange SILT. [HEAD DEPOSITS]	(1.30) 2.50	80.76	
		1.20	PID	<1ppm					
1.80 - 2.00	D7								
2.00 - 2.50	B13	2.00	SPT(S)	N=12 (3,3/3,3,3,3)	0				
		2.00	PID	<1ppm					
2.50 - 2.80	B14	2.50	PID	<1ppm		Firm grey mottled orange CLAY. [HEAD DEPOSITS]	(0.40) 2.90	80.36	
2.80 - 2.90	D8								
2.90 - 3.00	D9	2.90	PID	<1ppm		Firm green mottled orange slightly sandy SILT. Sand is fine to medium. [HEAD DEPOSITS]	3.00	80.26	

DRILLING TECHNIQUE

From	To	Technique
0.00	1.20	Inspection Pit
1.20	3.00	Window Sample

WATER OBSERVATIONS

Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed

HOLE/CASING DIAMETER

Hole Dia.	Depth	Casing Dia.	Depth
116	3.00	0	0.00

BACKFILL

Top	Base	Backfill
0.00	0.50	Arisings
0.50	3.00	Bentonite

Remarks
1. Groundwater seepage encountered at 1.80m. 2. Terminated at 3.00m due to refusal. 3. Hole collapsed from 3.00m to 2.00m due to water strike.

Termination Depth: 3.00m

AGS HCL House St Mellons Business Park Cardiff CF3 0EY

Unless otherwise stated: Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando Terrier	**Arcadis Consulting (UK) Ltd**	**LKW**	**IP**

ARCADIS Dynamic Sample Log

WS110

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**73.64**	**16/08/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**612443.89**	**137140.44**	**16/08/2017**	**Sheet 1 of 1**

SAMPLES		TESTS				STRATA				
Depth	Type/ No.	Depth	Type/ No.	Results	Water Strikes	Description	Legend	Depth (Thickness)	Level	Install/ Backfill
0.05 - 0.15	D5	0.05	PID	<1ppm		TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.		(0.15) 0.15	73.49	
0.05 - 0.15	ES2	0.20	PID	<1ppm		Soft orange and brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded to subangular, fine to coarse flint and limestone. [HEAD DEPOSITS]		(0.35) 0.50	73.14	
0.50 - 0.55	ES1	0.50	PID	<1ppm		Soft to firm orange and brown sandy CLAY. Sand is fine to medium. [HEAD DEPOSITS]		(0.80) 1.30	72.34	
0.50 - 0.70	B15	0.60	PID	<1ppm						
0.50 - 0.70	D6									
0.70 - 1.00	B16									
0.70 - 1.00	D7	1.00	PID	<1ppm						
1.00 - 1.05	ES3									
		1.20	SPT(S)	N=7 (2,2/1,2,2,2)	0					
1.30 - 1.80	B12	1.30	PID	<1ppm		Firm brownish grey mottled orange CLAY. [HEAD DEPOSITS]		(0.50) 1.80	71.84	
1.70 - 1.80	D11									
1.80 - 2.00	D8	1.80	PID	<1ppm		Soft brownish grey mottled orange sandy CLAY. Sand is fine to medium. [HEAD DEPOSITS]		(0.20) 2.00	71.64	
2.00 - 2.10	ES4	2.00	SPT(S)	N=26 (4,4/5,5,6,10)	0	Stiff brownish grey mottled orange CLAY. [HEAD DEPOSITS]		(0.60) 2.60	71.04	
2.10 - 2.20	D9	2.00	PID	<1ppm						
2.20 - 2.60	B14									
		2.50	PID	<1ppm						
2.60 - 2.90	B13	2.70	PID	<1ppm		Dense brownish grey mottled orange slightly silty fine to coarse SAND. [HEAD DEPOSITS]		(0.40) 3.00	70.64	
2.90 - 3.00	D10									
		3.00	SPT(S)	N=51 (9,10/10,15,12,14)	0					

DRILLING TECHNIQUE		
From	To	Technique
0.00	1.20	Inspection Pit
1.20	3.00	Window Sample

WATER OBSERVATIONS					
Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed

HOLE/CASING DIAMETER			
Hole Dia.	Depth	Casing Dia.	Depth
116	3.00	0	0.00

BACKFILL		
Top	Base	Backfill
0.00	0.30	Arisings
0.30	3.00	Bentonite

Remarks

1. Groundwater not encountered. 2. Terminated at 3.00m due to refusal.

Termination Depth: 3.00m

AGS HCL House St Mellons Business Park Cardiff CF3 0EY

Unless otherwise stated: Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando Terrier	**Arcadis Consulting (UK) Ltd**	**LKW**	**IP**

Dynamic Sample Log

WS111

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**82.23**	**17/08/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**612710.09**	**136342.97**	**17/08/2017**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA				
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend	Depth (Thickness)	Level	Install/ Backfill
						MADE GROUND; Lean-mix CONCRETE.		(0.40) 0.40	81.83	
0.38 - 0.48	D2					MADE GROUND; Dark grey gravelly CLAY. Gravel is angular, fine to coarse limestone and flint.		0.48	81.75	
0.48 - 0.60	ES1	0.50	PID	<1ppm		MADE GROUND; Black sandy subrounded to angular fine to coars GRAVEL of brick, flint and limestone.		(0.12) 0.60	81.63	

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	0.60	Inspection Pit											0.00 0.15	0.15 0.60	Concrete Arisings

Remarks

1. Groundwater encountered. 2. Terminated at 0.60m due to groundwater inflow.

Termination Depth: 0.60m

HCL House
St Mellons
Business Park
Cardiff
CF3 0EY

Unless otherwise stated:
Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando Terrier	**Arcadis Consulting (UK) Ltd**	**LKW**	**IP**

ARCADIS Dynamic Sample Log

WS112

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**99.93**	**16/08/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**610977.80**	**136085.15**	**16/08/2017**	**Sheet 1 of 1**

SAMPLES Depth	Type/No.	TESTS Depth	Type/No.	Results	Water Strikes	STRATA Description	Legend	Depth (Thickness)	Level	Install/Backfill
0.00 - 0.10	ES1	0.10	PID	<1ppm		TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.		(0.30) 0.30	99.63	
0.50 - 0.55	ES2	0.50	PID	<1ppm		Soft light brown slightly sandy CLAY. Sand is fine to medium. [HEAD DEPOSITS]		(0.90)		
0.50 - 0.70	B11									
0.50 - 0.70	D6									
0.70 - 1.00	B12									
0.70 - 1.00	D7	1.00	PID	<1ppm						
1.00 - 1.05	ES3									
1.20 - 1.80	B13	1.20	SPT(S)	N=4 (1,1/1,1,1,1)	0			1.20	98.73	
		1.20	PID	<1ppm		Soft to firm light brown CLAY. [HEAD DEPOSITS]				
		1.50	PID	<1ppm				(1.00)		
1.80 - 1.90	ES4									
1.90 - 2.00	D8	2.00	SPT(S)	N=14 (1,2/3,3,4,4)	0					
		2.00	PID	<1ppm						
2.20 - 2.70	B14	2.20	PID	<1ppm				2.20	97.73	
						Medium dense to very dense green mottled orange clayey SAND. Sand is fine to medium. [HEAD DEPOSITS]				
		2.50	PID	<1ppm						
2.70 - 2.80	ES5									
2.80 - 3.00	D9							(1.30)		
3.00 - 3.40	B15	3.00	SPT(S)	N=19 (2,3/4,4,5,6)	0					
		3.00	PID	<1ppm						
3.40 - 3.50	D10	3.50	SPT(S)	N=45 (7,8/9,9,9,18)	0			3.50	96.43	
		3.50	PID	<1ppm						

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	1.20	Inspection Pit							116	3.50	0	0.00	0.00	0.20	Concrete
1.20	3.50	Window Sample											0.20	1.00	Bentonite
													1.00	3.50	Gravel

Remarks

1. Groundwater seepage encountered at 2.90m. 2. Terminated at 3.50m due to refusal.

Termination Depth: 3.50m

AGS HCL House St Mellons Business Park Cardiff CF3 0EY

Unless otherwise stated: Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando Terrier	**Arcadis Consulting (UK) Ltd**	**LKW**	**IP**

ARCADIS Trial Pit Log

TP101

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**71.59**	**15/08/2017**	**1:25**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**610259.33**	**137376.17**	**15/08/2017**	**Sheet 1 of 1**

SAMPLES Depth	SAMPLES Type/No.	TESTS Depth	TESTS Type/No.	TESTS Results	Water Strikes	STRATA Description	Legend	Depth (Thickness)	Level	Install/Backfill
0.20 0.20 0.20	B1 D2 ES3					TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.		(0.30) 0.30	71.29	
0.50 0.50 0.50 1.00 1.00 1.00 1.50 1.50	B4 D5 ES6 B7 D8 ES9 B10 D1					Soft to firm yellowish brown slightly sandy gravelly CLAY with rare cobbles of limestone. Sand is fine to coarse. Gravel is angular to rounded, fine to coarse limestone. [HEAD DEPOSITS]		(1.70) 2.00	69.59	

PLAN DETAILS

2.3 × 0.5

Long Axis Orientation:

Shoring / Support: None

Stability: Stable

Groundwater (description):

Remarks

1. Groundwater not encountered. 2. Terminated at 2.00m due to refusal on bedrock.

Termination Depth: 2.00m

Arcadis Cymru House St Mellons Business Park Cardiff, CF3 0EY

Unless otherwise stated: Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
JCB 3CX	Arcadis Consulting (UK) Limited	HK	IP

ARCADIS Trial Pit Log

TP102

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**68.56**	**14/08/2017**	**1:25**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**611605.45**	**137227.56**	**14/08/2017**	**Sheet 1 of 1**

SAMPLES

Depth	Type/ No.
0.30	B1
0.30	D2
0.30	ES3
0.60	B4
0.60	D5
0.60	ES6
1.10	B7
1.10	D8
1.10	ES9
1.80	B10
1.80	D1
2.30	B2
2.30	D3

TESTS (Depth, Type/No., Results) – none recorded. **Water Strikes** – none recorded.

STRATA

Description	Legend	Depth (Thickness)	Level	Install/ Backfill
TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.		(0.40) 0.40	68.16	
Brown mottled orangish brown slightly gravelly sandy SILT. Sand is fine to coarse. Gravel is angular to rounded, fine to coarse flint. [HEAD DEPOSITS]		(0.40) 0.80	67.76	
Firm grey mottled orangish brown sandy CLAY. Becoming very sandy with depth. [HEAD DEPOSITS]		(1.70) 2.50	66.06	

PLAN DETAILS

2.7

0.5

Long Axis Orientation:

Shoring / Support: None

Stability: Stable

Groundwater (description):

Remarks

1. Groundwater not encountered. 2. Terminated at scheduled depth.

Termination Depth: 2.50m

Arcadis Cymru House St Mellons Business Park Cardiff, CF3 0EY

Unless otherwise stated: Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
JCB 3CX	**Arcadis Consulting (UK) Limited**	**HK**	**IP**

ARCADIS Trial Pit Log

TP103

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**79.73**	**18/07/2017**	**1:25**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**613536.69**	**136951.58**	**18/07/2017**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA				
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend	Depth (Thickness)	Level	Install/ Backfill
0.00 - 0.10	ES1					MADE GROUND; Brown mottled black CLAY.		(0.10)		
0.10 - 0.20	D2	0.10	PID	<1ppm				0.10	79.63	
0.20 - 0.30	B6	0.20	PID	<1ppm		MADE GROUND; Brown clayey GRAVEL. Gravel is rounded to subangular, fine to coarse flint, limestone and sandstone.		(0.25)		
0.35 - 0.45	B7							0.35	79.38	
0.35 - 0.45	D	0.40	PID	<1ppm		Soft grey mottled orange slightly gravelly CLAY. Gravel is rounded to angular, fine to coarse flint, limestone and sandstone. [HEAD DEPOSITS]		(0.10)		
								0.45	79.28	
0.50 - 0.70	B8	0.50	PID	<1ppm		Soft becoming firm grey mottled orange CLAY. [HEAD DEPOSITS]		(0.25)		
0.50 - 0.70	D1									
0.70 - 1.00	B9	0.70	PID	<1ppm		Firm grey mottled orange sandy SILT. [HEAD DEPOSITS]		0.70	79.03	
0.70 - 1.00	D2									
		1.00	PID	<1ppm						
1.50	B10	1.50	PID	<1ppm						
1.50	D3							(1.80)		
2.00	B11	2.00	PID	<1ppm						
2.00	D4									
2.50	B12	2.50	PID	<1ppm				2.50	77.23	
2.50	D5									

PLAN DETAILS

2.9

0.4

Long Axis Orientation:

Shoring / Support: None

Stability: Stable

Groundwater (description):

Remarks

1. Groundwater not encountered. 2. Terminated at scheduled depth.

Termination Depth:

2.50m

Equipment Used	Contractor	Logged By	Checked By
JCB 3CX	**Arcadis Consulting (UK) Limited**	**LKW**	**IP**

ARCADIS Trial Pit Log — TP104

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**65.76**	**16/08/2017**	**1:25**
Client: **Shepway District Council**	Easting (OS mE): **609988.22**	Northing (OS mN): **136627.81**	End Date: **16/08/2017**	**Sheet 1 of 1**

SAMPLES Depth	Type/ No.	TESTS Depth	Type/ No.	Results	Water Strikes	STRATA Description	Legend	Depth (Thickness)	Level	Install/ Backfill
						TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.		(0.30)		
0.20 0.20 0.20	B1 D2 ES3							0.30	65.46	
0.50 0.50 0.50	B4 D5 ES6					Soft to firm orangish brown sandy CLAY. Sand is fine to medium. [HEAD DEPOSITS]		(1.10)		
1.00 1.00 1.00	B7 D8 ES9							1.40	64.36	
1.50 1.50	B10 D1					Firm light greyish brown sandy CLAY. Sand is fine to medium. Rare pockets of white fine SAND (5x5mm). [HEAD DEPOSITS]		(1.40)		
2.20 2.20	B2 D3							2.80	62.96	

PLAN DETAILS

2.3 × 0.5

Long Axis Orientation:

Shoring / Support: None

Stability: Stable

Groundwater (description):

Remarks

1. Groundwater not encountered. 2. Terminated at scheduled depth.

Termination Depth: 2.80m

AGS	Unless otherwise stated: Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).	Equipment Used	Contractor	Logged By	Checked By
Arcadis Cymru House, St Mellons Business Park, Cardiff, CF3 0EY		JCB 3CX	Arcadis Consulting (UK) Limited	HK	IP

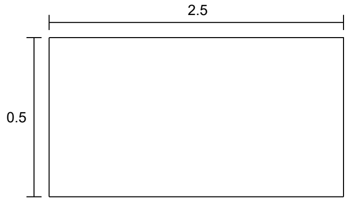
ARCADIS Trial Pit Log

TP105

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**66.65**	**21/08/2017**	**1:25**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**611195.12**	**137037.36**	**21/08/2017**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA				
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend	Depth (Thickness)	Level	Install/ Backfill
0.20 0.20 0.20	B1 D2 ES3					TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.		(0.30) 0.30	66.35	
0.50 0.50 0.50 1.00 1.00 1.00	B4 D5 ES6 B7 D8 ES9					Soft brown mottled orangish brown slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is rounded to subangular, fine to medium flint, limestone and sandstone. [ALLUVIUM DEPOSITS]		(1.10) 1.40	65.25	
1.50 1.50	B10 D1					Grey silty fine to medium SAND. [HEAD DEPOSITS]		(0.30) 1.70	64.95	
1.80 1.80	B2 D3					Grey slightly clayey sandy angular to rounded fine to coarse GRAVEL of flint. Sand is fine to coarse. [HEAD DEPOSITS]		(0.30) 2.00	64.65	
2.20 2.20	B4 D5					Grey clayey sandy angular to rounded fine to coarse GRAVEL of flint. Sand is fine to coarse. [HEAD DEPOSITS]		(0.50) 2.50	64.15	

PLAN DETAILS



Long Axis Orientation:

Shoring / Support: None

Stability: Not stable

Groundwater (description):

Remarks

1. Groundwater not encountered. 2. Terminated at scheduled depth.

Termination Depth: 2.50m

AGS
Arcadis Cymru House
St Mellons Business Park
Cardiff, CF3 0EY

Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
JCB 3CX	**Arcadis Consulting (UK) Limited**	**HK**	**IP**

Trial Pit Log

TP106

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**77.41**	**22/08/2017**	**1:25**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**612677.41**	**136513.96**	**22/08/2017**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA				Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend	Depth (Thickness)	Level	
0.20 0.20 0.20	B1 D2 ES3					TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets. Rare tile and concrete fragments.		(0.30) 0.30	77.11	
0.50 0.50 0.50	B4 D5 ES6					Soft becoming firm light brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is angular to rounded, fine to coarse flint. [HEAD DEPOSITS]		(0.40) 0.70	76.71	
1.00 1.00 1.00 1.50 1.50 2.00 2.00	B7 D8 ES9 B10 D1 B2 D3					Firm orangish brown mottled dark brown sandy CLAY. Sand is fine to medium. [HEAD DEPOSITS]		(1.80) 2.50	74.91	

PLAN DETAILS

2.3

0.5

Long Axis Orientation:

Shoring / Support: None

Stability: Stable

Groundwater (description):

Remarks

1. Groundwater not encountered. 2. Terminated at scheduled depth.

Termination Depth:

2.50m

Arcadis Cymru House
St Mellons Business Park
Cardiff, CF3 0EY

Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
JCB 3CX	**Arcadis Consulting (UK) Limited**	**HK**	**IP**

ARCADIS Trial Pit Log

TP107

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**92.67**	**15/08/2017**	**1:25**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**610704.30**	**136503.22**	**15/08/2017**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA				
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend	Depth (Thickness)	Level	Install/ Backfill
0.30 0.30 0.30 0.60 0.60 0.60	B1 D2 ES3 B4 D5 ES6					TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.		(0.50) 0.50	92.17	
1.00 1.00 1.00 1.60 1.60	B7 D8 ES9 B10 D1					Soft light brown very sandy CLAY with occasional rootlets. Sand is fine to medium. Occasional pockets of orange SAND (15x20mm). [HEAD DEPOSITS]		(1.20) 1.70	90.97	
2.60 2.60	B2 D3					Soft brown mottled reddish brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse flint. [HEAD DEPOSITS]		(1.00) 2.70	89.97	

PLAN DETAILS

2.6

0.5

Long Axis Orientation:

Shoring / Support: None

Stability: Stable

Groundwater (description):

Remarks

1. Groundwater not encountered. 2. Terminated at scheduled depth.

Termination Depth:

2.70m

Arcadis Cymru House
St Mellons Business Park
Cardiff, CF3 0EY

Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
JCB 3CX	**Arcadis Consulting (UK) Limited**	**HK**	**IP**

ARCADIS Trial Pit Log

TP108

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**73.04**	**17/08/2017**	**1:25**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**611770.64**	**136484.47**	**17/08/2017**	**Sheet 1 of 1**

SAMPLES Depth	SAMPLES Type/ No.	TESTS Depth	TESTS Type/ No.	TESTS Results	Water Strikes	STRATA Description	Legend	Depth (Thickness)	Level	Install/ Backfill
0.20 0.20 0.20	B1 D2 ES3					TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.		(0.40) 0.40	72.64	
0.60 0.60 0.60	B4 D5 ES6					Soft orangish brown sandy CLAY. Sand is fine to medium.[ALLUVIUM DEPOSITS]		(0.50) 0.90	72.14	
1.00 1.00 1.00	B7 D8 ES9					Soft brown mottled orangish brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to rounded, fine to coarse flint. Rare bands of black SAND (10-20mm). [HEAD DEPOSITS]		(0.40) 1.30	71.74	
1.50 1.50	B10 D1					Soft brown mottled orange and grey slightly gravelly slightly sandy CLAY. Sand is fine to coars. Gravel is angular to rounded, fine to coarse flint. Rare pockets of black SAND (10x15mm). [HEAD DEPOSITS] Limestone boulder (0.60 x 0.50 x 0.30m)		(0.70) 2.00	71.04	

PLAN DETAILS

2.2

0.5

Long Axis Orientation:

Shoring / Support: None

Stability: Stable

Groundwater (description):

Remarks

1. Groundwater not encountered. 2. Terminated at 2.00m due to refusal on bedrock.

Termination Depth:

2.00m

ARCADIS Trial Pit Log

TP109

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**80.25**	**21/08/2017**	**1:25**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**612231.61**	**136228.20**	**21/08/2017**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA				
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend	Depth (Thickness)	Level	Install/ Backfill
0.30 0.30 0.30	B1 D2 ES3					MADE GROUND; Brown slightly gravelly sandy SILT. Sand is fine to coarse. Gravel is angular to rounded, fine to coarse flint and plastic.		(0.60) 0.60	79.65	
0.70 0.70 0.70 1.20 1.20 1.20 2.00 2.00	B4 D5 ES6 B7 D8 ES9 B10 D1					Soft to firm orangish brown slightly sandy SILT with rare rootlets. Sand is fine. [HEAD DEPOSITS]		(1.90) 2.50	77.75	

PLAN DETAILS

2.3 × 0.5

Long Axis Orientation:

Shoring / Support: None

Stability: Stable

Groundwater (description):

Remarks

1. Groundwater not encountered. 2. Terminated at scheduled depth.

Termination Depth: 2.50m

Trial Pit Log — TP110

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**101.14**	**22/08/2017**	**1:25**
Client	**Easting (OS mE)**	**Northing (OS mN)**	**End Date**	
Shepway District Council	**610956.18**	**136019.59**	**22/08/2017**	**Sheet 1 of 1**

Samples Depth	Samples Type/No.	Tests Depth	Tests Type/No.	Results	Water Strikes
0.30	B1				
0.30	D2				
0.30	ES3				
0.60	B4				
0.60	D5				
0.60	ES6				
1.00	B7				
1.00	D8				
1.00	ES9				
1.80	B10				
1.80	D1				
2.40	B2				
2.40	D3				

Strata Description	Depth (Thickness)	Level
TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.	0.40 (0.40)	100.74
Soft becoming firm orangish brown slightly sandy SILT. Sand is fine to coarse. [HEAD DEPOSITS]	1.60 (1.20)	99.54
Firm greenish brown sandy CLAY. Sand is fine to coarse. Becoming very sandy with depth. Occasional pockets of light brown and black SAND (10x10mm). [HEAD DEPOSITS]	2.50 (0.90)	98.64

PLAN DETAILS

2.1 × 0.5

Long Axis Orientation:

Shoring / Support: None

Stability: Stable

Groundwater (description):

Remarks

1. Groundwater not encountered. 2. Terminated at scheduled depth.

Termination Depth: 2.50m

Arcadis Cymru House
St Mellons Business Park
Cardiff, CF3 0EY

Unless otherwise stated: Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
JCB 3CX	Arcadis Consulting (UK) Limited	HK	IP

ARCADIS **Trial Pit Log** **TP111**

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**91.43**	**15/08/2017**	**1:25**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**611372.01**	**136251.04**	**15/08/2017**	**Sheet 1 of 1**

SAMPLES Depth	SAMPLES Type/No.	TESTS Depth	TESTS Type/No.	TESTS Results	Water Strikes	STRATA Description	Legend	Depth (Thickness)	Level	Install/Backfill
0.30 0.30 0.30	B1 D2 ES3					TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.		(0.60)		
0.50 0.50 0.50	B4 D5 ES6							0.60	90.82	
1.00 1.00 1.00	B7 D8 ES9					Soft becoming firm orangish brown sandy CLAY. Sand is fine to coarse. [HEAD DEPOSITS]		(1.50)		
1.60 1.60	B10 D1					Cobbles of weathered grey limestone up to 350x250mm		2.10	89.32	

PLAN DETAILS

2.3 x 0.5

Long Axis Orientation:

Shoring / Support: None

Stability: Stable

Groundwater (description):

Remarks

1. Groundwater not encountered. 2. Terminated at 2.0m due to refusal on bedrock.

Termination Depth: 2.10m

AGS Arcadis Cymru House St Mellons Business Park Cardiff, CF3 0EY

Unless otherwise stated: Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
JCB 3CX	**Arcadis Consulting (UK) Limited**	**HK**	**IP**

Trial Pit Log

TP111A

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**89.21**	**22/08/2017**	**1:25**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**611403.93**	**136322.45**	**22/08/2017**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA				
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend	Depth (Thickness)	Level	Install/ Backfill
						TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets. Limestone rockhead encountered at 0.30m.		(0.40) 0.40	88.81	

PLAN DETAILS	Remarks
1.7 × 0.5 Long Axis Orientation: Shoring / Support: None Stability: Stable Groundwater (description):	1. Groundwater not encountered. 2. Terminated at 0.40m due to refusal on bedrock. Termination Depth: 0.40m

ARCADIS Trial Pit Log — TP112

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	UA008926	96.44	16/08/2017	1:25
Client	**Easting (OS mE)**	**Northing (OS mN)**	**End Date**	
Shepway District Council	611665.00	135941.12	16/08/2017	Sheet 1 of 1

Samples Depth	Samples Type/No.	Tests Depth	Tests Type/No.	Results	Water Strikes	Strata Description	Depth (Thickness)	Level
						TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.	(0.30)	
0.20	B1							
0.20	D2							
0.20	ES3						0.30	96.14
						Yellowish brown slightly clayey sandy GRAVEL with occasional cobbles of limestone. Sand is fine to coarse. Gravel is angular to rounded, fine to coarse of limestone. [HEAD DEPOSITS]		
0.50	B4							
0.50	D5							
0.50	ES6							
1.00	B7						(1.30)	
1.00	D8							
1.00	ES9							
						Limestone boulder (0.50 x 0.25 x 0.40m.		
						Sandstone gravels rounded to subangular fine to coarse.		
1.50	B10							
1.50	D1						1.60	94.84

PLAN DETAILS

2.3

0.5

Long Axis Orientation:

Shoring / Support: None

Stability: Stable

Groundwater (description):

Remarks

1. Groundwater not encountered. 2. Terminated at 1.60m due to refusal on bedrock.

Termination Depth: 1.60m

Arcadis Cymru House
St Mellons Business Park
Cardiff, CF3 0EY

Unless otherwise stated: Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
JCB 3CX	Arcadis Consulting (UK) Limited	HK	IP

ARCADIS Trial Pit Log

TP113

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**82.66**	**17/08/2017**	**1:25**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**611234.8**	**136519.5**	**17/08/2017**	**Sheet 1 of 1**

SAMPLES Depth	SAMPLES Type/No.	TESTS Depth	TESTS Type/No.	TESTS Results	Water Strikes	STRATA Description	Legend	Depth (Thickness)	Level	Install/Backfill
						MADE GROUND; Dark grey slightly clayey sandy GRAVEL with rare cobbles of concrete. Sand is fine to coarse. Gravel is angular to rounded, fine to coarse flint, brick, tarmac and concrete. Hydrocarbon odour noted.		(0.40)		
0.30 0.30 0.30	B1 D2 ES3									
						MADE GROUND; Soft greenish brown slightly gravelly sandy CLAY with rare cobbles of concrete. Sand is fine to coarse. Gravel is angular to rounded, fine to coarse flint, concrete, slag, tarmac, wood and pipe.		0.40	82.26	
0.60 0.60 0.60	B4 D5 ES6									
1.00 1.00 1.00	B7 D8 ES9									
1.40 1.40 1.40	B10 D1 ES2									
								(2.70)		
2.00 2.00 2.00	B3 D4 ES5									
						Burnt wood pieces and rusted metal up to 200 x 150mm.				
2.50 2.50 2.50	B6 D7 ES8									
3.00 3.00 3.00	B9 D10 ES1					Black tarmac pieces with odour 50x50mm.		3.10	79.56	

PLAN DETAILS

2.9

0.5

Long Axis Orientation:

Shoring / Support: None

Stability: Stable

Groundwater (description):

Remarks

1. Groundwater not encountered. 2. Terminated at 3.10m due to refusal.

Termination Depth: 3.10m

Arcadis Cymru House
St Mellons Business Park
Cardiff, CF3 0EY

Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
JCB 3CX	**Arcadis Consulting (UK) Limited**	**HK**	**IP**

Trial Pit Log — HD101

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**68.09**	**21/08/2017**	**1:25**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**609688.13**	**136765.08**	**21/08/2017**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
						TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.		(0.25) 0.25	67.84	
0.50 0.50 1.00 1.00	B ES B ES					Firm brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular, fine to coarse quartz. [HEAD DEPOSITS]		(0.95) 1.20	66.89	

PLAN DETAILS

0.7

0.7

Long Axis Orientation:

Shoring / Support: None

Stability: Stable

Groundwater (description):

Remarks

1. Hand dug pit. 2. Groundwater not encountered. 3. No visual or olfactory evidence of contamination.

Termination Depth:

1.20m

Arcadis Cymru House
St Mellons Business Park
Cardiff, CF3 0EY

Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Hand tools	**Arcadis Consulting (UK) Limited**	**SAS**	**IP**

ARCADIS Trial Pit Log

HD102

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**65.22**	**21/08/2017**	**1:25**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**609855.55**	**136667.01**	**21/08/2017**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA				Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend	Depth (Thickness)	Level	
						TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.		(0.20) 0.20	65.02	
0.50 0.50	B ES					Firm brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular, fine to coarse quartz. [HEAD DEPOSITS]		(1.00)		
1.00 1.00	B ES							1.20	64.02	

PLAN DETAILS

0.7 × 0.7

Long Axis Orientation:

Shoring / Support: None

Stability: Stable

Groundwater (description):

Remarks

1. Hand dug pit. 2. Groundwater not encountered. 3. No visual or olfactory evidence of contamination.

Termination Depth:

1.20m

AGS Arcadis Cymru House St Mellons Business Park Cardiff, CF3 0EY

Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Hand tools	**Arcadis Consulting (UK) Limited**	**SAS**	**IP**

ARCADIS Trial Pit Log

HD103

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
Otterpool Park	**UA008926**	**79.01**	**21/08/2017**	**1:25**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Shepway District Council	**609754.60**	**136560.71**	**21/08/2017**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA				Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend	Depth (Thickness)	Level	
						TOPSOIL; Grass over brown slightly gravelly sandy clay with rootlets.		(0.20) 0.20	78.81	
0.50 0.50	B ES					Firm brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular, fine to coarse quartz. [HEAD DEPOSITS]		(1.00) 1.20	77.81	
1.00 1.00	B ES									

PLAN DETAILS

0.7 × 0.7

Long Axis Orientation:

Shoring / Support: None

Stability: Stable

Groundwater (description):

Remarks

1. Hand dug pit. 2. Groundwater not encountered. 3. No visual or olfactory evidence of contamination.

Termination Depth: 1.20m

AGS

Arcadis Cymru House
St Mellons Business Park
Cardiff, CF3 0EY

Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Hand tools	**Arcadis Consulting (UK) Limited**	**SAS**	**IP**

APPENDIX D

CERTIFICATION OF FIELD APPARATUS

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX59JP

SPT Hammer Ref:	AR1704
Test Date:	09/02/2017
Report Date:	24/05/2017
File Name:	AR1704.spt
Test Operator:	SH

Instrumented Rod Data

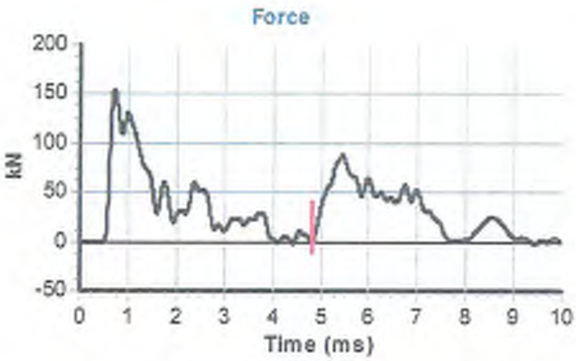
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.1
Assumed Modulus E_a (GPa):	200
Accelerometer No.1:	7080
Accelerometer No.2:	7079

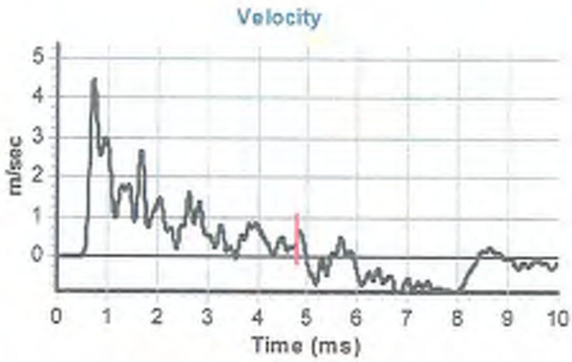
SPT Hammer Information

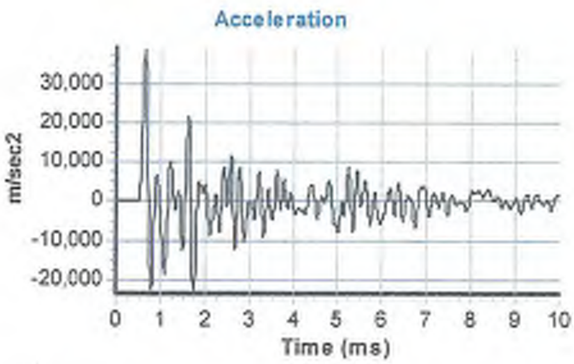
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	10.0

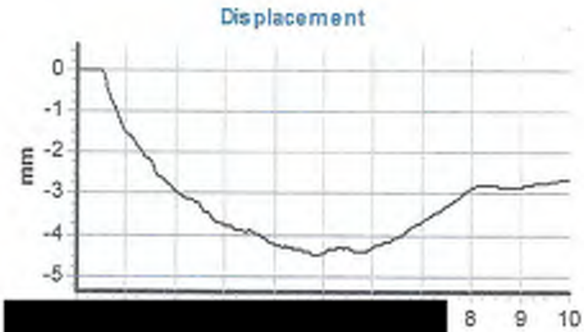
Comments / Location

CALIBRATION









[redacted]

Calculations

Area of Rod A (mm2):	918
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	321

Energy Ratio E_r (%): 68

Signed: S. HOWARTH
Title: FITTER

The recommended calibration interval is 12 months

APPENDIX E

IN SITU AND MONITORING DATA

Project:	Otterpool Park			Weather:	Dry
Job Number:	UA008926	Date:	31/08/2017	Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS103	31/08/2017 11:43	1007		Peak: 0.0	Peak: 0.0	0	0.0	0.0	21.4	0	0	-	5.4	
						10	0.1	2.2	19.6	0	0			
						20	0.1	2.3	18.9	0	0			
						30	0.1	2.3	18.8	0	0			
						40	0.1	2.4	18.6	0	0			
						50	0.1	2.5	18.5	0	0			
						60	0.1	2.6	18.4	0	0			
						90	0.1	2.7	18.3	0	0			
						120	0.1	2.8	18.1	0	0			
				Steady: 0.0	Steady: 0.0	150	0.1	2.9	18.1	0	0			
						180	0.1	2.9	18.1	0	0			
						210	0.1	3.0	17.9	0	0			
						240	0.1	3.3	17.6	0	0			
						270	0.1	3.5	17.4	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	21.4
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	31/08/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS104	31/08/2017 12:47	1007		Peak: 0.02 Steady: 0.00	Peak: 0.0 Steady: 0.0	0	0.0	0.0	21.4	0	0	-	5.4	
						10	0.1	1.5	19.6	0	0			
						20	0.1	1.5	19.5	0	0			
						30	0.1	1.5	19.5	0	0			
						40	0.1	1.5	19.5	0	0			
						50	0.1	1.5	19.5	0	0			
						60	0.1	1.5	19.4	0	0			
						90	0.1	1.6	19.4	0	0			
						120	0.1	1.6	19.4	0	0			
						150	0.1	1.6	19.4	0	0			
						180	0.1	1.6	19.3	0	0			
						210	0.1	1.7	19.3	0	0			
						240	0.1	1.7	19.2	0	0			
						270	0.1	1.8	19.1	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	21.4
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	31/08/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS105	31/08/2017 12:17	1007		Peak: 0.00	Peak: 0.0	0	0.0	0.0	21.3	0	0	1.18	2.65	
						10	0.1	0.1	21.2	0	0			
						20	0.1	0.1	21.1	0	0			
						30	0.1	0.2	21.0	0	0			
						40	0.1	0.2	21.0	0	0			
						50	0.1	0.2	21.0	0	0			
						60	0.1	0.2	20.9	0	0			
						90	0.1	0.2	20.9	0	0			
						120	0.1	0.2	20.9	0	0			
				Steady: 0.00	Steady: 0.0	150	0.1	0.2	20.9	0	0			
						180	0.1	0.2	20.9	0	0			
						210	0.1	0.2	20.9	0	0			
						240	0.1	0.2	20.9	0	0			
						270	0.1	0.2	20.9	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	21.3
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	31/08/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°C)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS106	31/08/2017 13:38	1010		Peak: 0.00 Steady: 0.00	Peak: 0.0 Steady: 0.0	0	0.0	0.0	21.3	0	0	2.31	3.33	
						10	0.1	1.0	20.5	0	0			
						20	0.0	1.1	20.3	0	0			
						30	0.0	1.1	20.3	0	0			
						40	0.0	1.1	20.3	0	0			
						50	0.0	1.1	20.3	0	0			
						60	0.0	1.1	20.3	0	0			
						90	0.0	1.2	20.3	0	0			
						120	0.1	1.2	20.3	0	0			
						150	0.1	1.2	20.2	0	0			
						180	0.0	1.2	20.2	0	0			
						210	0.0	1.2	20.2	0	0			
						240	0.0	1.2	20.2	0	0			
						270	0.0	1.2	20.2	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	21.3
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	31/08/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS107	31/08/2017 14:30	1010		Peak: 0.00	Peak: 0.0	0	0.0	0.0	21.0	0	0	2.14	2.95	
						10	0.0	3.8	16.0	0	0			
						20	0.0	3.9	14.6	0	0			
						30	0.0	4.1	14.3	0	0			
						40	0.0	4.3	14.1	0	0			
						50	0.0	4.5	13.8	0	0			
						60	0.0	4.5	13.6	0	0			
						90	0.0	4.5	13.6	0	0			
						120	0.0	4.6	13.5	0	0			
				Steady: 0.00	Steady: 0.0	150	0.0	4.6	13.5	0	0			
						180	0.0	4.6	13.5	0	0			
						210	0.0	4.6	13.5	0	0			
						240	0.0	4.6	13.4	0	0			
						270	0.0	4.6	13.1	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	21.3
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	31/08/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS108	31/08/2017 15:44	1010		Peak: 0.00 Steady: 0.00	Peak: 0.0 Steady: 0.0	0	0.0	0.0	21.5	0	0	2.42	2.75	
						10	0.0	1.8	20.2	0	0			
						20	0.0	1.9	19.9	0	0			
						30	0.0	2.1	19.8	0	0			
						40	0.0	2.1	19.7	0	0			
						50	0.0	2.2	19.7	0	0			
						60	0.0	2.2	19.7	0	0			
						90	0.0	2.2	19.7	0	0			
						120	0.0	2.2	19.7	0	0			
						150	0.0	2.2	19.7	0	0			
						180	0.0	2.2	19.6	0	0			
						210	0.0	2.2	19.6	0	0			
						240	0.0	2.2	19.6	0	0			
						270	0.0	2.2	19.6	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	21.5
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	31/08/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°C)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS112	31/08/2017 10:25	1007		Peak: 0.01 Steady: 0.00	Peak: 0.3 Steady: 0.0	0	0.0	0.0	20.6	0	0	-	3.31	
						10	0.0	0.2	20.5	0	0			
						20	0.0	0.9	19.8	0	0			
						30	0.0	1.0	19.7	0	0			
						40	0.0	1.0	19.6	0	0			
						50	0.0	1.0	19.5	0	0			
						60	0.0	1.0	19.5	0	0			
						90	0.0	1.1	19.5	0	0			
						120	0.0	1.1	19.4	0	0			
						150	0.0	1.1	19.3	0	0			
						180	0.1	1.2	19.3	0	0			
						210	0.1	1.2	19.2	0	0			
						240	0.1	1.3	19.0	0	0			
						270	0.1	1.4	18.9	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.6
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	31/08/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH101	31/08/2017 10:35	1007		Peak: 0.01 Steady: 0.0	Peak: 0.01 Steady: 0.0	0	0.0	0.0	20.2	0	0	-	9.92	
						10	0.0	0.0	20.0	0	0			
						20	0.0	0.0	20.1	0	0			
						30	0.0	0.0	20.2	0	0			
						40	0.0	0.0	20.1	0	0			
						50	0.0	0.0	20.1	0	0			
						60	0.0	0.0	20.1	0	0			
						90	0.0	0.0	20.1	0	0			
						120	0.0	0.0	20.1	0	0			
						150	0.0	0.0	20.2	0	0			
						180	0.0	0.0	20.2	0	0			
						210	0.0	0.0	20.2	0	0			
						240	0.0	0.0	20.2	0	0			
						270	0.0	0.0	20.2	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	31/08/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH102	31/08/2017 13:18	1010		Peak: 0.01 Steady: 0.0	Peak: 0.01 Steady: 0.0	0	0.0	0.0	21.4	0	0	-	9.56	
						10	0.0	2.5	19.1	0	0			
						20	0.0	2.5	19.1	0	0			
						30	0.0	2.5	19.1	0	0			
						40	0.0	2.5	19.1	0	0			
						50	0.0	2.5	19.1	0	0			
						60	0.0	2.5	19.1	0	0			
						90	0.0	2.5	19.1	0	0			
						120	0.0	2.5	19.1	0	0			
						150	0.0	2.5	19.1	0	0			
						180	0.0	2.5	19.1	0	0			
						210	0.0	2.5	19.1	0	0			
						240	0.0	2.5	19.1	0	0			
						270	0.0	2.5	19.1	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	21.4
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	31/08/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH103	31/08/2017 14:38	1010		Peak: 0.01 Steady: 0.0	Peak: 0.01 Steady: 0.0	0	0.0	0.0	20.8	0	0	1.87	8.28	
						10	0.1	0.1	20.9	0	0			
						20	0.1	0.2	20.5	0	0			
						30	0.1	0.2	20.4	0	0			
						40	0.0	0.2	20.4	0	0			
						50	0.0	0.2	20.3	0	0			
						60	0.0	0.2	20.3	0	0			
						90	0.0	0.2	20.2	0	0			
						120	0.0	0.2	20.2	0	0			
						150	0.0	0.2	20.1	0	0			
						180	0.0	0.2	20.1	0	0			
						210	0.0	0.2	20.0	0	0			
						240	0.0	0.2	20.0	0	0			
						270	0.0	0.2	20.0	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.8
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	31/08/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH104	31/08/2017 11:00	1010		Peak: 0.0 Steady: 0.0	Peak: 0.0 Steady: 0.0	0	0.0	0.0	20.2	0	0	3.81	7.88	
						10	0.0	0.4	19.8	2	0			
						20	0.0	0.4	19.7	2	0			
						30	0.0	0.4	19.4	2	0			
						40	0.0	0.4	19.3	3	0			
						50	0.0	0.4	19.2	2	0			
						60	0.0	0.4	19.1	3	0			
						90	0.0	0.4	19.1	3	0			
						120	0.0	0.5	19.1	2	0			
						150	0.0	0.5	19.1	2	0			
						180	0.0	0.5	19.0	3	0			
						210	0.0	0.5	19.0	2	0			
						240	0.0	0.5	19.0	3	0			
						270	0.0	0.5	19.0	3	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.2
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	31/08/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH105	31/08/2017 15:17	1009		Peak: 0.4 Steady: 0.4	Peak: 0.6 Steady: 0.6	0	0.0	0.1	21.5	0	0	3.69	7.27	
						10	0.0	0.3	18.8	0	0			
						20	0.0	1.2	14.4	3	0			
						30	0.0	1.3	13.2	4	0			
						40	0.0	1.4	12.5	5	0			
						50	0.0	1.4	12.0	6	0			
						60	0.0	1.5	11.6	7	0			
						90	0.0	1.5	11.1	7	0			
						120	0.0	1.6	10.4	8	0			
						150	0.0	1.7	9.6	9	0			
						180	0.0	1.9	8.0	10	0			
						210	0.0	2.3	5.3	13	0			
						240	0.0	2.4	3.9	14	0			
						270	0.0	2.5	3.4	15	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.2
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°C)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS103	08/09/2017 11:40	992		Peak: 0.0 Steady: 0.0	Peak: 0.0 Steady: 0.0	0	0.0	0.0	21.1	0	0	-	4.96	
						10	0.0	0.6	20.0	0	0			
						20	0.0	4.2	17.1	0	0			
						30	0.0	4.3	16.4	0	0			
						40	0.0	4.4	16.2	0	0			
						50	0.0	4.4	16.1	0	0			
						60	0.0	4.4	16.1	0	0			
						90	0.0	4.4	16.1	0	0			
						120	0.0	4.4	16.1	0	0			
						150	0.0	4.4	16.1	0	0			
						180	0.0	4.4	16.1	0	0			
						210	0.0	4.4	16.1	0	0			
						240	0.0	4.4	16.1	0	0			
						270	0.0	4.4	16.1	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	21.1
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°C)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS104	08/09/2017 12:50	992		Peak: 0.02 Steady: 0.00	Peak: 0.0 Steady: 0.0	0	0.0	0.0	20.8	0	0	-	3.77	
						10	0.0	1.9	18.2	0	0			
						20	0.0	2.8	16.8	0	0			
						30	0.0	2.9	16.4	0	0			
						40	0.0	2.9	16.3	0	0			
						50	0.0	2.9	16.3	0	0			
						60	0.0	2.9	16.3	0	0			
						90	0.0	2.9	16.3	0	0			
						120	0.0	2.9	16.3	0	0			
						150	0.0	2.9	16.3	0	0			
						180	0.0	2.9	16.3	0	0			
						210	0.0	2.9	16.3	0	0			
						240	0.0	2.9	16.3	0	0			
						270	0.0	2.9	16.3	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.8
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS105	08/09/2017 12:32	994		Peak: 0.00 Steady: 0.00	Peak: 0.0 Steady: 0.0	0	0.0	0.0	20.8	0	0	0.942	2.65	
						10	0.0	0.1	20.8	0	0			
						20	0.0	0.2	20.4	0	0			
						30	0.0	0.2	20.3	0	0			
						40	0.0	0.2	20.3	0	0			
						50	0.0	0.2	20.3	0	0			
						60	0.0	0.2	20.3	0	0			
						90	0.0	0.2	20.3	0	0			
						120	0.0	0.2	20.3	0	0			
						150	0.0	0.2	20.3	0	0			
						180	0.0	0.2	20.3	0	0			
						210	0.0	0.2	20.3	0	0			
						240	0.0	0.2	20.3	0	0			
						270	0.0	0.2	20.3	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.8
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°C)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS106	08/09/2017 13:50	992		Peak: 0.00 Steady: 0.00	Peak: 0.0 Steady: 0.0	0	0.0	0.0	21.0	0	0	1.99	2.99	
						10	0.1	0.6	20.6	0	0			
						20	0.0	0.7	20.4	0	0			
						30	0.0	0.9	20.3	0	0			
						40	0.0	1.0	20.3	0	0			
						50	0.0	1.1	20.2	0	0			
						60	0.0	1.1	20.1	0	0			
						90	0.0	1.2	20.0	0	0			
						120	0.0	1.2	20.0	0	0			
						150	0.0	1.3	19.9	0	0			
						180	0.0	1.3	19.9	0	0			
						210	0.0	1.4	19.9	0	0			
						240	0.0	1.4	19.8	0	0			
						270	0.0	1.4	19.8	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	21.0
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS107	08/09/2017 14:30	992		Peak: 0.00	Peak: 0.0	0	0.0	0.0	20.6	0	0	2.28	3.03	
						10	0.0	0.2	20.5	0	0			
						20	0.0	0.9	19.7	0	0			
						30	0.0	1.1	18.9	0	0			
						40	0.0	1.4	18.5	0	0			
						50	0.0	1.7	17.6	0	0			
						60	0.0	2.0	16.4	0	0			
						90	0.0	2.3	16.1	0	0			
						120	0.0	2.4	15.9	0	0			
				Steady: 0.00	Steady: 0.0	150	0.0	2.7	15.1	0	0			
						180	0.0	2.9	15.5	0	0			
						210	0.0	3.1	15.4	0	0			
						240	0.0	3.4	15.4	0	0			
						270	0.0	3.5	15.4	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.6
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS108	08/09/2017 16:00	995		Peak: 0.01	Peak: 0.0	0	0.0	0.0	20.7	0	0	2.672	2.72	
						10	0.0	0.1	20.7	0	0			
						20	0.0	0.1	20.7	0	0			
						30	0.0	0.1	20.7	0	0			
						40	0.0	0.1	20.7	0	0			
						50	0.0	0.1	20.7	0	0			
						60	0.0	0.1	20.7	0	0			
						90	0.0	0.1	20.7	0	0			
				Steady: 0.01	Steady: 0.0	120	0.0	0.2	20.7	0	0			
						150	0.0	0.2	20.7	0	0			
						180	0.0	0.3	20.7	0	0			
						210	0.0	0.3	20.7	0	0			
						240	0.0	0.4	20.6	0	0			
						270	0.0	0.4	20.5	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.7
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°C)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS112	08/09/2017 10:12	991		Peak: 0.01 Steady: 0.00	Peak: 0.3 Steady: 0.0	0	0.0	0.0	20.5	0	0	-	3.41	
						10	0.0	0.0	20.4	0	0			
						20	0.0	0.0	20.4	0	0			
						30	0.0	0.0	20.4	0	0			
						40	0.0	0.0	20.4	0	0			
						50	0.0	0.0	20.4	0	0			
						60	0.0	0.0	20.4	0	0			
						90	0.0	0.0	20.4	0	0			
						120	0.0	0.0	20.4	0	0			
						150	0.0	0.0	20.4	0	0			
						180	0.0	0.0	20.4	0	0			
						210	0.0	0.0	20.4	0	0			
						240	0.0	0.0	20.4	0	0			
						270	0.0	0.0	20.4	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.5
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°C)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH101	08/09/2017 10:00	989		Peak: 0.00 Steady: 0.00	Peak: 0.0 Steady: 0.0	0	0.0	0.0	20.5	0	0	9.885	9.92	
						10	0.0	1.0	20.0	0	0			
						20	0.0	1.3	19.3	0	0			
						30	0.0	1.4	19.3	0	0			
						40	0.0	1.4	19.3	0	0			
						50	0.0	1.4	19.3	0	0			
						60	0.0	1.4	19.3	0	0			
						90	0.0	1.4	19.3	0	0			
						120	0.0	1.4	19.3	0	0			
						150	0.0	1.4	19.3	0	0			
						180	0.0	1.4	19.3	0	0			
						210	0.0	1.4	19.3	0	0			
						240	0.0	1.4	19.3	0	0			
						270	0.0	1.4	19.3	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.5
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH102	08/09/2017 10:32	989		Peak: 0.00 Steady: 0.00	Peak: 0.0 Steady: 0.0	0	0.0	0.0	20.6	0	0	-	9.56	
						10	0.0	1.7	19.6	0	0			
						20	0.0	2.1	19.1	0	0			
						30	0.0	2.2	18.9	0	0			
						40	0.0	2.3	18.7	0	0			
						50	0.0	2.5	18.6	0	0			
						60	0.0	2.5	18.6	0	0			
						90	0.0	2.6	18.5	0	0			
						120	0.0	2.7	18.5	0	0			
						150	0.0	2.7	18.4	0	0			
						180	0.0	2.7	18.4	0	0			
						210	0.0	2.7	18.4	0	0			
						240	0.0	2.7	18.4	0	0			
						270	0.0	2.7	18.4	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.6
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°C)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH103	08/09/2017 14:38	992		Peak: 0.00	Peak: 0.0	0	0.0	0.0	20.5	0	0	1.84	8.24	
						10	0.0	0.1	20.5	0	0			
						20	0.0	0.2	19.6	0	0			
						30	0.0	0.2	18.8	0	0			
						40	0.0	0.2	18.6	0	0			
						50	0.0	0.2	18.6	0	0			
						60	0.0	0.2	18.4	0	0			
						90	0.0	0.2	18.4	0	0			
						120	0.0	0.2	18.4	0	0			
				Steady: 0.00	Steady: 0.0	150	0.0	0.2	18.2	0	0			
						180	0.0	0.2	18.1	0	0			
						210	0.0	0.2	17.8	0	0			
						240	0.0	0.2	16.8	0	0			
						270	0.0	0.3	16.7	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.5
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH104	08/09/2017 11:00	991		Peak: 0.00 Steady: 0.00	Peak: 0.0 Steady: 0.0	0	0.0	0.0	20.9	0	0	3.47	7.2	
						10	0.0	1.5	19.6	0	0			
						20	0.0	1.5	18.7	0	0			
						30	0.0	1.5	18.5	0	0			
						40	0.0	1.5	18.5	0	0			
						50	0.0	1.5	18.5	0	0			
						60	0.0	1.5	18.5	0	0			
						90	0.0	1.5	18.5	0	0			
						120	0.0	1.5	18.5	0	0			
						150	0.0	1.5	18.5	0	0			
						180	0.0	1.5	18.5	0	0			
						210	0.0	1.5	18.5	0	0			
						240	0.0	1.5	18.5	0	0			
						270	0.0	1.5	18.5	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.9
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH105	08/09/2017 15:00	992		Peak: -0.02	Peak: 0.0	0	0.0	0.0	20.8	0	0	3.655	7.32	
						10	0.0	1.9	19.2	0	0			
						20	0.0	2.6	18.5	0	0			
						30	0.0	2.6	18.4	0	0			
						40	0.0	2.6	18.4	0	0			
						50	0.0	2.7	18.3	0	0			
						60	0.0	2.7	18.3	0	0			
						90	0.0	2.7	18.3	0	0			
						120	0.0	2.7	18.3	0	0			
				Steady: -0.02	Steady: 0.0	150	0.0	2.7	18.3	0	0			
						180	0.0	2.7	18.3	0	0			
						210	0.0	2.7	18.3	0	0			
						240	0.0	2.7	18.3	0	0			
						270	0.0	2.7	18.3	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.8
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park			Weather:	Dry
Job Number:	UA008926	Date:	08/09/2017	Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH1	08/09/2017 10:30	991		Peak: 0.00 Steady: 0.00	Peak: 0.0 Steady: 0.0	0	0.0	0.0	20.9	0	0	9.4	12.36	
						10	0.0	2.6	19.8	0	0			
						20	0.0	3.2	18.9	0	0			
						30	0.0	3.4	18.5	0	0			
						40	0.0	3.5	18.6	0	0			
						50	0.0	3.7	18.2	0	0			
						60	0.0	3.9	18.1	0	0			
						90	0.0	3.9	18.0	0	0			
						120	0.0	3.9	18.0	0	0			
						150	0.0	4.0	17.9	0	0			
						180	0.0	4.0	17.9	0	0			
						210	0.0	4.0	17.9	0	0			
						240	0.0	4.0	17.9	0	0			
						270	0.0	4.0	17.9	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.9
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH2	08/09/2017 10:45	991		Peak: 0.01 Steady: 0.01	Peak: 0.0 Steady: 0.0	0	0.0	0.0	20.9	0	0	7.07	10.56	
						10	0.0	0.0	20.9	0	0			
						20	0.0	2.2	19.5	0	0			
						30	0.0	3.5	17.7	0	0			
						40	0.0	3.5	17.4	0	0			
						50	0.0	3.5	17.3	0	0			
						60	0.0	3.5	17.3	0	0			
						90	0.0	3.5	17.3	0	0			
						120	0.0	3.5	17.2	0	0			
						150	0.0	3.5	17.2	0	0			
						180	0.0	3.5	17.2	0	0			
						210	0.0	3.5	17.2	0	0			
						240	0.0	3.5	17.2	0	0			
						270	0.0	3.5	17.1	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.9
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH3	08/09/2017 11:00	990		Peak: 0.00	Peak: 0.0	0	0.0	0.0	20.6	0	0	-	12.87	
						10	0.0	0.4	19.2	0	0			
						20	0.0	1.7	16.6	0	0			
						30	0.0	1.7	16.1	0	0			
						40	0.0	1.7	16.1	0	0			
						50	0.0	1.7	16.1	0	0			
						60	0.0	1.7	16.1	0	0			
						90	0.0	1.7	16.1	0	0			
				Steady: 0.00	Steady: 0.0	120	0.0	1.7	16.1	0	0			
						150	0.0	1.7	16.1	0	0			
						180	0.0	1.7	16.1	0	0			
						210	0.0	1.7	16.1	0	0			
						240	0.0	1.7	16.1	0	0			
						270	0.0	1.7	16.1	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.6
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH4	08/09/2017 11:15	993		Peak: 0.00	Peak: 0.0	0	0.0	0.0	20.7	0	0	10.205	10.845	
						10	0.0	2.3	17.2	0	0			
						20	0.0	2.7	15.3	0	0			
						30	0.0	2.9	14.9	0	0			
						40	0.0	3.1	14.4	0	0			
						50	0.0	3.2	14.2	0	0			
						60	0.0	3.2	14.1	0	0			
						90	0.0	3.3	14.0	0	0			
						120	0.0	3.3	14.0	0	0			
				Steady: 0.00	Steady: 0.0	150	0.0	3.3	13.9	0	0			
						180	0.0	3.3	13.8	0	0			
						210	0.0	3.4	13.8	0	0			
						240	0.0	3.4	13.8	0	0			
						270	0.0	3.4	13.7	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.7
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH5	08/09/2017 11:30	991		Peak: 0.00	Peak: 0.0	0	0.0	0.0	20.8	0	0	9.73	12.44	
						10	0.0	0.6	19.5	0	0			
						20	0.0	4.1	16.6	0	0			
						30	0.0	4.4	15.9	0	0			
						40	0.0	4.4	15.8	0	0			
						50	0.0	4.4	15.7	0	0			
						60	0.0	4.4	15.7	0	0			
						90	0.0	4.4	15.7	0	0			
						120	0.0	4.4	15.7	0	0			
				Steady: 0.00	Steady: 0.0	150	0.0	4.4	15.7	0	0			
						180	0.0	4.4	15.7	0	0			
						210	0.0	4.4	15.7	0	0			
						240	0.0	4.4	15.7	0	0			
						270	0.0	4.4	13.7	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.8
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH6	08/09/2017 11:40	990		Peak: 0.02	Peak: 0.1	0	0.0	0.0	20.5	0	0	11.39	12.91	
						10	0.0	2.4	18.7	0	0			
						20	0.0	3.6	16.5	0	0			
						30	0.0	3.7	16.1	0	0			
						40	0.0	3.7	16.0	0	0			
						50	0.0	3.7	15.9	0	0			
						60	0.0	3.7	15.9	0	0			
						90	0.0	3.8	15.8	0	0			
						120	0.0	3.8	15.8	0	0			
				Steady: 0.02	Steady: 0.1	150	0.0	3.8	15.8	0	0			
						180	0.0	3.8	15.8	0	0			
						210	0.0	3.8	15.8	0	0			
						240	0.0	3.8	15.8	0	0			
						270	0.0	3.8	15.7	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.5
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH7	08/09/2017 11:50	990		Peak: 0.05 Steady: 0.05	Peak: 0.1 Steady: 0.0	0	0.0	0.0	20.7	0	0	-	12.77	
						10	0.0	3.8	15.5	0	0			
						20	0.0	4.0	14.8	0	0			
						30	0.0	4.0	14.6	0	0			
						40	0.0	4.0	14.5	0	0			
						50	0.0	4.0	14.5	0	0			
						60	0.0	4.0	14.5	0	0			
						90	0.0	4.0	14.5	0	0			
						120	0.0	4.0	14.5	0	0			
						150	0.0	4.0	14.5	0	0			
						180	0.0	4.0	14.5	0	0			
						210	0.0	4.0	14.5	0	0			
						240	0.0	4.0	14.5	0	0			
						270	0.0	4.0	14.5	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.7
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH8	08/09/2017 12:00	990		Peak: 0.05 Steady: 0.05	Peak: 0.1 Steady: 0.0	0	0.0	0.0	20.6	0	0	-	12.72	
						10	0.0	0.3	20.4	0	0			
						20	0.0	1.6	19.7	0	0			
						30	0.0	1.7	19.5	0	0			
						40	0.0	1.7	19.5	0	0			
						50	0.0	1.7	19.4	0	0			
						60	0.0	1.8	19.4	0	0			
						90	0.0	1.8	19.4	0	0			
						120	0.0	1.8	19.4	0	0			
						150	0.0	1.9	19.3	0	0			
						180	0.0	1.9	19.3	0	0			
						210	0.0	1.9	19.3	0	0			
						240	0.0	2.0	19.3	0	0			
						270	0.0	2.0	19.3	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.6
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH9	08/09/2017 12:10	990		Peak: 0.00 Steady: 0.00	Peak: 0.0 Steady: 0.0	0	0.0	0.0	20.6	0	0	11.24	12.65	
						10	0.0	2.1	19.5	0	0			
						20	0.0	2.5	17.9	0	0			
						30	0.0	2.5	17.6	0	0			
						40	0.0	2.5	17.5	0	0			
						50	0.0	2.5	17.4	0	0			
						60	0.0	2.5	17.4	0	0			
						90	0.0	2.5	17.4	0	0			
						120	0.0	2.6	17.4	0	0			
						150	0.0	2.6	17.4	0	0			
						180	0.0	2.6	17.3	0	0			
						210	0.0	2.6	17.3	0	0			
						240	0.0	2.6	17.3	0	0			
						270	0.0	2.6	17.3	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.6
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	08/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH10	08/09/2017 12:20	990		Peak: 0.07 Steady: 0.07	Peak: 0.0 Steady: 0.0	0	0.0	0.0	20.5	0	0	-	12.7	
						10	0.0	1.2	19.6	0	0			
						20	0.0	1.4	18.9	0	0			
						30	0.0	1.4	18.8	0	0			
						40	0.0	1.5	18.7	0	0			
						50	0.0	1.5	18.6	0	0			
						60	0.0	1.5	18.6	0	0			
						90	0.0	1.5	18.6	0	0			
						120	0.0	1.5	18.6	0	0			
						150	0.0	1.5	18.6	0	0			
						180	0.0	1.5	18.6	0	0			
						210	0.0	1.5	18.6	0	0			
						240	0.0	1.5	18.6	0	0			
						270	0.0	1.5	18.6	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.5
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	15/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°C)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS103	15/09/2017 12:30	999		Peak: 0.0 Steady: 0.0	Peak: 0.0 Steady: 0.0	0	0.0	0.0	21.1	0	0	-	4.955	
						10	0.0	0.6	18.9	0	0			
						20	0.0	4.3	17.3	0	0			
						30	0.0	4.4	16.8	0	0			
						40	0.0	4.5	16.6	0	0			
						50	0.0	4.5	16.6	0	0			
						60	0.0	4.5	16.5	0	0			
						90	0.0	4.5	16.5	0	0			
						120	0.0	4.5	16.5	0	0			
						150	0.0	4.5	16.5	0	0			
						180	0.0	4.5	16.5	0	0			
						210	0.0	4.5	16.5	0	0			
						240	0.0	4.5	16.5	0	0			
						270	0.0	4.5	16.5	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	21.1
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	15/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS104	15/09/2017 14:00	1000		Peak: 0.01	Peak: 0.0	0	0.0	0.0	21.0	0	0	-	3.77	
						10	0.0	1.6	19.1	0	0			
						20	0.0	2.4	18.1	0	0			
						30	0.0	2.4	17.7	0	0			
						40	0.0	2.4	17.6	0	0			
						50	0.0	2.4	17.6	0	0			
						60	0.0	2.4	17.6	0	0			
						90	0.0	2.4	17.6	0	0			
						120	0.0	2.4	17.6	0	0			
				Steady: 0.00	Steady: 0.0	150	0.0	2.4	17.6	0	0			
						180	0.0	2.4	17.6	0	0			
						210	0.0	2.4	17.6	0	0			
						240	0.0	2.4	17.6	0	0			
						270	0.0	2.4	17.5	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	21.0
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	15/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS105	15/09/2017 11:36	1001		Peak: 0.00	Peak: 0.0	0	0.0	0.0	20.5	0	0	0.931	2.65	
						10	0.0	0.4	21.0	0	0			
						20	0.0	2.1	19.2	0	0			
						30	0.0	2.2	18.8	0	0			
						40	0.0	2.2	18.7	0	0			
						50	0.0	2.2	18.6	0	0			
						60	0.0	2.2	18.6	0	0			
						90	0.0	2.2	18.6	0	0			
						120	0.0	2.2	18.6	0	0			
				Steady: 0.00	Steady: 0.0	150	0.0	2.2	18.6	0	0			
						180	0.0	2.2	18.6	0	0			
						210	0.0	2.2	18.6	0	0			
						240	0.0	2.2	18.6	0	0			
						270	0.0	2.2	18.6	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.5
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	15/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS106	15/09/2017 13:50	1000		Peak: 0.00 Steady: 0.00	Peak: 0.0 Steady: 0.0	0	0.0	0.0	20.4	0	0	1.935	2.98	
						10	0.0	0.7	20.0	0	0			
						20	0.0	1.7	19.6	0	0			
						30	0.0	1.8	19.3	0	0			
						40	0.0	1.9	19.3	0	0			
						50	0.0	2.0	19.2	0	0			
						60	0.0	2.0	19.2	0	0			
						90	0.0	2.0	19.1	0	0			
						120	0.0	2.0	19.1	0	0			
						150	0.1	2.1	19.1	0	0			
						180	0.1	2.1	19.1	0	0			
						210	0.1	2.1	19.1	0	0			
						240	0.1	2.1	19.1	0	0			
						270	0.1	2.1	19.1	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.4
H2S	0
CO	0

ARCADIS

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	15/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS107	15/09/2017 10:30	1000		Peak: 0.00 Steady: 0.00	Peak: 0.0 Steady: 0.0	0	0.0	0.0	20.5	0	0	2.235	3	
						10	0.0	2.7	19.0	0	0			
						20	0.0	4.4	15.7	0	0			
						30	0.0	4.5	14.3	0	0			
						40	0.0	4.6	13.6	0	0			
						50	0.0	4.6	13.3	0	0			
						60	0.0	4.7	13.1	0	0			
						90	0.0	4.7	13.0	0	0			
						120	0.0	4.7	13.0	0	0			
						150	0.0	4.7	12.9	0	0			
						180	0.0	4.7	12.9	0	0			
						210	0.0	4.7	12.9	0	0			
						240	0.0	4.7	12.9	0	0			
						270	0.0	4.7	12.8	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.5
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	15/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS108	15/09/2017 16:00	1001		Peak: 0.00 Steady: 0.00	Peak: 0.0 Steady: 0.0	0	0.0	0.0	20.8	0	0	2.572	2.7	
						10	0.0	1.2	20.6	0	0			
						20	0.0	1.7	19.9	0	0			
						30	0.0	1.8	19.6	0	0			
						40	0.0	1.8	19.4	0	0			
						50	0.0	1.8	19.4	0	0			
						60	0.0	1.8	19.4	0	0			
						90	0.0	1.8	19.4	0	0			
						120	0.0	1.8	19.4	0	0			
						150	0.0	1.8	19.4	0	0			
						180	0.0	1.8	19.3	0	0			
						210	0.0	1.8	19.3	0	0			
						240	0.0	1.8	19.3	0	0			
						270	0.0	1.8	19.3	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.8
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	15/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°C)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS112	15/09/2017 12:12	1001		Peak: 0.00 Steady: 0.00	Peak: 0.0 Steady: 0.0	0	0.0	0.0	20.9	0	0	-	3.696	
						10	0.0	0.3	20.3	0	0			
						20	0.0	0.7	19.9	0	0			
						30	0.0	0.7	19.8	0	0			
						40	0.0	0.7	19.8	0	0			
						50	0.0	0.7	19.8	0	0			
						60	0.0	0.7	19.8	0	0			
						90	0.0	0.7	19.8	0	0			
						120	0.0	0.7	19.8	0	0			
						150	0.0	0.7	19.8	0	0			
						180	0.0	0.7	19.8	0	0			
						210	0.0	0.7	19.8	0	0			
						240	0.0	0.7	19.8	0	0			
						270	0.0	0.7	19.8	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.9
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	15/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH101	15/09/2017 12:03	1001		Peak: 0.01 Steady: 0.01	Peak: 0.0 Steady: 0.0	0	0.0	0.0	20.9	0	0	10.13	10.18	Not true groundwater in well. This is leftover water in the well endcap from infiltrating testing
						10	0.0	0.3	20.8	0	0			
						20	0.0	0.6	20.5	0	0			
						30	0.0	0.6	20.5	0	0			
						40	0.0	0.6	20.5	0	0			
						50	0.0	0.6	20.5	0	0			
						60	0.0	0.6	20.5	0	0			
						90	0.0	0.6	20.5	0	0			
						120	0.0	0.6	20.5	0	0			
						150	0.0	0.6	20.5	0	0			
						180	0.0	0.6	20.5	0	0			
						210	0.0	0.6	20.5	0	0			
						240	0.0	0.6	20.5	0	0			
						270	0.0	0.6	20.5	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.9
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	15/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°C)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH102	15/09/2017 11:51	1001		Peak: 0.00 Steady: 0.00	Peak: 0.0 Steady: 0.0	0	0.0	0.0	20.6	0	0	-	9.59	
						10	0.0	0.1	20.5	0	0			
						20	0.0	2.6	19.4	0	0			
						30	0.0	2.8	18.7	0	0			
						40	0.0	2.8	18.5	0	0			
						50	0.0	2.8	18.5	0	0			
						60	0.0	2.8	18.4	0	0			
						90	0.0	2.8	18.5	0	0			
						120	0.0	2.8	18.5	0	0			
						150	0.0	2.8	18.4	0	0			
						180	0.0	2.8	18.4	0	0			
						210	0.0	2.8	18.4	0	0			
						240	0.0	2.8	18.5	0	0			
						270	0.0	2.8	18.5	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.6
H2S	0
CO	0

ARCADIS

Project:	Otterpool Park		
Job Number:	UA008926	Date:	15/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°C)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH103	15/09/2017 12:00	1000		Peak: 0.00 Steady: 0.00	Peak: 0.0 Steady: 0.0	0	0.0	0.0	20.2	0	0	1.477	8.24	
						10	0.0	0.0	20.1	0	0			
						20	0.0	0.1	20.0	0	0			
						30	0.0	0.1	19.9	0	0			
						40	0.0	0.1	19.8	0	0			
						50	0.0	0.1	19.8	0	0			
						60	0.0	0.1	19.8	0	0			
						90	0.0	0.1	19.8	0	0			
						120	0.0	0.2	19.7	0	0			
						150	0.0	0.2	19.7	0	0			
						180	0.0	0.2	19.6	0	0			
						210	0.0	0.2	19.6	0	0			
						240	0.0	0.2	19.6	0	0			
						270	0.0	0.2	19.6	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.5
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	15/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°c)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH104	15/09/2017 14:30	1000		Peak: 0.00 Steady: 0.00	Peak: 0.0 Steady: 0.0	0	0.0	0.0	20.6	0	0	3.474	6.45	
						10	0.1	1.6	18.7	0	0			
						20	0.1	1.6	17.9	0	0			
						30	0.1	1.6	17.8	0	0			
						40	0.0	1.6	17.8	0	0			
						50	0.0	1.6	17.8	0	0			
						60	0.0	1.6	17.8	0	0			
						90	0.0	1.6	17.8	0	0			
						120	0.0	1.6	17.8	0	0			
						150	0.0	1.6	17.7	0	0			
						180	0.0	1.6	17.7	0	0			
						210	0.0	1.6	17.7	0	0			
						240	0.0	1.6	17.7	0	0			
						270	0.0	1.6	17.7	0	0			

Notes:

Ambient Concentration	
CH4	0
CO2	0
O2	20.6
H2S	0
CO	0

Project:	Otterpool Park		
Job Number:	UA008926	Date:	15/09/2017

Weather:	Dry
Engineer:	Roy Dennis

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°C)	Well Pressure (mbar)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	CO (ppm)	H2S (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
BH105	15/09/2017 11:22	1001		Peak: -0.02 Steady: -0.02	Peak: 0.0 Steady: 0.0	0	0.0	0.0	20.8	0	0	3.378	7.31	
						10	0.0	0.4	19.8	0	0			
						20	0.0	2.7	18.1	0	0			
						30	0.0	3.0	17.3	0	0			
						40	0.0	3.3	16.8	0	0			
						50	0.0	3.5	16.4	0	0			
						60	0.0	3.6	16.0	0	0			
						90	0.0	3.8	14.7	0	0			
						120	0.0	3.9	15.6	0	0			
						150	0.0	3.9	15.5	0	0			
						180	0.0	3.9	15.4	0	0			
						210	0.0	4.0	15.4	0	0			
						240	0.0	4.0	15.3	0	0			
						270	0.0	4.0	15.3	0	0			

Notes:

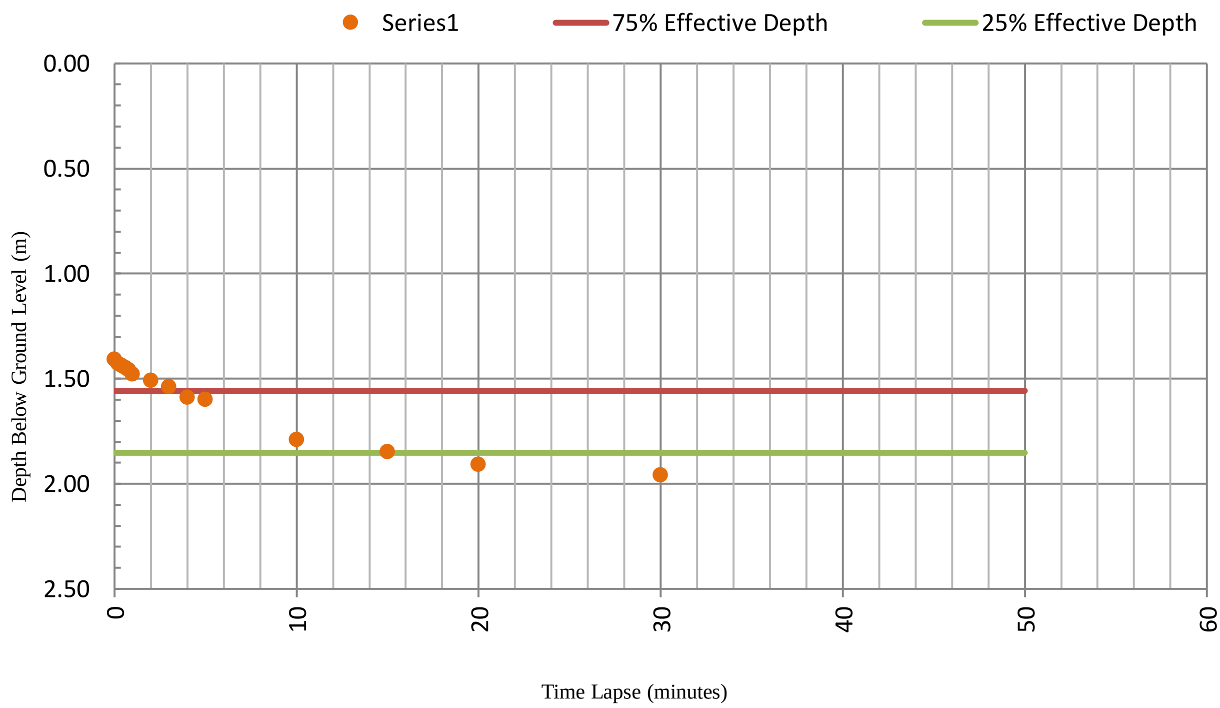
Ambient Concentration	
CH4	0
CO2	0
O2	20.8
H2S	0
CO	0

SOAKAWAY INFILTRATION TEST

Project				Trial Pit No
Otterpool Park				TP101
Job No. UA008926	Date 15/08/2017	Ground Level (mAOD) 71.59	Co-Ordinates E 610259.33 N 137376.17	
Contractor Arcadis Consulting (UK) Limited				Sheet 1 of 1

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	2.30	Length	2.70
Width	0.50	Width	0.50
Depth	2.00	Depth	2.50

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	1.41		
0.2	1.43		
0.4	1.44		
0.6	1.45		
0.8	1.46		
1	1.48		
2	1.51		
3	1.54		
4	1.59		
5	1.60		
10	1.79		
15	1.85		
20	1.91		
30	1.96		
50	Dry		



Infiltration Rate = 1.44×10^{-4} m/s

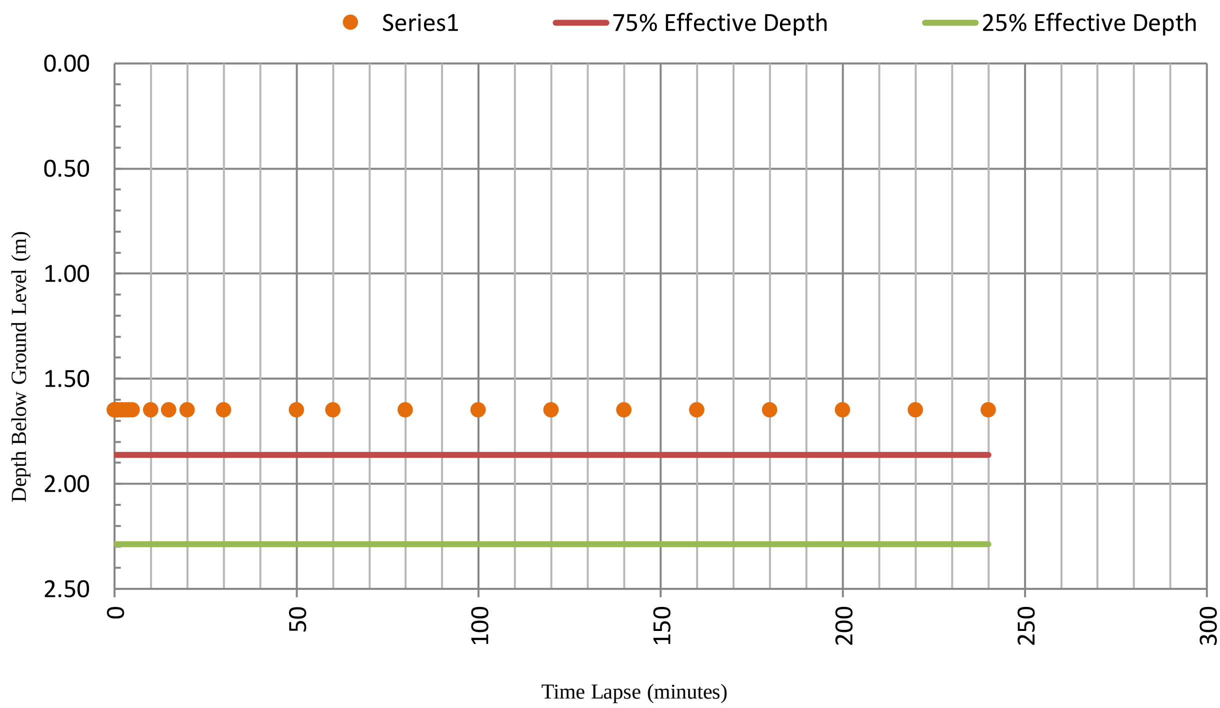
All dimensions in metres, sides collasped so second test could not be undertaken.	Client Shepway District Council	Logged By HK

SOAKAWAY INFILTRATION TEST

Project				Trial Pit No
Otterpool Park				TP102
Job No. UA008926	Date 14/08/2017	Ground Level (mAOD)	Co-Ordinates	
Contractor Arcadis Consulting (UK) Limited				Sheet 1 of 1

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	2.70	Length	2.70
Width	0.50	Width	0.50
Depth	2.50	Depth	2.50

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	1.65	80	1.65
0.2	1.65	100	1.65
0.4	1.65	120	1.65
0.6	1.65	140	1.65
0.8	1.65	160	1.65
1	1.65	180	1.65
2	1.65	200	1.65
3	1.65	220	1.65
4	1.65	240	1.65
5	1.65		
10	1.65		
15	1.65		
20	1.65		
30	1.65		
50	1.65		
60	1.65		



Infiltration Rate = cannot be calculated due to lack of soakage

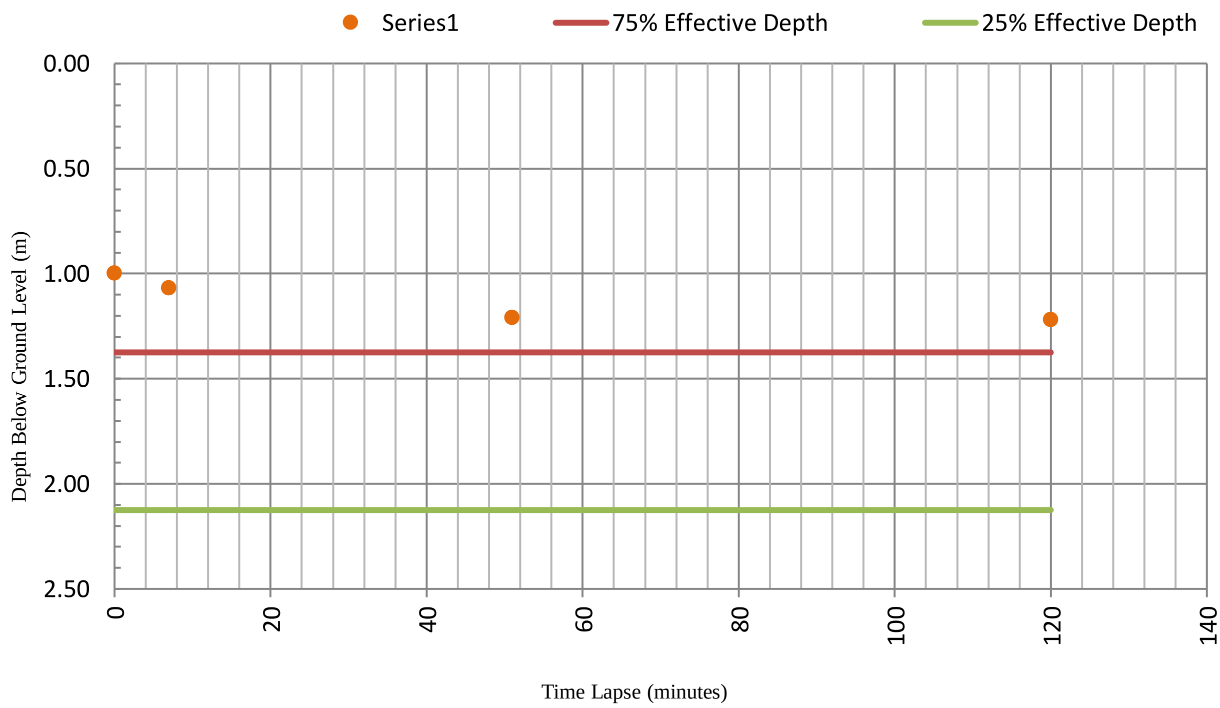
All dimensions in metres	Client	Logged By
	Shepway District Council	HK

SOAKAWAY INFILTRATION TEST

Project				Trial Pit No
Otterpool Park				TP103
Job No. UA008926	Date 14/08/2017	Ground Level (mAOD) 79.732	Co-Ordinates E613536.69 W136951.58	
Contractor Arcadis Consulting (UK) Limited				Sheet 1 of 1

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	2.90	Length	2.90
Width	0.40	Width	2.40
Depth	2.50	Depth	2.50

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	1.00		
7	1.07		
51	1.21		
120	1.22		



Infiltration Rate = cannot be calculated due to lack of soakage

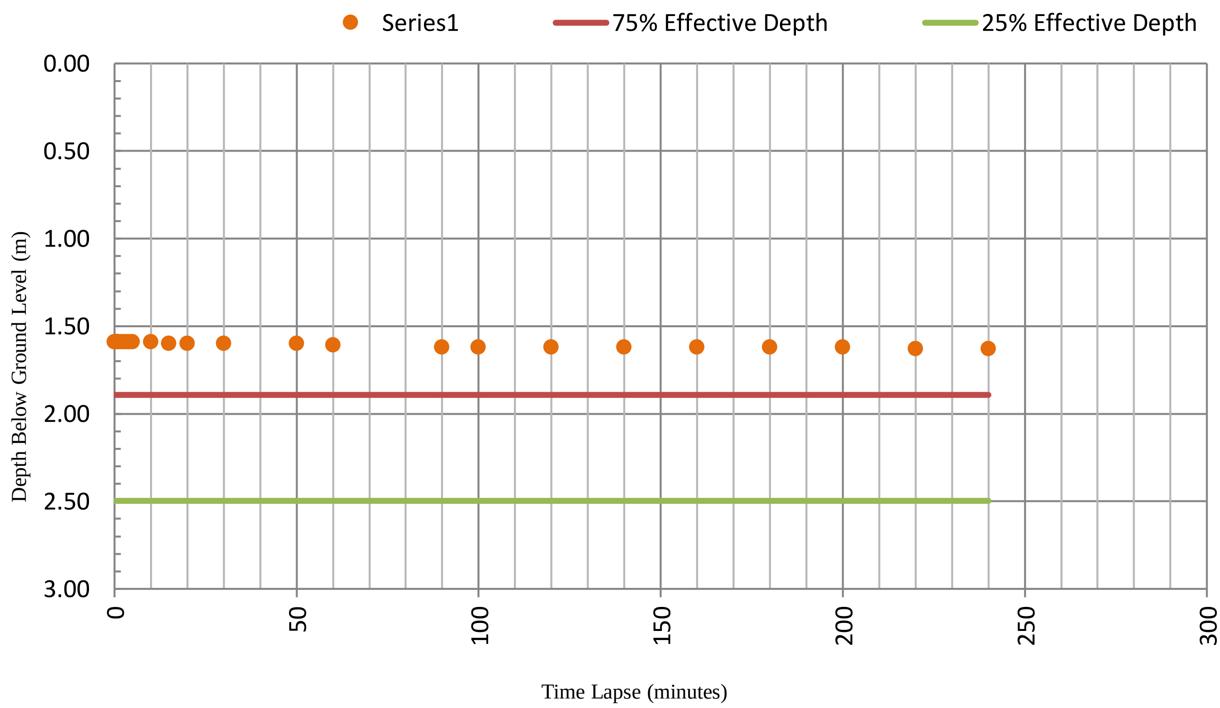
All dimensions in metres	Client Shepway District Council	Logged By LK

SOAKAWAY INFILTRATION TEST

Project				Trial Pit No
Otterpool Park				TP104
Job No. UA008926	Date 16/08/2017	Ground Level (mAOD) 65.76	Co-Ordinates E609988.22 W136627.81	
Contractor Arcadis Consulting (UK) Limited				Sheet 1 of 1

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	2.30	Length	2.20
Width	0.50	Width	0.50
Depth	2.80	Depth	2.70

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	1.59	90	1.62
0.2	1.59	100	1.62
0.4	1.59	120	1.62
0.6	1.59	140	1.62
0.8	1.59	160	1.62
1	1.59	180	1.62
2	1.59	200	1.62
3	1.59	220	1.63
4	1.59	240	1.63
5	1.59		
10	1.59		
15	1.60		
20	1.60		
30	1.60		
50	1.60		
60	1.61		



Infiltration Rate = cannot be calculated due to lack of soakage

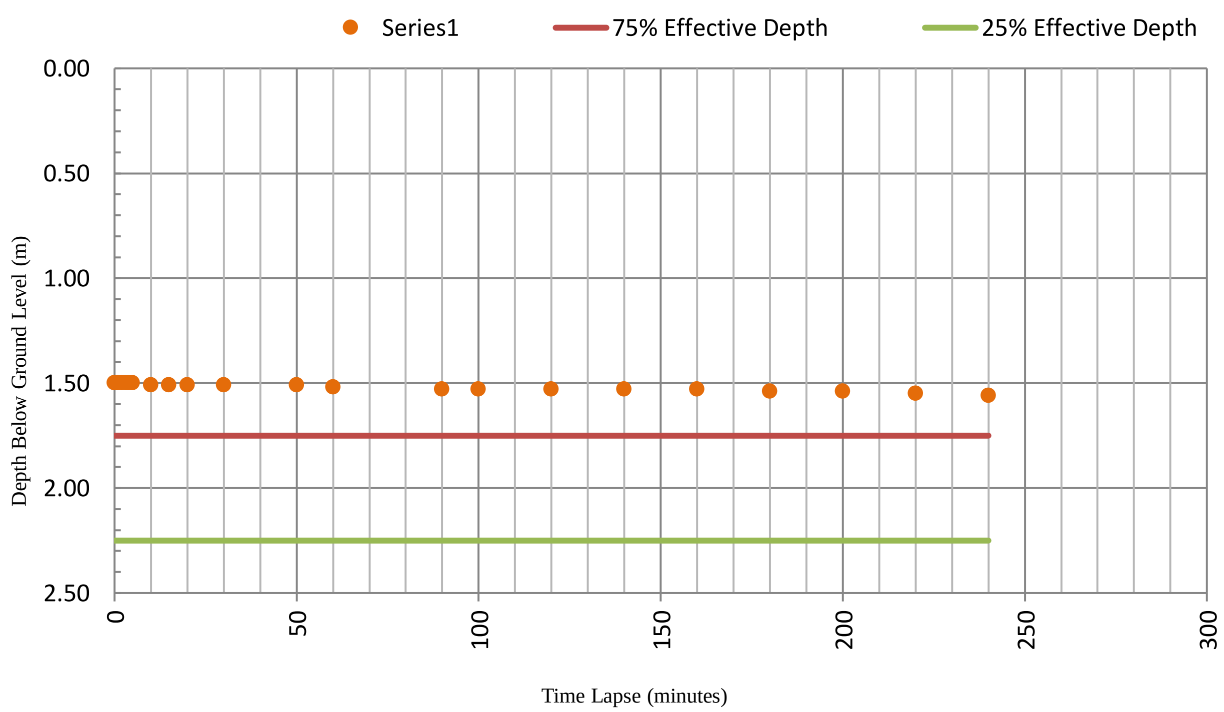
All dimensions in metres	Client Shepway District Council	Logged By HK

SOAKAWAY INFILTRATION TEST

Project: Otterpool Park				Trial Pit No: **TP106**
Job No.: UA008926	Date: 22/08/2017	Ground Level (mAOD): 77.41	Co-Ordinates: E612677.41 W136513.96	
Contractor: Arcadis Consulting (UK) Limited				Sheet: 1 of 1

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	2.30	Length	2.30
Width	0.50	Width	0.50
Depth	2.50	Depth	2.50

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	1.50	90	1.53
0.2	1.50	100	1.53
0.4	1.50	120	1.53
0.6	1.50	140	1.53
0.8	1.50	160	1.53
1	1.50	180	1.54
2	1.50	200	1.54
3	1.50	220	1.55
4	1.50	240	1.56
5	1.50		
10	1.51		
15	1.51		
20	1.51		
30	1.51		
50	1.51		
60	1.52		



Infiltration Rate = cannot be calculated due to lack of soakage

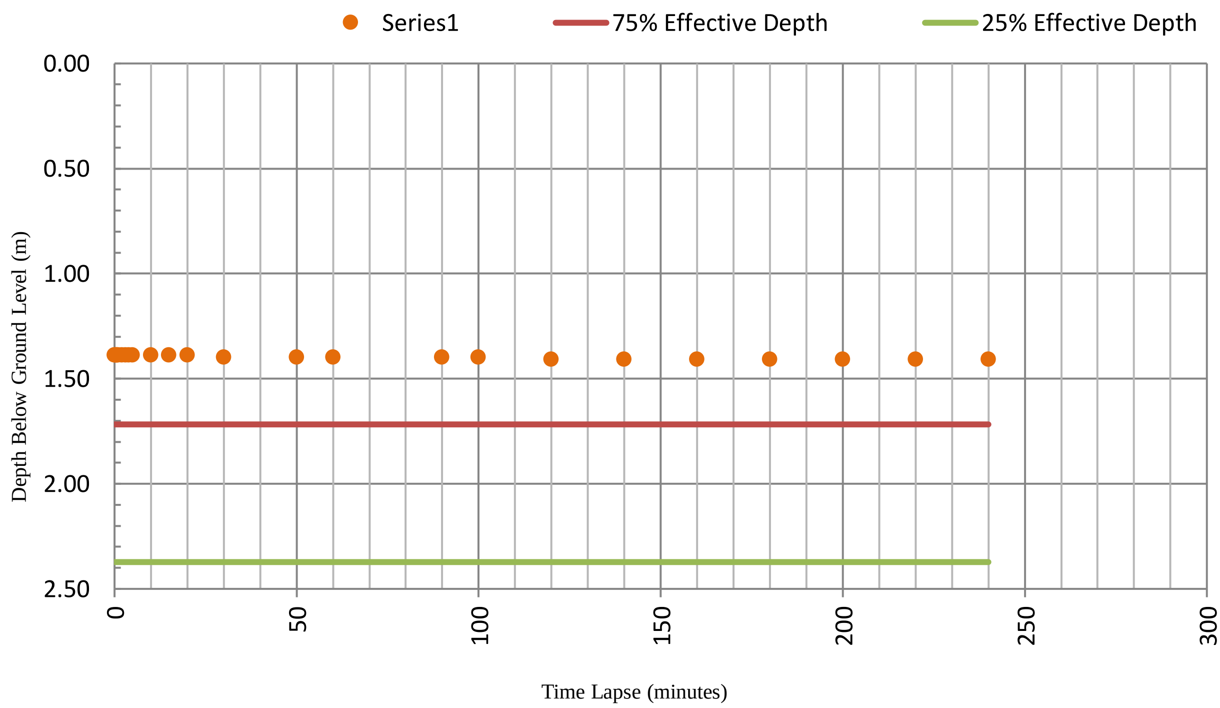
All dimensions in metres	Client: Shepway District Council	Logged By: HK

SOAKAWAY INFILTRATION TEST

Project				Trial Pit No
Otterpool Park				**TP107**
Job No.	Date	Ground Level (mAOD)	Co-Ordinates	
UA008926	16/08/2017	92.67	E610704.30 W136503.22	
Contractor				Sheet
Arcadis Consulting (UK) Limited				1 of 1

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	2.20	Length	2.20
Width	0.50	Width	0.50
Depth	2.70	Depth	2.70

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	1.39	90	1.40
0.2	1.39	100	1.40
0.4	1.39	120	1.41
0.6	1.39	140	1.41
0.8	1.39	160	1.41
1	1.39	180	1.41
2	1.39	200	1.41
3	1.39	220	1.41
4	1.39	240	1.41
5	1.39		
10	1.39		
15	1.39		
20	1.39		
30	1.40		
50	1.40		
60	1.40		



Infiltration Rate = cannot be calculated due to lack of soakage

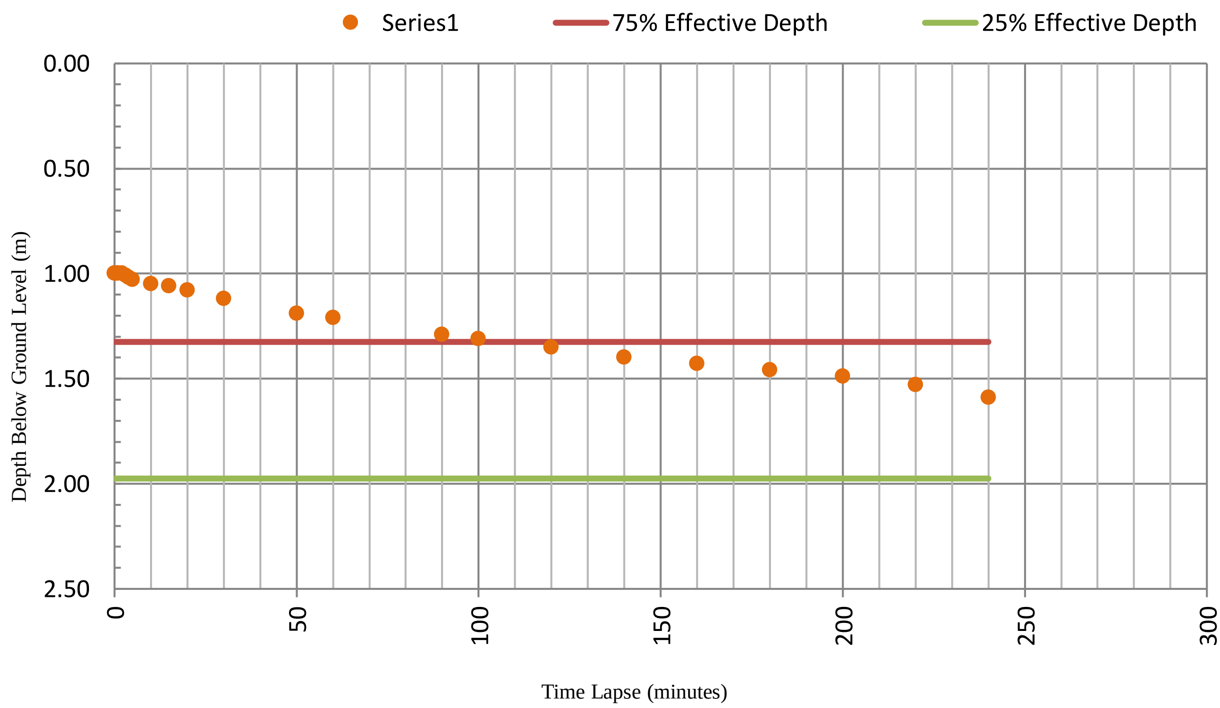
All dimensions in metres	Client	Logged By
	Shepway District Council	HK

SOAKAWAY INFILTRATION TEST

Project				Trial Pit No
Otterpool Park				TP108
Job No. UA008926	Date 17/08/2017	Ground Level (mAOD) 73.04	Co-Ordinates E 611770.64 N 136484.47	
Contractor Arcadis Consulting (UK) Limited				Sheet 1 of 1

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	2.20	Length	2.20
Width	0.50	Width	0.50
Depth	2.30	Depth	2.30

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	1.00	90	1.29
0.2	1.00	100	1.31
0.4	1.00	120	1.35
0.6	1.00	140	1.40
0.8	1.00	160	1.43
1	1.00	180	1.46
2	1.00	200	1.49
3	1.01	220	1.53
4	1.02	240	1.59
5	1.03		
10	1.05		
15	1.06		
20	1.08		
30	1.12		
50	1.19		
60	1.21		



Infiltration Rate = 8.69 x 10^{-6} m/s

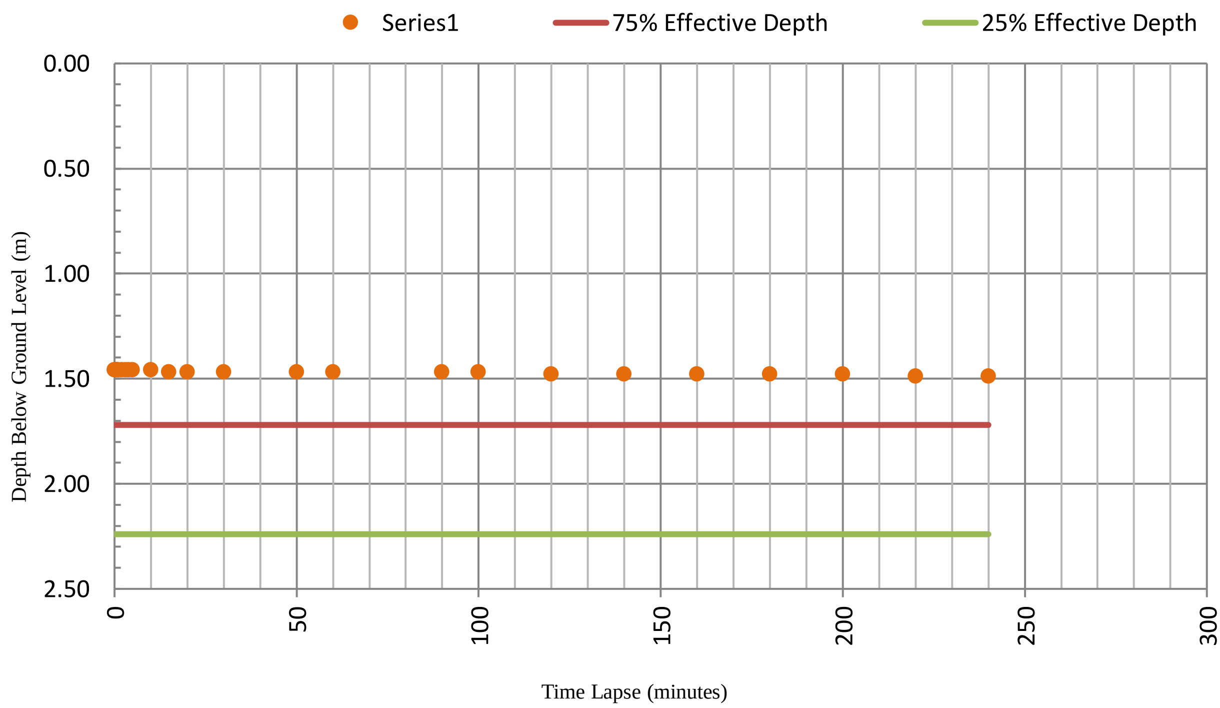
All dimensions in metres. 25% not attained, results are extrapolated.	Client Shepway District Council	Logged By HK

SOAKAWAY INFILTRATION TEST

Project: Otterpool Park				Trial Pit No: TP109
Job No.: UA008926	Date: 21/08/2017	Ground Level (mAOD): 80.25	Co-Ordinates: E 612231.61 N 136228.20	
Contractor: Arcadis Consulting (UK) Limited				Sheet: 1 of 1

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	2.30	Length	2.30
Width	0.50	Width	0.50
Depth	2.50	Depth	2.50

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	1.46	90	1.47
0.2	1.46	100	1.47
0.4	1.46	120	1.48
0.6	1.46	140	1.48
0.8	1.46	160	1.48
1	1.46	180	1.48
2	1.46	200	1.48
3	1.46	220	1.49
4	1.46	240	1.49
5	1.46		
10	1.46		
15	1.47		
20	1.47		
30	1.47		
50	1.47		
60	1.47		



Infiltration Rate = cannot be calculated due to lack of soakage

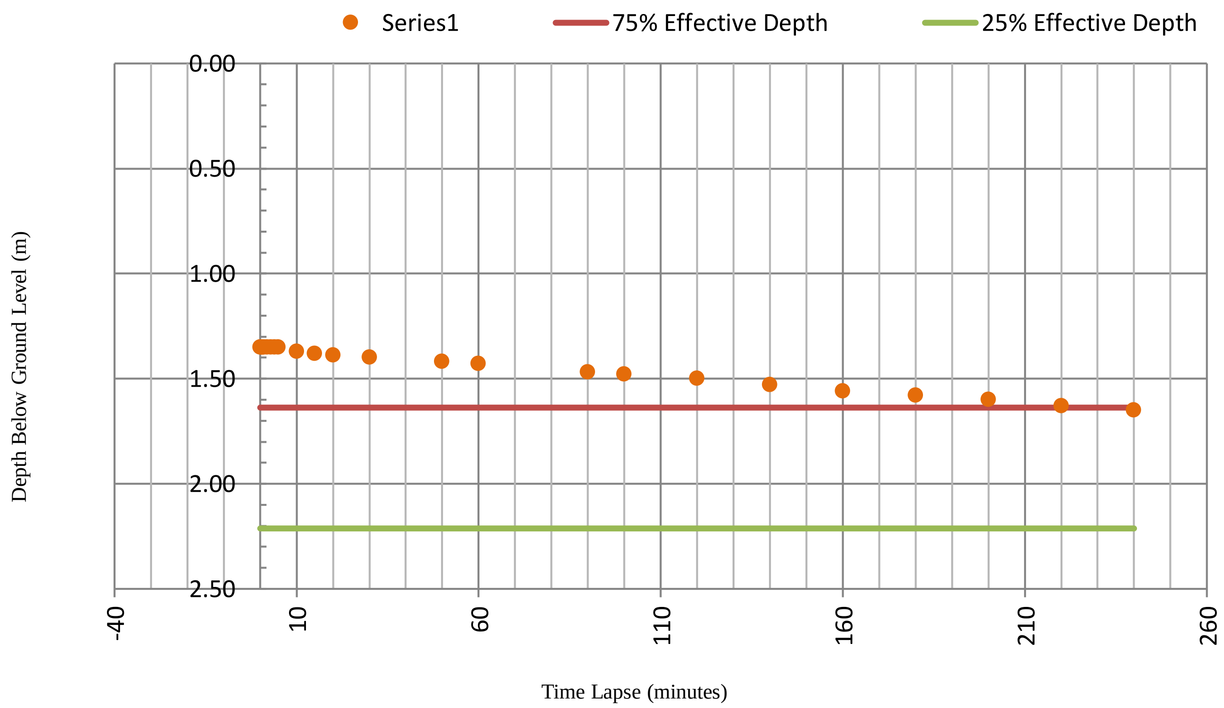
All dimensions in metres	Client: Shepway District Council	Logged By: HK

SOAKAWAY INFILTRATION TEST

Project				Trial Pit No
Otterpool Park				**TP110**
Job No.	Date	Ground Level (mAOD)	Co-Ordinates	
UA008926	22/08/2017	101.14	E 610956.18 N 136019.59	
Contractor				Sheet
Arcadis Consulting (UK) Limited				1 of 1

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	2.10	Length	2.10
Width	0.50	Width	0.50
Depth	2.50	Depth	2.50

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	1.35	90	1.47
0.2	1.35	100	1.48
0.4	1.35	120	1.50
0.6	1.35	140	1.53
0.8	1.35	160	1.56
1	1.35	180	1.58
2	1.35	200	1.60
3	1.35	220	1.63
4	1.35	240	1.65
5	1.35		
10	1.37		
15	1.38		
20	1.39		
30	1.40		
50	1.42		
60	1.43		



Infiltration Rate = 4.15×10^{-6} m/s

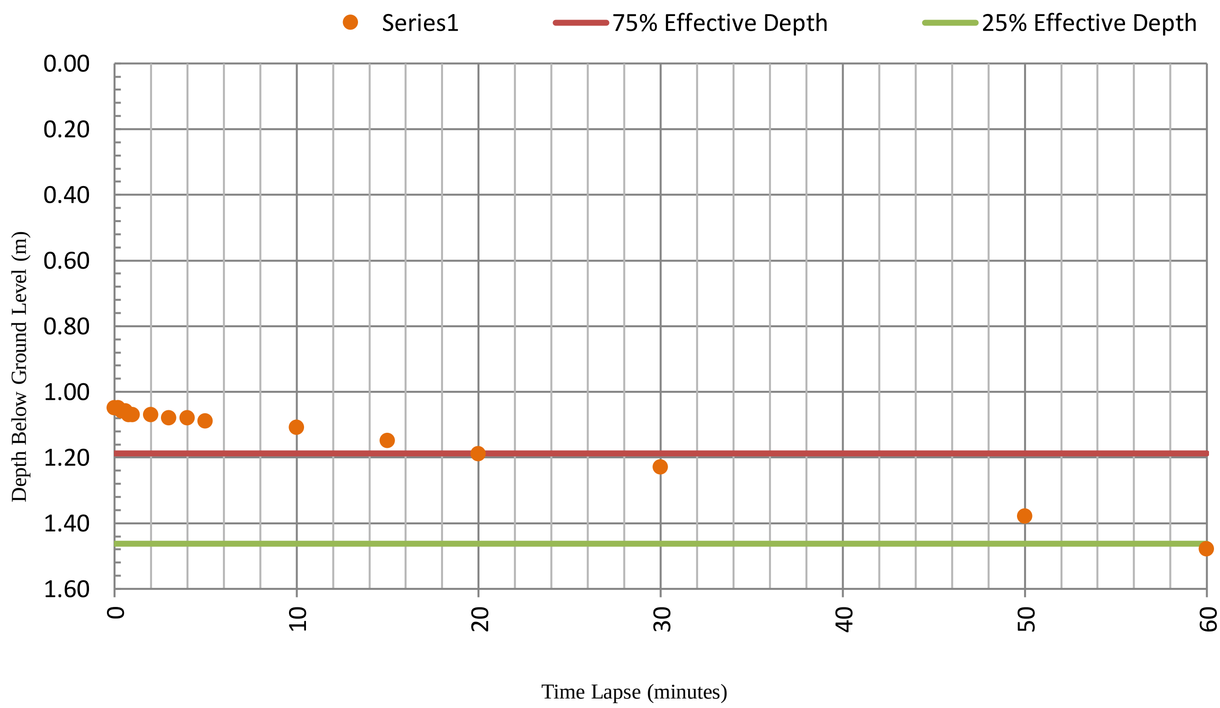
All dimensions in metres. 25% not attained, results are extrapolated.	Client	Logged By
	Shepway District Council	HK

SOAKAWAY INFILTRATION TEST

Project				Trial Pit No
Otterpool Park				TP112
Job No. UA008926	Date 16/08/2017	Ground Level (mAOD) 96.44	Co-Ordinates E611665.00 W135941.12	
Contractor Arcadis Consulting (UK) Limited				Sheet 1 of 1

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	2.30	Length	2.30
Width	0.50	Width	0.50
Depth	1.60	Depth	1.50

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	1.05		
0.2	1.05		
0.4	1.06		
0.6	1.06		
0.8	1.07		
1	1.07		
2	1.07		
3	1.08		
4	1.08		
5	1.09		
10	1.11		
15	1.15		
20	1.19		
30	1.23		
50	1.38		
60	1.48		



Infiltration Rate = 4.90 x 10^{-5} m/s

All dimensions in metres.	Client Shepway District Council	Logged By HK

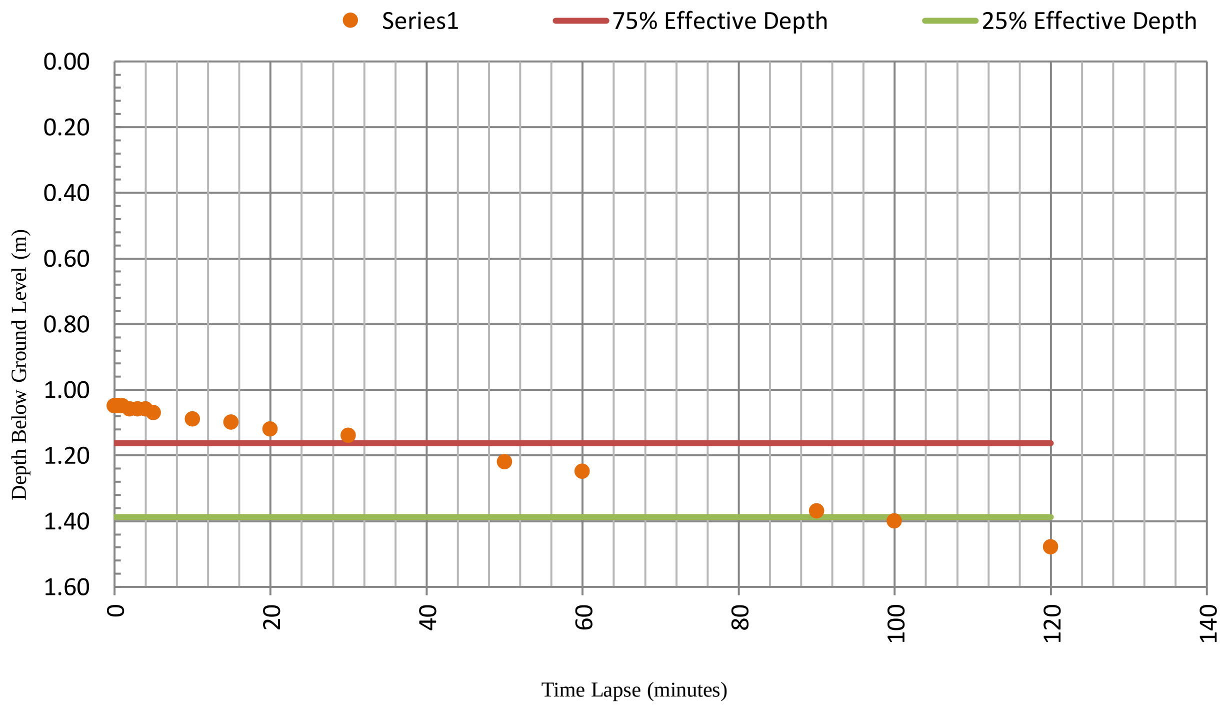
ARCADIS

SOAKAWAY INFILTRATION TEST

Project				Trial Pit No
Otterpool Park				**TP112**
Job No.	Date	Ground Level (mAOD)	Co-Ordinates	
UA008926	16/08/2017	96.44	E611665.00 W135941.12	
Contractor				Sheet
Arcadis Consulting (UK) Limited				1 of 1

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	2.30	Length	2.30
Width	0.50	Width	0.50
Depth	1.50	Depth	1.50

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	1.05	90	1.37
0.2	1.05	100	1.40
0.4	1.05	120	1.48
0.6	1.05		
0.8	1.05		
1	1.05		
2	1.06		
3	1.06		
4	1.06		
5	1.07		
10	1.09		
15	1.10		
20	1.12		
30	1.14		
50	1.22		
60	1.25		



Infiltration Rate = 3.58×10^{-5} m/s

All dimensions in metres.	Client	Logged By
	Shepway District Council	HK

Permeability Test

BH101

Project	Project No.	Ground Level (m OD)		
Otterpool Park	**UA008926-43-02**	**101.23**		
Client	**Easting (OD)**	**Northing (OD)**	**Test Date**	**Sheet**
Shepway District Council	**610,950.1**	**136,019.1**	**08/09/2017**	**1 of 1**

Depth & Purge Records:	
Variable Head Test Type:	Falling Head
Depth to Base of Borehole (m bgl):	10.00
Depth to Pre Test Goundwater Level (m bgl):	9.92
Time Taken to Purge (minutes):	0
Volume of Water Purged (ltrs):	0

Response Zone Details:	
Installation Diameter (m):	0.05
Height of Installation above GL (m):	0.00
Diameter of Borehole (m):	0.05
Top of Test Section (m bgl):	6.00
Bottom of Test Section (m bgl):	10.00

Elapsed Time (minutes)	Depth to Water (m bgl)	Head (m)	Proportional Head (H_t/H_o)
0	0.00	10.00	1.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00

Calculated Parameters	
Cross Sectional Area of Response Zone:	1.96E-03
Intake Factor:	1.00E-01
Time Lag (seconds):	0

NOTE: Ht/Ho = 0.37 has not been satisfied. Therefore data has been extrapolated from the last two readings to achive Ht/Ho = 0.37. Permeability is therefore approximate only.

Permeability (m/s)	**#DIV/0!**

Remarks

Unable to maintain a head of water. Entire IBC (1000 L) emptied into borehole in 6 minutes

Engineer/Technitian	Calculation By	Checked By
Arcadis	**RD**	**0**

Permeability Test

BH103

Project	Project No.	Ground Level (m OD)		
Otterpool Park	**UA008926-43-02**	**101.23**		
Client	Easting (OD)	Northing (OD)	Test Date	Sheet
Shepway District Council	**611,768.1**	**136,019.1**	**08/09/2017**	**1 of 1**

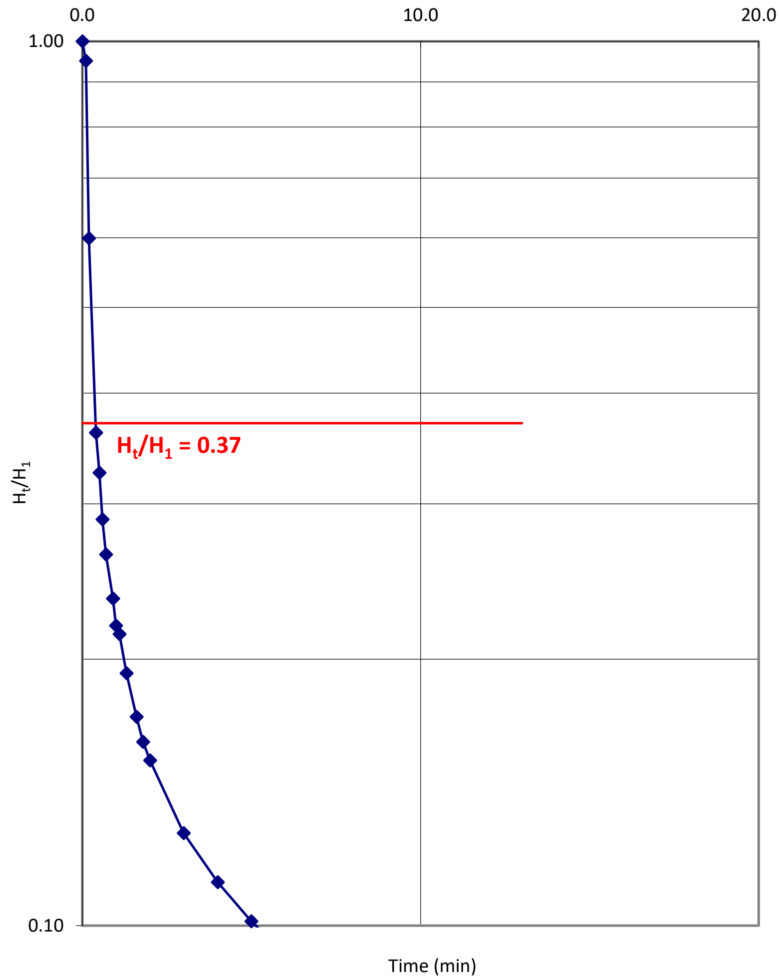
Depth & Purge Records:

Variable Head Test Type:	Falling Head
Depth to Base of Borehole (m bgl):	10.00
Depth to Pre Test Goundwater Level (m bgl):	1.84
Time Taken to Purge (minutes):	0
Volume of Water Purged (ltrs):	0

Response Zone Details:

Installation Diameter (m):	0.05
Height of Installation above GL (m):	0.00
Diameter of Borehole (m):	0.05
Top of Test Section (m bgl):	4.00
Bottom of Test Section (m bgl):	10.00

Elapsed Time (minutes)	Depth to Water (m bgl)	Head (m)	Proportional Head (H_t/H_o)
0	0.00	10.00	1.00
0.1	0.09	9.91	0.95
0.2	0.74	9.26	0.60
0.4	1.18	8.82	0.36
0.4	1.18	8.82	0.36
0.5	1.24	8.76	0.33
0.6	1.31	8.69	0.29
0.7	1.36	8.64	0.26
0.9	1.41	8.59	0.23
0.9	1.41	8.59	0.23
1	1.44	8.56	0.22
1.1	1.45	8.55	0.21
1.3	1.49	8.52	0.19
1.6	1.52	8.48	0.17
1.8	1.54	8.46	0.16
2	1.56	8.44	0.15
3	1.61	8.39	0.13
4	1.63	8.37	0.11
5	1.65	8.35	0.10
6	1.67	8.33	0.09
7	1.68	8.32	0.09
8	1.69	8.31	0.08
9	1.70	8.31	0.08



Calculated Parameters

Cross Sectional Area of Response Zone:	1.96E-03
Intake Factor:	1.00E-01
Time Lag (seconds):	23.4

NOTE: Ht/Ho = 0.37 has not been satisfied. Therefore data has been extrapolated from the last two readings to achive Ht/Ho = 0.37. Permeability is therefore approximate only.

Permeability (m/s)	**1.22E-05**

Remarks

For the permeabilty test, 100 litres of water was added to the borehole.

Engineer/Technitian	Calculation By	Checked By
Arcadis	**RD**	**IP**

Permeability Test

BH103

Project	Project No.	Ground Level (m OD)		
Otterpool Park	**UA008926-43-02**	**101.23**		
Client	Easting (OD)	Northing (OD)	Test Date	Sheet
Shepway District Council	**611,768.1**	**136,019.1**	**08/09/2017**	**1 of 1**

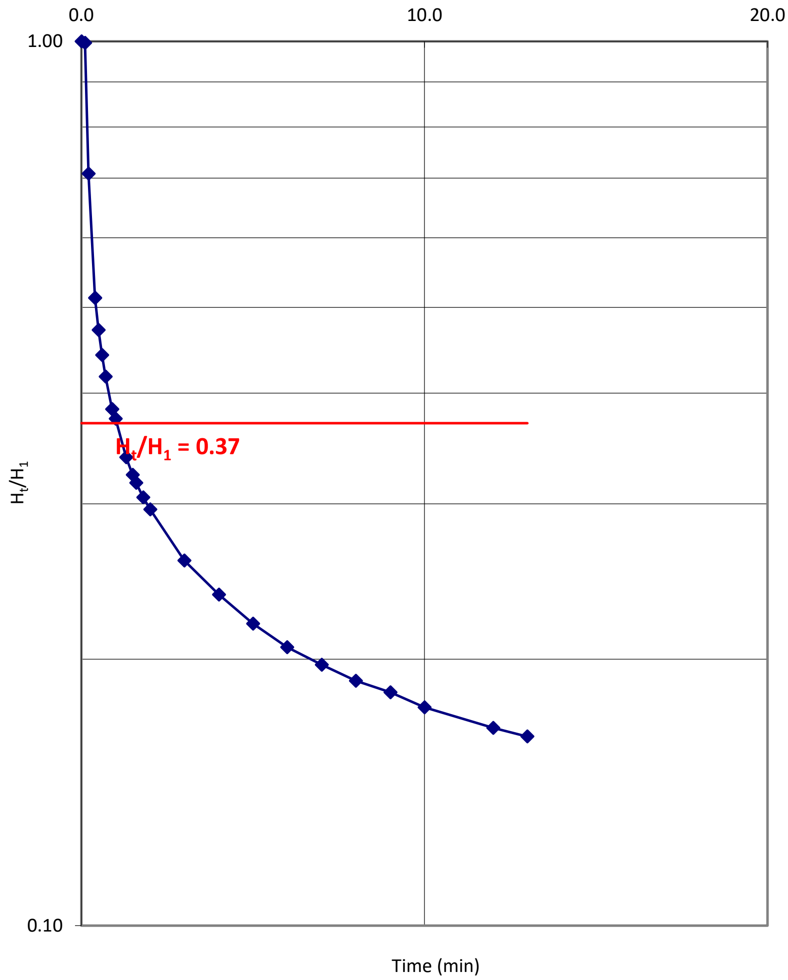
Depth & Purge Records:

Variable Head Test Type:	Falling Head
Depth to Base of Borehole (m bgl):	10.00
Depth to Pre Test Goundwater Level (m bgl):	1.84
Time Taken to Purge (minutes):	0
Volume of Water Purged (ltrs):	0

Response Zone Details:

Installation Diameter (m):	0.05
Height of Installation above GL (m):	0.00
Diameter of Borehole (m):	0.05
Top of Test Section (m bgl):	4.00
Bottom of Test Section (m bgl):	10.00

Elapsed Time (minutes)	Depth to Water (m bgl)	Head (m)	Proportional Head (H_t/H_o)
0	0.00	10.00	1.00
0.1	0.01	9.99	1.00
0.2	0.54	9.46	0.71
0.4	0.90	9.10	0.51
0.4	0.90	9.10	0.51
0.5	0.97	9.03	0.47
0.6	1.03	8.97	0.44
0.7	1.07	8.93	0.42
0.9	1.13	8.87	0.38
0.9	1.13	8.87	0.38
1	1.15	8.85	0.37
1.3	1.22	8.78	0.34
1.5	1.25	8.76	0.32
1.6	1.26	8.74	0.32
1.8	1.28	8.72	0.30
2	1.30	8.70	0.30
3	1.36	8.64	0.26
4	1.40	8.60	0.24
5	1.44	8.56	0.22
6	1.46	8.54	0.21
7	1.48	8.52	0.20
8	1.49	8.51	0.19
9	1.50	8.50	0.18



Calculated Parameters

Cross Sectional Area of Response Zone:	1.96E-03
Intake Factor:	1.00E-01
Time Lag (seconds):	62.4

NOTE: Ht/Ho = 0.37 has not been satisfied. Therefore data has been extrapolated from the last two readings to achive Ht/Ho = 0.37. Permeability is therefore approximate only.

Permeability (m/s)	**4.57E-06**

Remarks

For the permeabilty test, 300 litres of water was added to the borehole.

Engineer/Technitian	Calculation By	Checked By
Arcadis	**RD**	**IP**

Permeability Test

BH103

Project	Project No.	Ground Level (m OD)		
Otterpool Park	UA008926-43-02	101.23		
Client	**Easting (OD)**	**Northing (OD)**	**Test Date**	**Sheet**
Shepway District Council	611,768.1	136,019.1	08/09/2017	1 of 1

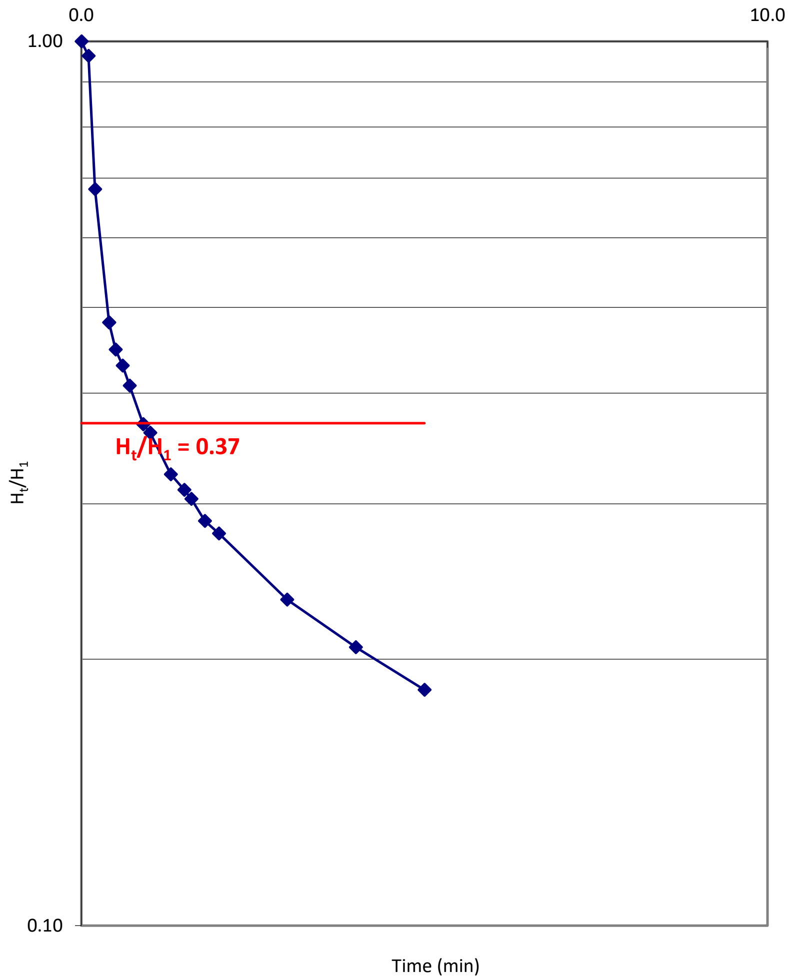
Depth & Purge Records:

Variable Head Test Type:	Falling Head
Depth to Base of Borehole (m bgl):	10.00
Depth to Pre Test Goundwater Level (m bgl):	1.84
Time Taken to Purge (minutes):	0
Volume of Water Purged (ltrs):	0

Response Zone Details:

Installation Diameter (m):	0.05
Height of Installation above GL (m):	0.00
Diameter of Borehole (m):	0.05
Top of Test Section (m bgl):	4.00
Bottom of Test Section (m bgl):	10.00

Elapsed Time (minutes)	Depth to Water (m bgl)	Head (m)	Proportional Head (H_t/H_o)
0	0.00	10.00	1.00
0.1	0.07	9.93	0.96
0.2	0.59	9.41	0.68
0.4	0.96	9.05	0.48
0.4	0.96	9.05	0.48
0.5	1.02	8.99	0.45
0.6	1.05	8.95	0.43
0.7	1.09	8.91	0.41
0.9	1.16	8.84	0.37
0.9	1.16	8.84	0.37
1	1.18	8.82	0.36
1.3	1.24	8.76	0.32
1.5	1.27	8.73	0.31
1.6	1.28	8.72	0.30
1.8	1.31	8.69	0.29
2	1.33	8.67	0.28
3	1.41	8.59	0.23
4	1.46	8.54	0.21
5	1.50	8.50	0.18
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00
0	0.00	10.00	0.00



Calculated Parameters

Cross Sectional Area of Response Zone:	1.96E-03
Intake Factor:	1.00E-01
Time Lag (seconds):	53.4

NOTE: Ht/Ho = 0.37 has not been satisfied. Therefore data has been extrapolated from the last two readings to achive Ht/Ho = 0.37. Permeability is therefore approximate only.

Permeability (m/s)	**5.35E-06**

Remarks

For the permeabilty test, 600 litres of water was added to the borehole.

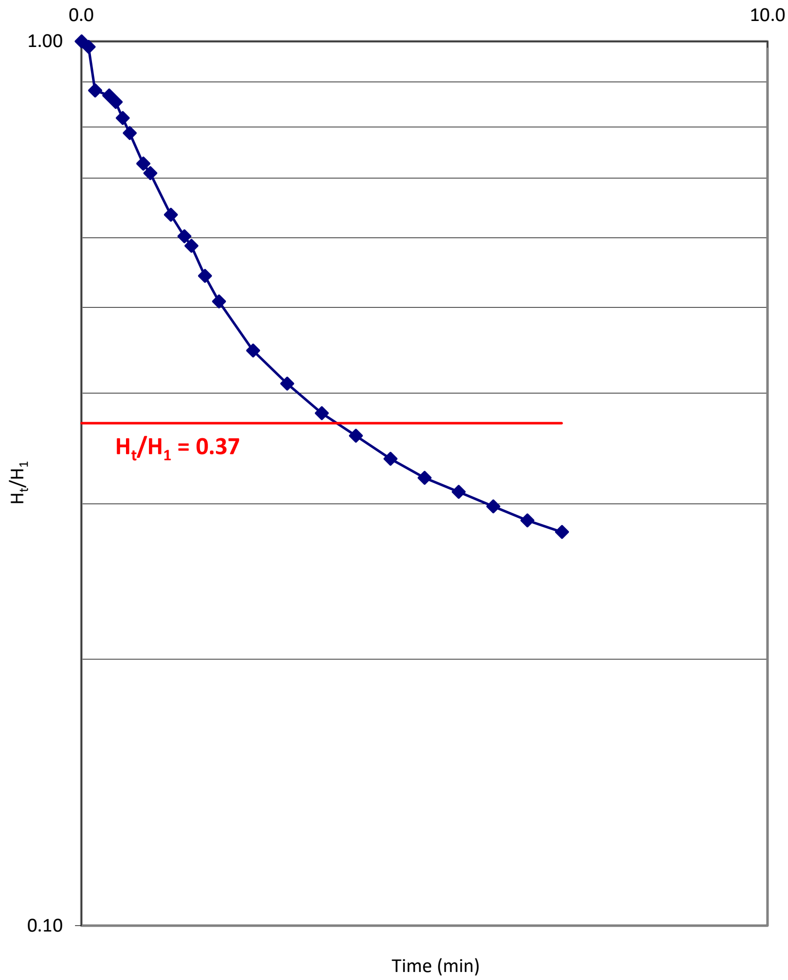
Engineer/Technitian	Calculation By	Checked By
Arcadis	**RD**	**IP**

ARCADIS Permeability Test BH104

Project	Project No.	Ground Level (m OD)		
Otterpool Park	UA008926-43-02	94.56		
Client	**Easting (OD)**	**Northing (OD)**	**Test Date**	**Sheet**
Shepway District Council	611,750.5	135,820.1	08/09/2017	1 of 1

Depth & Purge Records:		Response Zone Details:	
Variable Head Test Type:	Falling Head	Installation Diameter (m):	0.05
Depth to Base of Borehole (m bgl):	9.95	Height of Installation above GL (m):	0.00
Depth to Pre Test Goundwater Level (m bgl):	3.47	Diameter of Borehole (m):	0.05
Time Taken to Purge (minutes):	0	Top of Test Section (m bgl):	2.00
Volume of Water Purged (ltrs):	0	Bottom of Test Section (m bgl):	9.95

Elapsed Time (minutes)	Depth to Water (m bgl)	Head (m)	Proportional Head (H_t/H_o)
0	0.00	9.95	1.00
0.1	0.05	9.90	0.99
0.2	0.42	9.53	0.88
0.2	0.42	9.53	0.88
0.4	0.46	9.49	0.87
0.5	0.51	9.44	0.85
0.6	0.63	9.32	0.82
0.7	0.74	9.21	0.79
0.9	0.95	9.01	0.73
0.9	0.95	9.01	0.73
1	1.01	8.94	0.71
1.3	1.26	8.69	0.64
1.5	1.38	8.57	0.60
1.6	1.43	8.52	0.59
1.8	1.59	8.36	0.54
2	1.71	8.24	0.51
2.5	1.92	8.03	0.45
3	2.05	7.90	0.41
3.5	2.15	7.80	0.38
4	2.23	7.72	0.36
4.5	2.30	7.65	0.34
5	2.36	7.59	0.32
5.5	2.40	7.55	0.31



Calculated Parameters	
Cross Sectional Area of Response Zone:	1.96E-03
Intake Factor:	1.00E-01
Time Lag (seconds):	223.2

NOTE: Ht/Ho = 0.37 has not been satisfied. Therefore data has been extrapolated from the last two readings to achive Ht/Ho = 0.37. Permeability is therefore approximate only.

Permeability (m/s)	**1.01E-06**

Remarks

For the permeabilty test, 300 litres of water was added to the borehole.

Engineer/Technitian	Calculation By	Checked By
Arcadis	**RD**	**IP**

Permeability Test

BH104

Project	Project No.	Ground Level (m OD)		
Otterpool Park	**UA008926-43-02**	**94.56**		

Client	Easting (OD)	Northing (OD)	Test Date	Sheet
Shepway District Council	**611,750.5**	**135,820.1**	**08/09/2017**	**1 of 1**

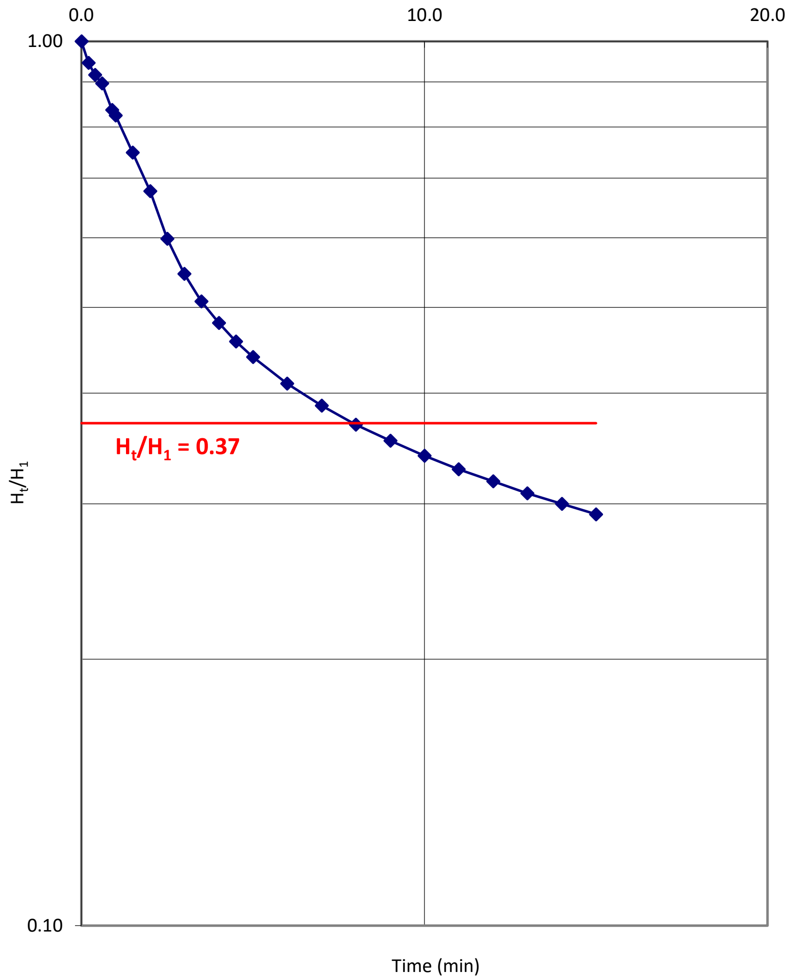
Depth & Purge Records:

Variable Head Test Type:	Falling Head
Depth to Base of Borehole (m bgl):	9.95
Depth to Pre Test Goundwater Level (m bgl):	3.47
Time Taken to Purge (minutes):	0
Volume of Water Purged (ltrs):	0

Response Zone Details:

Installation Diameter (m):	0.05
Height of Installation above GL (m):	0.00
Diameter of Borehole (m):	0.05
Top of Test Section (m bgl):	2.00
Bottom of Test Section (m bgl):	9.95

Elapsed Time (minutes)	Depth to Water (m bgl)	Head (m)	Proportional Head (H_t/H_o)
0	0.00	9.95	1.00
0.2	0.19	9.76	0.95
0.4	0.29	9.66	0.92
0.6	0.36	9.59	0.90
0.9	0.57	9.38	0.84
1	0.61	9.34	0.82
1.5	0.87	9.08	0.75
2	1.12	8.83	0.68
2.5	1.40	8.56	0.60
3	1.58	8.37	0.55
3.5	1.71	8.24	0.51
4	1.80	8.15	0.48
4.5	1.88	8.07	0.46
5	1.94	8.01	0.44
6	2.05	7.90	0.41
7	2.13	7.82	0.39
8	2.19	7.76	0.37
9	2.24	7.71	0.35
10	2.29	7.66	0.34
11	2.33	7.62	0.33
12	2.37	7.58	0.32
13	2.40	7.55	0.31
14	2.43	7.52	0.30



Calculated Parameters

Cross Sectional Area of Response Zone:	1.96E-03
Intake Factor:	1.00E-01
Time Lag (seconds):	475.2

NOTE: Ht/Ho = 0.37 has not been satisfied. Therefore data has been extrapolated from the last two readings to achive Ht/Ho = 0.37. Permeability is therefore approximate only.

Permeability (m/s)	**4.77E-07**

Remarks

For the permeabilty test, 600 litres of water was added to the borehole.

Engineer/Technitian	Calculation By	Checked By
Arcadis	**RD**	**IP**

Permeability Test

BH105

Project	Project No.	Ground Level (m OD)		
Otterpool Park	UA008926-43-02	79.97		
Client	**Easting (OD)**	**Northing (OD)**	**Test Date**	**Sheet**
Shepway District Council	613,555.5	136,952.2	08/09/2017	1 of 1

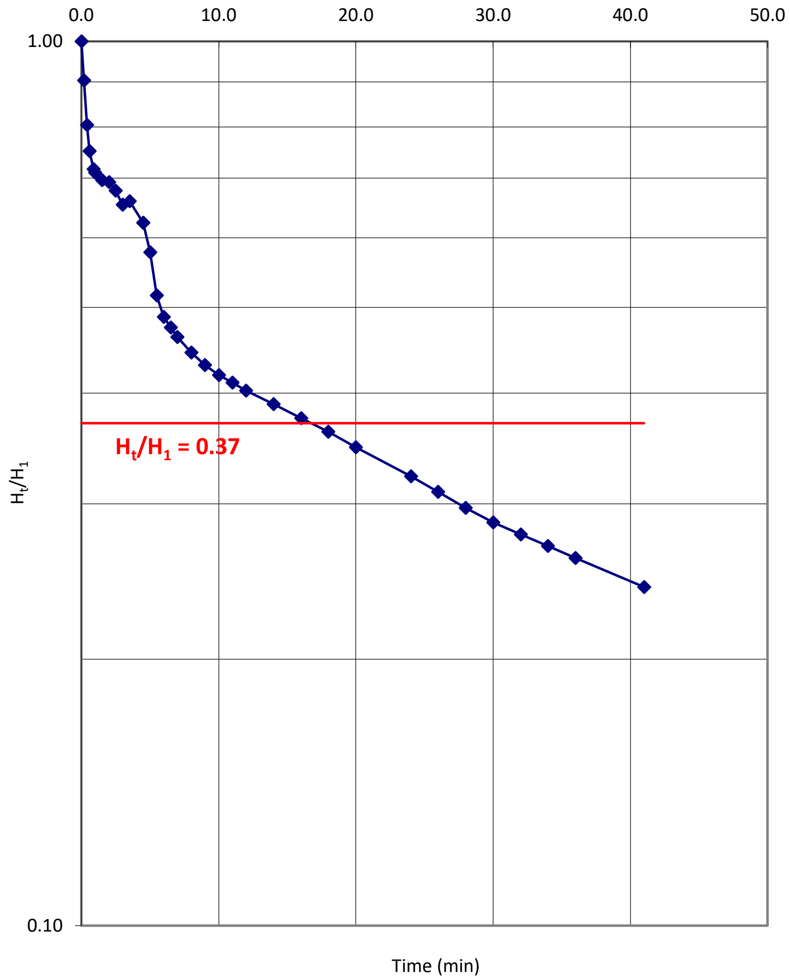
Depth & Purge Records:

Variable Head Test Type:	Falling Head
Depth to Base of Borehole (m bgl):	10.00
Depth to Pre Test Goundwater Level (m bgl):	3.69
Time Taken to Purge (minutes):	0
Volume of Water Purged (ltrs):	0

Response Zone Details:

Installation Diameter (m):	0.05
Height of Installation above GL (m):	0.00
Diameter of Borehole (m):	0.05
Top of Test Section (m bgl):	2.00
Bottom of Test Section (m bgl):	10.00

Elapsed Time (minutes)	Depth to Water (m bgl)	Head (m)	Proportional Head (H_t/H_o)
0	0.00	10.00	1.00
0.2	0.36	9.64	0.90
0.4	0.72	9.28	0.80
0.6	0.92	9.09	0.75
0.9	1.04	8.96	0.72
1	1.07	8.93	0.71
1.5	1.12	8.88	0.70
2	1.13	8.87	0.69
2.5	1.19	8.81	0.68
3	1.28	8.72	0.65
3.5	1.25	8.75	0.66
4.5	1.39	8.61	0.62
4.5	1.39	8.61	0.62
5	1.56	8.44	0.58
5.5	1.78	8.22	0.52
6	1.89	8.11	0.49
6.5	1.94	8.06	0.47
7	1.98	8.02	0.46
8	2.05	7.96	0.45
9	2.10	7.90	0.43
10	2.14	7.86	0.42
11	2.17	7.83	0.41
12	2.20	7.80	0.40



Calculated Parameters

Cross Sectional Area of Response Zone:	1.96E-03
Intake Factor:	1.00E-01
Time Lag (seconds):	1004.4

NOTE: Ht/Ho = 0.37 has not been satisfied. Therefore data has been extrapolated from the last two readings to achive Ht/Ho = 0.37. Permeability is therefore approximate only.

Permeability (m/s)	**2.24E-07**

Remarks

For the permeabilty test, 200 litres of water was added to the borehole.

Engineer/Technitian	Calculation By	Checked By
Arcadis	RD	IP

Permeability Test

BH105

Project	Project No.	Ground Level (m OD)		
Otterpool Park	**UA008926-43-02**	**79.97**		
Client	Easting (OD)	Northing (OD)	Test Date	Sheet
Shepway District Council	**613,555.5**	**136,952.2**	**08/09/2017**	**1 of 1**

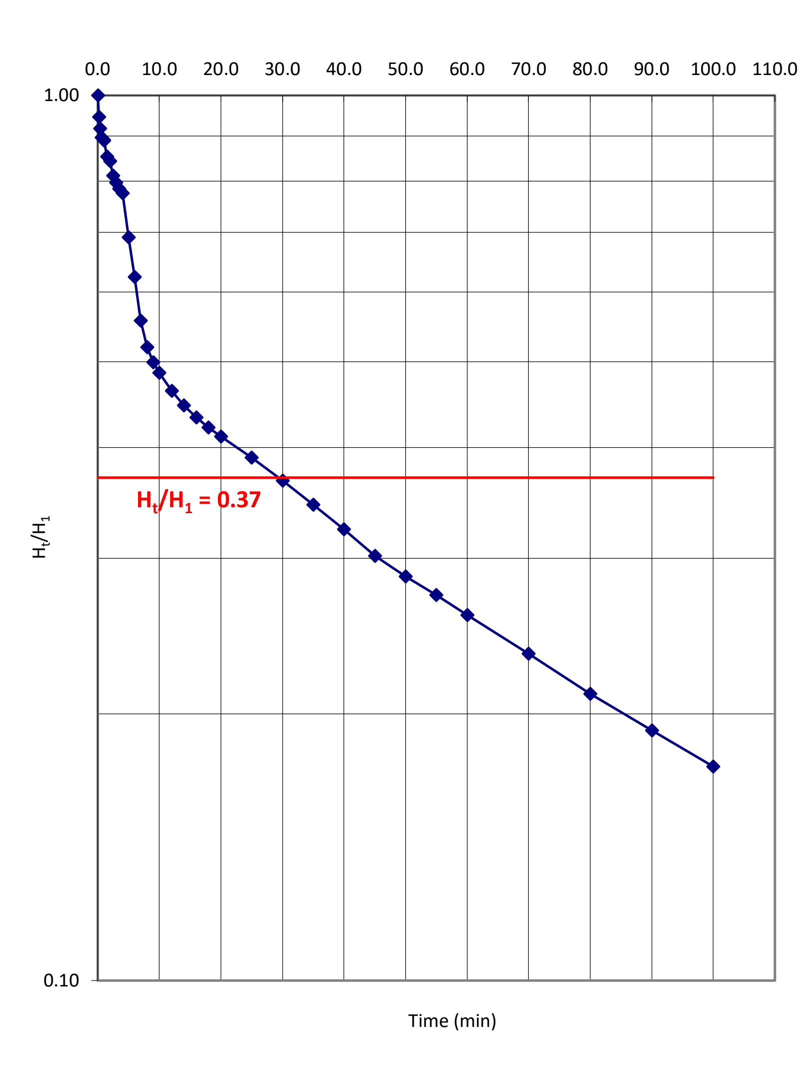
Depth & Purge Records:

Variable Head Test Type:	Falling Head
Depth to Base of Borehole (m bgl):	10.00
Depth to Pre Test Goundwater Level (m bgl):	3.69
Time Taken to Purge (minutes):	0
Volume of Water Purged (ltrs):	0

Response Zone Details:

Installation Diameter (m):	0.05
Height of Installation above GL (m):	0.00
Diameter of Borehole (m):	0.05
Top of Test Section (m bgl):	2.00
Bottom of Test Section (m bgl):	10.00

Elapsed Time (minutes)	Depth to Water (m bgl)	Head (m)	Proportional Head (H_t/H_o)
0	0.00	10.00	1.00
0.2	0.20	9.80	0.95
0.4	0.30	9.70	0.92
0.6	0.38	9.62	0.90
0.9	0.40	9.60	0.89
1	0.41	9.59	0.89
1.5	0.54	9.46	0.85
2	0.58	9.42	0.84
2.5	0.69	9.31	0.81
3	0.75	9.25	0.80
3.5	0.79	9.21	0.78
4	0.83	9.17	0.78
5	1.14	8.86	0.69
6	1.39	8.61	0.62
7	1.63	8.37	0.56
8	1.77	8.23	0.52
9	1.85	8.16	0.50
10	1.89	8.11	0.49
12	1.98	8.02	0.46
14	2.04	7.96	0.45
16	2.09	7.91	0.43
18	2.13	7.87	0.42
20	2.17	7.83	0.41



Calculated Parameters

Cross Sectional Area of Response Zone:	1.96E-03
Intake Factor:	1.00E-01
Time Lag (seconds):	1761

NOTE: Ht/Ho = 0.37 has not been satisfied. Therefore data has been extrapolated from the last two readings to achive Ht/Ho = 0.37. Permeability is therefore approximate only.

Permeability (m/s)	**1.28E-07**

Remarks

For the permeabilty test, 300 litres of water was added to the borehole.

Engineer/Technitian	Calculation By	Checked By
Arcadis	**RD**	**IP**

Permeability Test

WS112

Project	Project No.	Ground Level (m OD)		
Otterpool Park	**UA008926-43-02**	**99.93**		
Client	**Easting (OD)**	**Northing (OD)**	**Test Date**	**Sheet**
Shepway District Council	**610,977.8**	**136,085.2**	**08/09/2017**	**1 of 1**

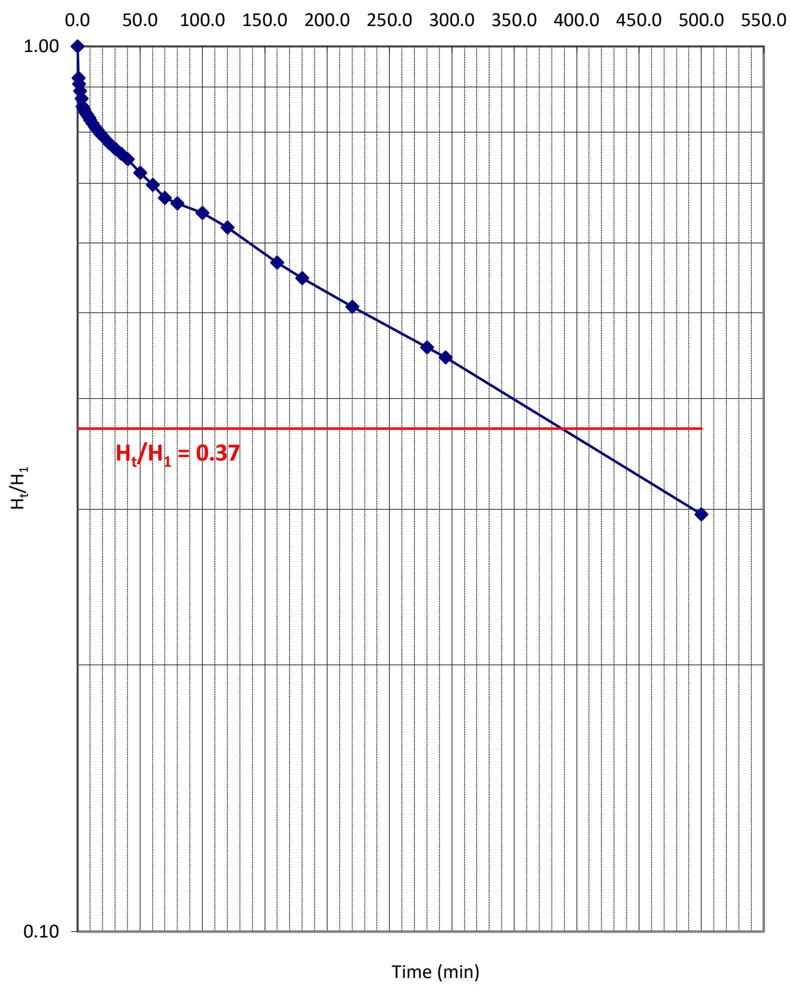
Depth & Purge Records:

Variable Head Test Type:	Falling Head
Depth to Base of Borehole (m bgl):	3.50
Depth to Pre Test Goundwater Level (m bgl):	3.41
Time Taken to Purge (minutes):	0
Volume of Water Purged (ltrs):	0

Response Zone Details:

Installation Diameter (m):	0.05
Height of Installation above GL (m):	0.00
Diameter of Borehole (m):	0.05
Top of Test Section (m bgl):	1.00
Bottom of Test Section (m bgl):	3.50

Elapsed Time (minutes)	Depth to Water (m bgl)	Head (m)	Proportional Head (H_t/H_o)
0	0.00	3.50	1.00
0.5	0.27	3.23	0.92
1	0.32	3.18	0.91
2	0.38	3.13	0.89
3	0.43	3.07	0.87
4	0.49	3.01	0.86
5	0.52	2.99	0.85
6	0.53	2.97	0.84
7	0.55	2.95	0.84
8	0.56	2.94	0.83
9	0.58	2.92	0.83
10	0.59	2.91	0.83
12	0.62	2.88	0.82
14	0.65	2.85	0.81
16	0.67	2.83	0.80
18	0.69	2.81	0.80
20	0.71	2.79	0.79
25	0.76	2.74	0.78
30	0.80	2.70	0.77
35	0.83	2.67	0.76
40	0.87	2.63	0.75
50	0.96	2.55	0.72
60	1.03	2.47	0.70



Calculated Parameters

Cross Sectional Area of Response Zone:	1.96E-03
Intake Factor:	1.00E-01
Time Lag (seconds):	23100

NOTE: Ht/Ho = 0.37 has not been satisfied. Therefore data has been extrapolated from the last two readings to achive Ht/Ho = 0.37. Permeability is therefore approximate only.

Permeability (m/s)	**2.49E-08**

Remarks

For the permeabilty test, ~20 litres of water was added to the borehole. V. Slow infiltration - results have been extrapolated.

Engineer/Technitian	Calculation By	Checked By
Arcadis	**RD**	**0**

APPENDIX F

GEOTECHNICAL LABORATORY TEST DATA

Laboratory Report

UKAS TESTING 2788

GSTL
GEO Site & Testing Services Ltd

Contract Number: 36503

Client's Reference: **UA008926** Report Date: **29-09-2017**

Client **Arcadis**
Fortran Rd
St Mellons
Cardiff
CF3 0EY

Contract Title: **OtterPool Park**
For the attention of: **Ian Parsons**

Date Received: **05-09-2017**
Date Commenced: **05-09-2017**
Date Completed: **29-09-2017**

Test Description	Qty
Moisture Content 1377 : 1990 Part 2 : 3.2 - * UKAS	32
4 Point Liquid & Plastic Limit (LL/PL) 1377 : 1990 Part 2 : 4.3 & 5.3 - * UKAS	17
PSD Wet Sieve method 1377 : 1990 Part 2 : 9.2 - * UKAS	16
PSD: Sedimentation by pipette carried out with Wet Sieve (Wet Sieve must also be selected) 1377 : 1990 Part 2 : 9.4 - * UKAS	6
(GI) BRE Suite Total Sulphate, Aqueous Sulphate, Total Sulphur, Aqueous Nitrate, Aqueous Mag, Chloride, 1377 : 1990 Part 3 & BRE CP2/79 - @ Non Accredited Test	12
Dry Den/MC (2.5kg Rammer Method 1 Litre Mould) 1377 : 1990 Part 4 : 3.3 - * UKAS	6
Disposal of Samples on Project	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
 # - denotes test carried out by approved contractor
@ - denotes non accredited tests

Approved Signatories:
Alex Wynn (Associate Director) - Ben Sharp (Contracts Manager) - Emma Sharp (Office Manager)
Paul Evans (Quality/Technical Manager) - Richard John (Advanced Testing Manager) - Sean Penn (Administrative Assistant)
Vaughan Edwards (Managing Director) - Wayne Honey (Administrative/Quality Assistant)

GEO Site & Testing Services Ltd
Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN
Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

GSTL	LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377 : Part 2 : 1990 Method 5) DESCRIPTIONS	
Contract Number	36503	
Site Name	Otterpool Park	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Descriptions
BH101	4	B	0.75	-	1.00	Brown fine to coarse gravelly sandy silty CLAY.
BH103	3	D	0.50	-		Brown slightly sandy clayey SILT.
BH103	7	D	1.00	-		Brown slightly sandy silty CLAY.
BH103	9	D	2.00	-		Brown slightly silty CLAY.
BH104	2	B	7.00	-	8.00	Grey/brown slightly sandy silty CLAY.
BH105	13	D	6.00	-		Grey/brown slightly sandy clayey SILT.
TP101	4	B	0.50	-		Brown slightly silty sandy CLAY.
TP102	7	B	1.10	-		Brown slightly silty slightly sandy CLAY.
TP102	1	D	1.80	-		Brown slightly silty slightly sandy CLAY.
TP103	10	B	1.50	-		Brown slightly fine to coarse gravelly silty clayey fine to coarse SAND.
TP104	7	B	1.00	-		Brown fine to coarse gravelly slightly sandy silty CLAY.
TP105	5	D	0.50	-		Brown slightly sandy clayey SILT.
TP105	7	B	1.00	-		Brown slightly sandy silty CLAY.
TP105	1	D	1.50	-		Brown silty CLAY.
TP106	10	B	1.50	-		Brown slightly silty slightly sandy CLAY.
TP106	2	B	2.00	-		Brown silty CLAY.
TP107	7	B	1.00	-		Brown silty clayey SAND.
TP107	10	B	1.60	-		Brown sandy silty CLAY.
TP108	5	D	0.60	-		Brown sandy silty CLAY.
TP110	8	D	1.00	-		Brown sandy silty CLAY.
TP110	1	D	1.80	-		Brown slightly silty slightly sandy fine to coarse gravelly CLAY.
TP111	10	B	1.60	-		Brown fine gravelly clayey SILT.
				-		
				-		

Operators	Checked	27-09-17	Ben Sharp (Contracts Manager)
Jordan Simmonite	Approved	27-09-17	Paul Evans (Quality/Technical Manager)

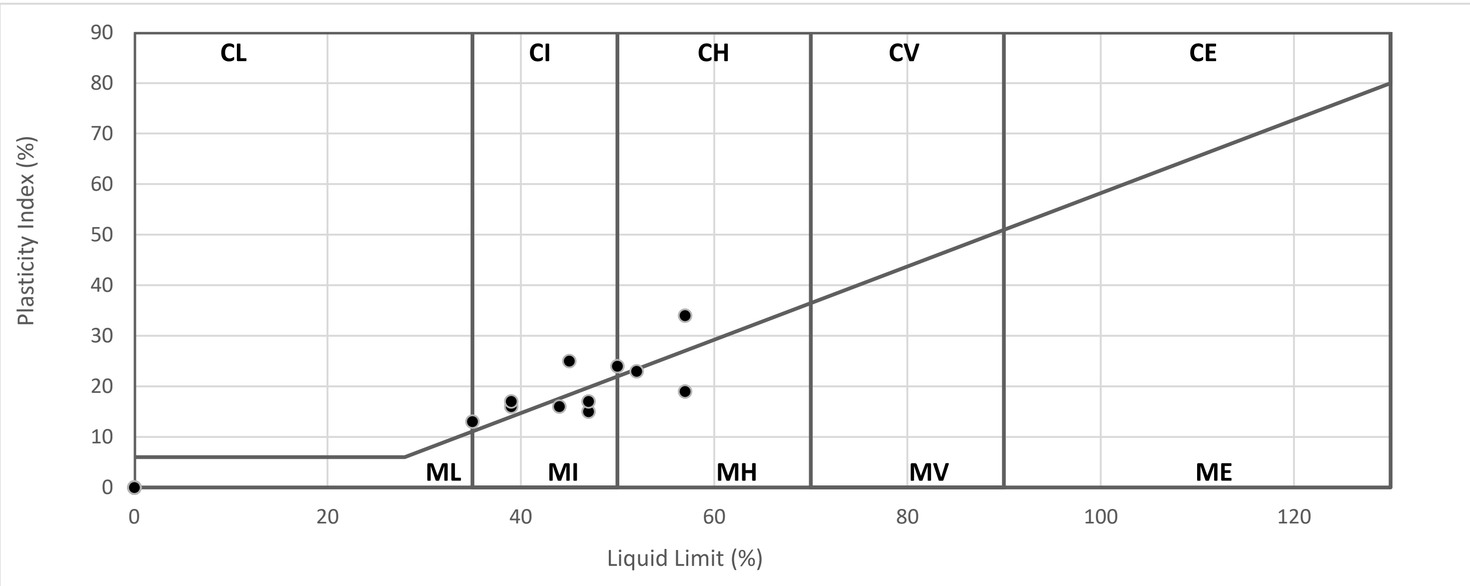
UKAS TESTING 2788

GSTL	LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377 : Part 2 : 1990 Method 5)	
Contract Number	36503	
Site Name	Otterpool Park	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing .425mm %	Remarks
BH101	4	B	0.75	-	1.00	17	39	23	16	78	CI Intermediate Plasticity
BH103	3	D	0.50	-		17					
BH103	7	D	1.00	-		20					
BH103	9	D	2.00	-		31					
BH104	2	B	7.00	-	8.00	31	52	29	23	100	MH High Plasticity
BH105	13	D	6.00	-		27	47	32	15	100	MI Intermediate Plasticity
TP101	4	B	0.50	-		21	50	26	24	98	CI/H Inter/High Plasticity
TP102	7	B	1.10	-		18	57	23	34	100	CH High Plasticity
TP102	1	D	1.80	-		24					
TP103	10	B	1.50	-		28	35	22	13	94	CL/I Low/Inter. Plasticity
TP104	7	B	1.00	-		21	39	22	17	78	CI Intermediate Plasticity
TP105	5	D	0.50	-		37	47	30	17	100	MI Intermediate Plasticity
TP105	7	B	1.00	-		29	45	20	25	100	CI Intermediate Plasticity
TP105	1	D	1.50	-		34					
TP106	10	B	1.50	-		27	44	28	16	100	MI Intermediate Plasticity
TP106	2	B	2.00	-		25					
TP107	7	B	1.00	-		26					
TP107	10	B	1.60	-		23					
TP108	5	D	0.60	-		18					
TP110	8	D	1.00	-		14					
TP110	1	D	1.80	-		16					
TP111	10	B	1.60	-		44	57	38	19	79	MH High Plasticity
				-							
				-							

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION
BS 5930:1999+A2:2010



Operators	Checked	27-09-17	Ben Sharp (Contracts Manager)
Jordan Simmonite	Approved	27-09-17	Paul Evans (Quality/Technical Manager)

UKAS TESTING 2788

GSTL	LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377 : Part 2 : 1990 Method 5) DESCRIPTIONS	
Contract Number	**36503**	
Site Name	**Otterpool Park**	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Descriptions
TP113	5	D	0.60	-		Brown slightly silty slightly sandy CLAY.
TP113	10	B	1.40	-		Brown slightly silty slightly sandy CLAY.
TP113	7	D	2.50	-		Grey slightly silty fine to coarse gravelly CLAY.
WS104C	14	B	1.20	-	1.80	Brown slightly silty sandy fine to coarse gravelly CLAY.
WS106	10	B	1.40	-	2.00	Brown slightly silty CALY.
WS107	11	B	0.70	-	1.00	Brown slightly silty slightly sandy fine to coarse gravelly CLAY.
WS108	15	B	1.20	-	2.00	Brown slightly sandy silty CLAY.
WS110	16	B	0.70	-	1.00	Brown fine to coarse gravelly sandy silty CLAY.
WS110	8	D	1.80	-	2.00	Brown slightly silty slightly sandy CLAY.
WS110	9	D	2.10	-	2.20	Brown slightly sandy silty CLAY.
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		

Operators	Checked	27-09-17	Ben Sharp (Contracts Manager)
Jordan Simmonite	Approved	27-09-17	Paul Evans (Quality/Technical Manager)

UKAS TESTING 2788

GSTL

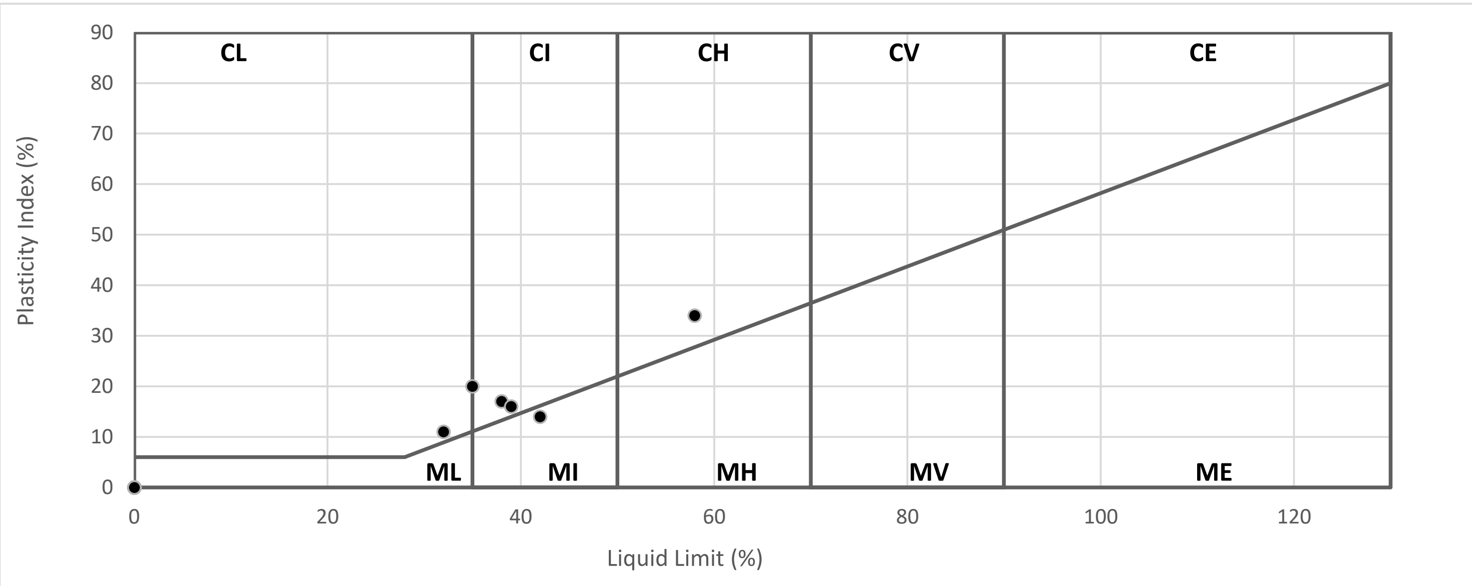
LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX
(BS 1377 : Part 2 : 1990 Method 5)

Contract Number	**36503**	
Site Name	**Otterpool Park**	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing .425mm %	Remarks
TP113	5	D	0.60	-		14					
TP113	10	B	1.40	-		31	42	28	14	100	MI Intermediate Plasticity
TP113	7	D	2.50	-		26					
WS104C	14	B	1.20	-	1.80	22	35	15	20	76	CL/I Low/Inter. Plasticity
WS106	10	B	1.40	-	2.00	20	38	21	17	100	CI Intermediate Plasticity
WS107	11	B	0.70	-	1.00	16	32	21	11	84	CL Low Plasticity
WS108	15	B	1.20	-	2.00	34	58	24	34	96	CH High Plasticity
WS110	16	B	0.70	-	1.00	17	39	23	16	74	CI Intermediate Plasticity
WS110	8	D	1.80	-	2.00	28					
WS110	9	D	2.10	-	2.20	21					
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

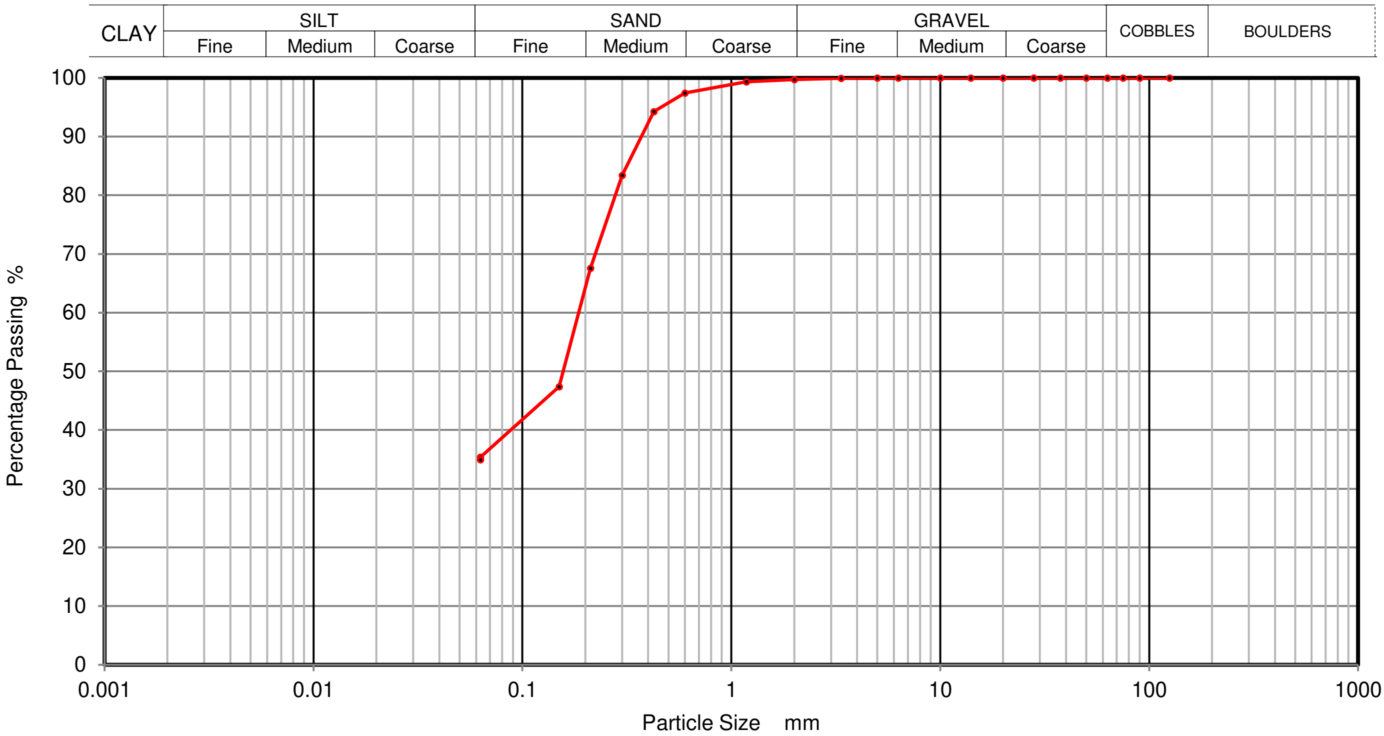
PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION
BS 5930:1999+A2:2010



Operators	Checked	27-09-17	Ben Sharp (Contracts Manager)
Jordan Simmonite	Approved	27-09-17	Paul Evans (Quality/Technical Manager)

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	36503
		Borehole/Pit No.	BH102
Site Name	Otterpool Park	Sample No.	8
Soil Description	Brown silty clayey fine to coarse SAND.	Depth Top	2.00
		Depth Base	3.00
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
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	99		
0.6	97		
0.425	94		
0.3	83		
0.212	68		
0.15	47		
0.063	35		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	65
Silt and Clay	35

Grading Analysis	
Uniformity Coefficient	

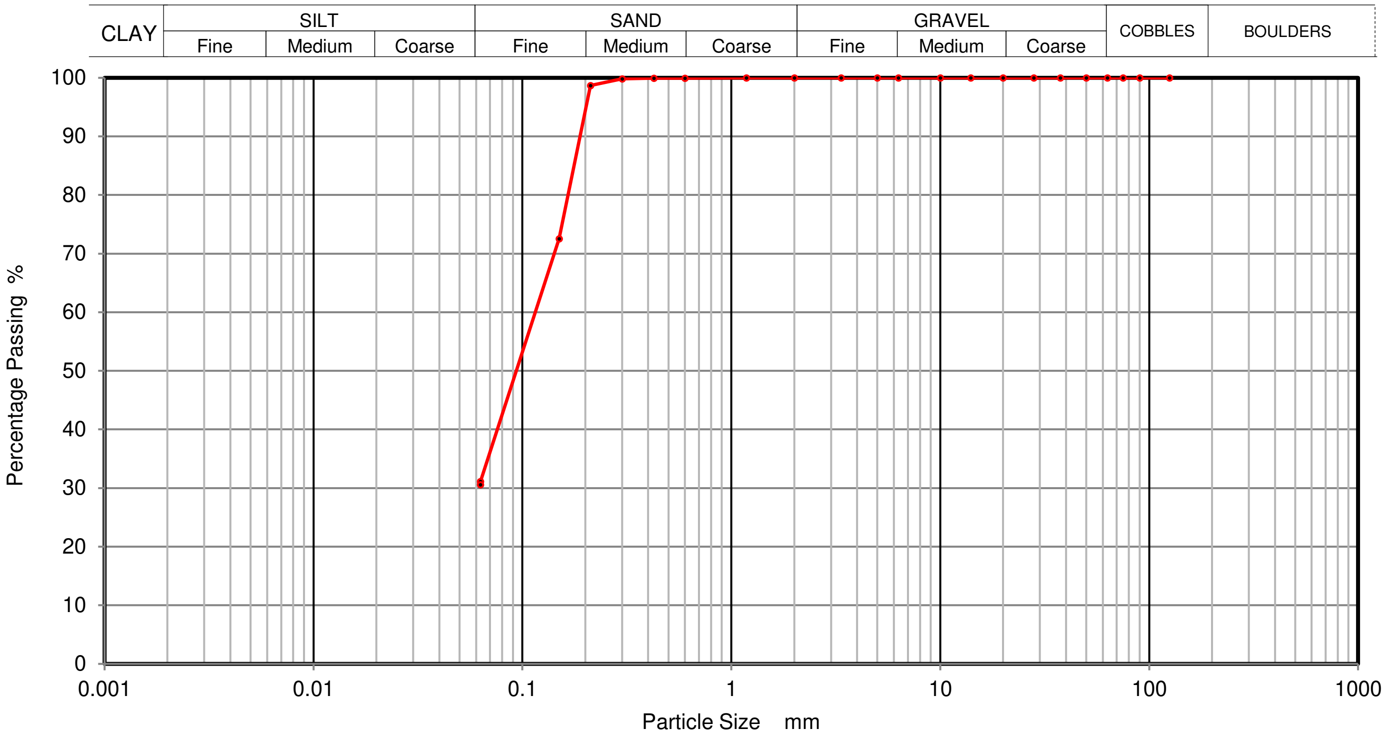
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	26-09-17	Ben Sharp	
RO/MH	Approved	27-09-17	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	36503
		Borehole/Pit No.	BH104
Site Name	Otterpool Park	Sample No.	1
Soil Description	Brown silty clayey fine to medium SAND.	Depth Top	4.00
		Depth Base	5.00
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
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	100		
0.3	100		
0.212	99		
0.15	73		
0.063	31		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	69
Silt and Clay	31

Grading Analysis	
Uniformity Coefficient	

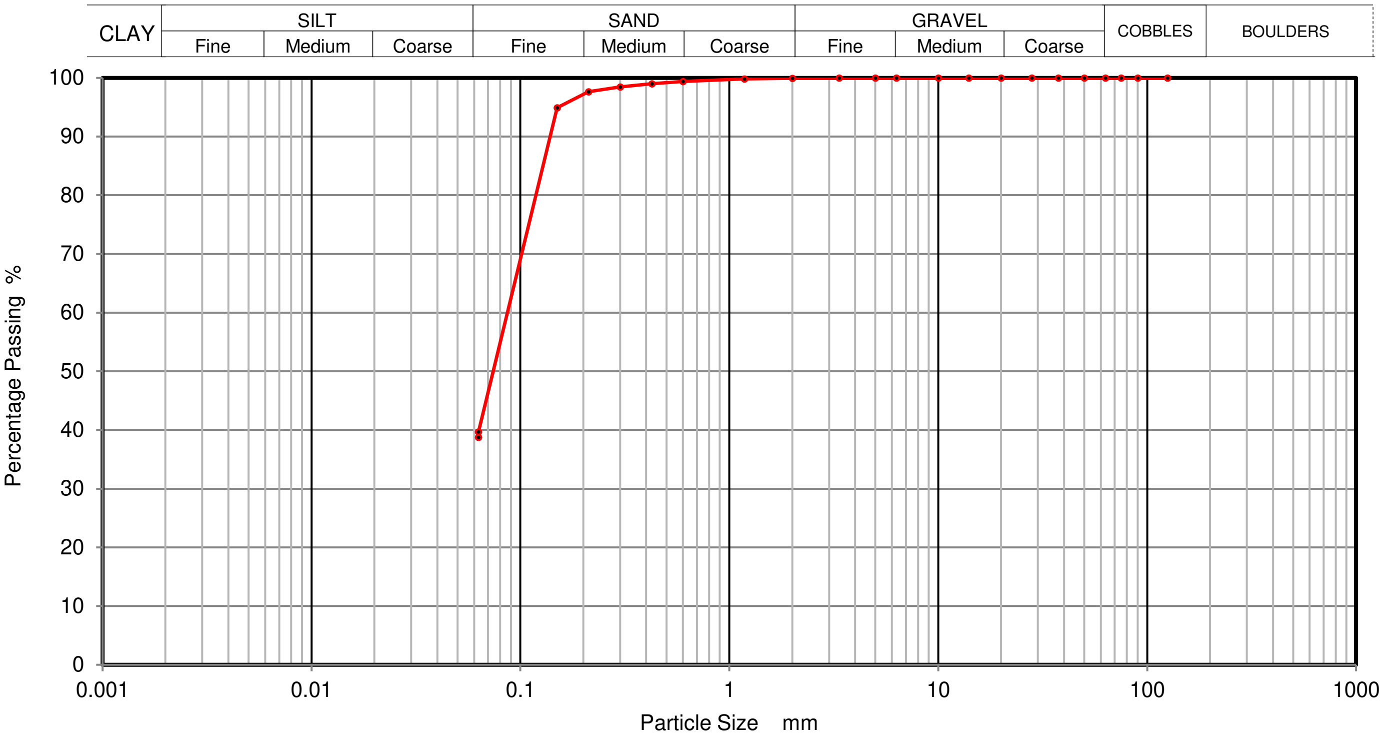
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	26-09-17	Ben Sharp	
RO/MH	Approved	27-09-17	Paul Evans	P Evans

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	36503
		Borehole/Pit No.	BH105
Site Name	Otterpool Park	Sample No.	12
Soil Description	Grey silty clayey fine to coarse SAND.	Depth Top	5.00
		Depth Base	
		Sample Type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
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	99		
0.3	98		
0.212	98		
0.15	95		
0.063	40		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	60
Silt and Clay	40

Grading Analysis	
Uniformity Coefficient	

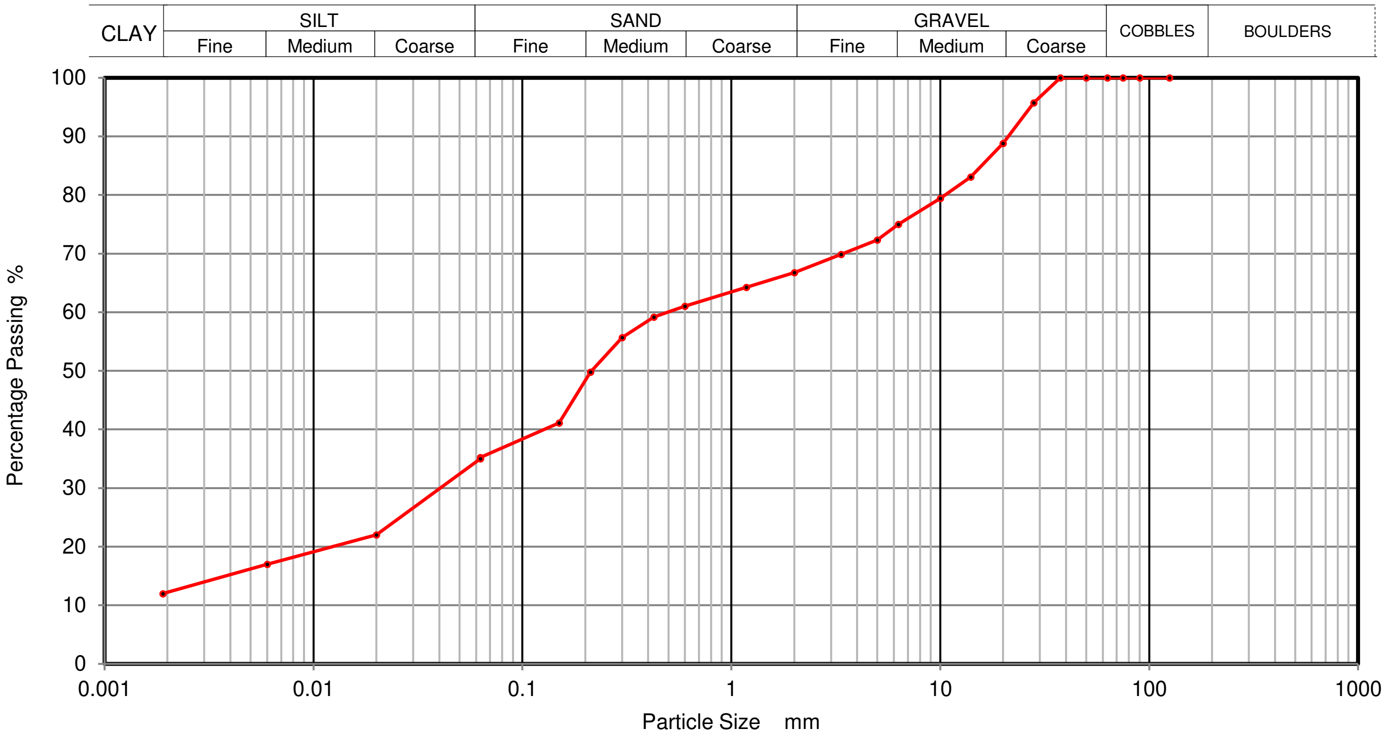
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	26-09-17	Ben Sharp	
RO/MH	Approved	27-09-17	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	36503
		Borehole/Pit No.	TP101
Site Name	Otterpool Park	Sample No.	10
Soil Description	Brown clayey silty fine to coarse sandy fine to coarse GRAVEL.	Depth Top	1.50
		Depth Base	
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	22
90	100	0.0060	17
75	100	0.0019	12
63	100		
50	100		
37.5	100		
28	96		
20	89		
14	83		
10	79		
6.3	75		
5	72		
3.35	70		
2	67		
1.18	64		
0.6	61		
0.425	59		
0.3	56		
0.212	50		
0.15	41		
0.063	35		

Sample Proportions	% dry mass
Cobbles	0
Gravel	33
Sand	32
Silt	23
Clay	12

Grading Analysis	
Uniformity Coefficient	

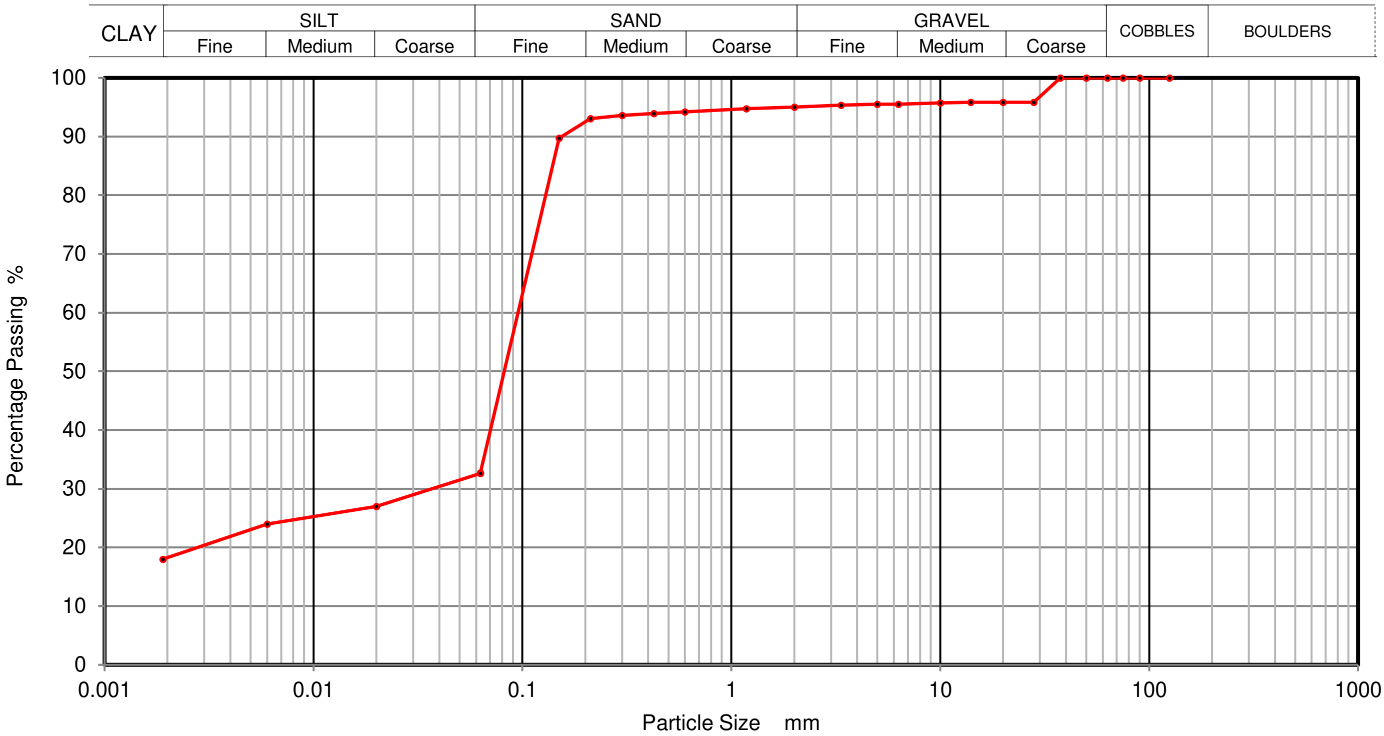
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	26-09-17	Ben Sharp	
RO/MH	Approved	27-09-17	Paul Evans	D P Evans

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	36503
		Borehole/Pit No.	TP103
Site Name	Otterpool Park	Sample No.	10
Soil Description	Brown slightly fine to coarse gravelly silty clayey fine to coarse SAND.	Depth Top	1.50
		Depth Base	
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	27
90	100	0.0060	24
75	100	0.0019	18
63	100		
50	100		
37.5	100		
28	96		
20	96		
14	96		
10	96		
6.3	96		
5	96		
3.35	95		
2	95		
1.18	95		
0.6	94		
0.425	94		
0.3	94		
0.212	93		
0.15	90		
0.063	33		

Sample Proportions	% dry mass
Cobbles	0
Gravel	5
Sand	62
Silt	15
Clay	18

Grading Analysis	
Uniformity Coefficient	

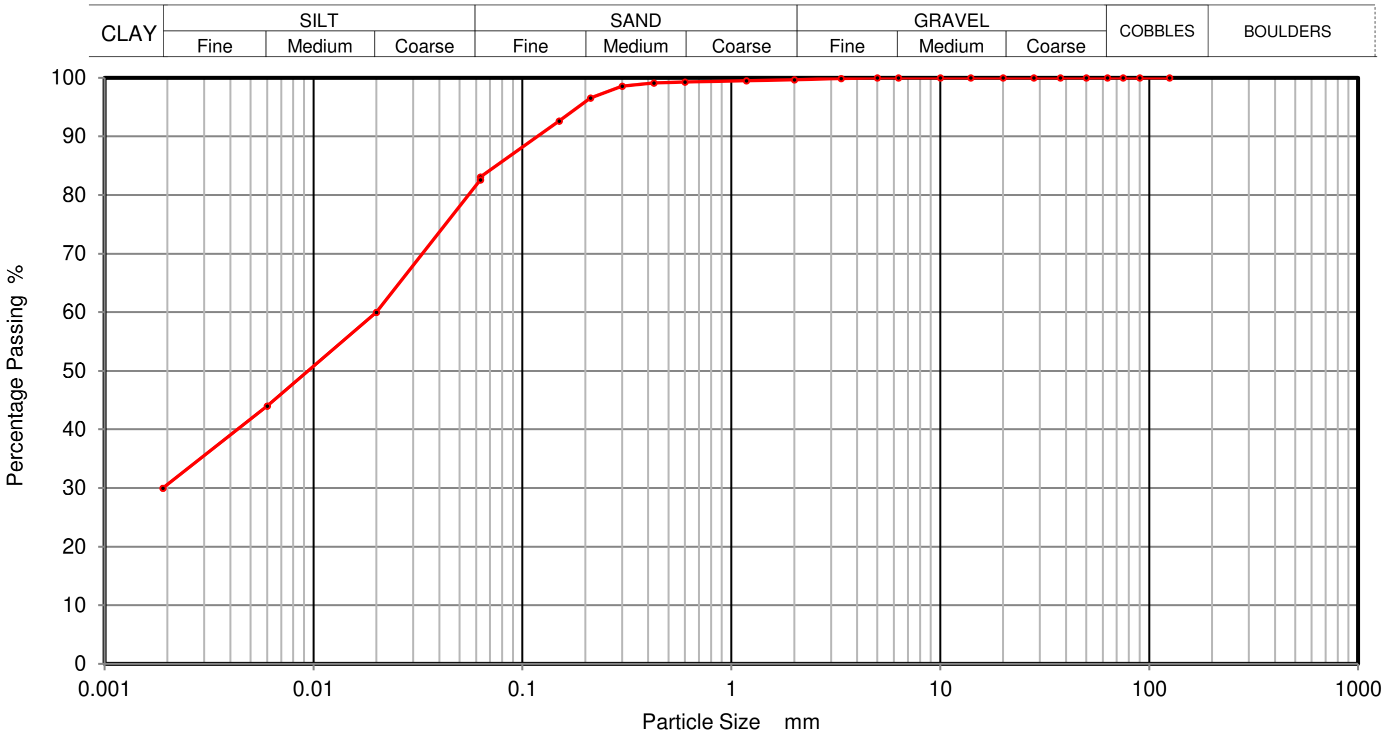
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	26-09-17	Ben Sharp	
RO/MH	Approved	27-09-17	Paul Evans	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	36503
		Borehole/Pit No.	TP104
Site Name	Otterpool Park	Sample No.	10
Soil Description	Brown fine to coarse sandy clayey SILT.	Depth Top	1.50
		Depth Base	
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	60
90	100	0.0060	44
75	100	0.0019	30
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	99		
0.3	99		
0.212	97		
0.15	93		
0.063	83		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	17
Silt	53
Clay	30

Grading Analysis	
Uniformity Coefficient	

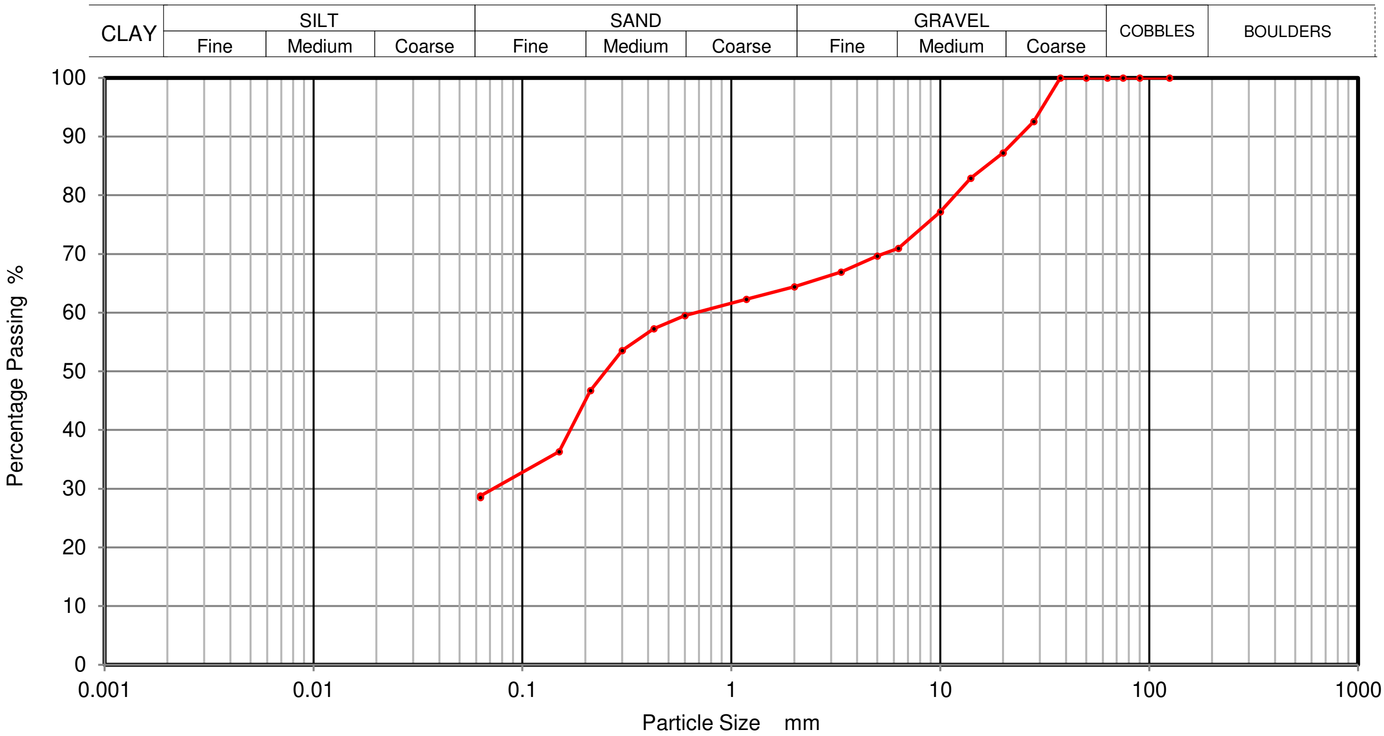
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	26-09-17	Ben Sharp	
RO/MH	Approved	27-09-17	Paul Evans	D P Evans

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	36503
		Borehole/Pit No.	TP105
Site Name	Otterpool Park	Sample No.	4
Soil Description	Brown silty clayey fine to coarse sandy fine to coarse GRAVEL.	Depth Top	2.20
		Depth Base	
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	93		
20	87		
14	83		
10	77		
6.3	71		
5	70		
3.35	67		
2	64		
1.18	62		
0.6	59		
0.425	57		
0.3	54		
0.212	47		
0.15	36		
0.063	29		

Sample Proportions	% dry mass
Cobbles	0
Gravel	36
Sand	35
Silt and Clay	29

Grading Analysis	
Uniformity Coefficient	

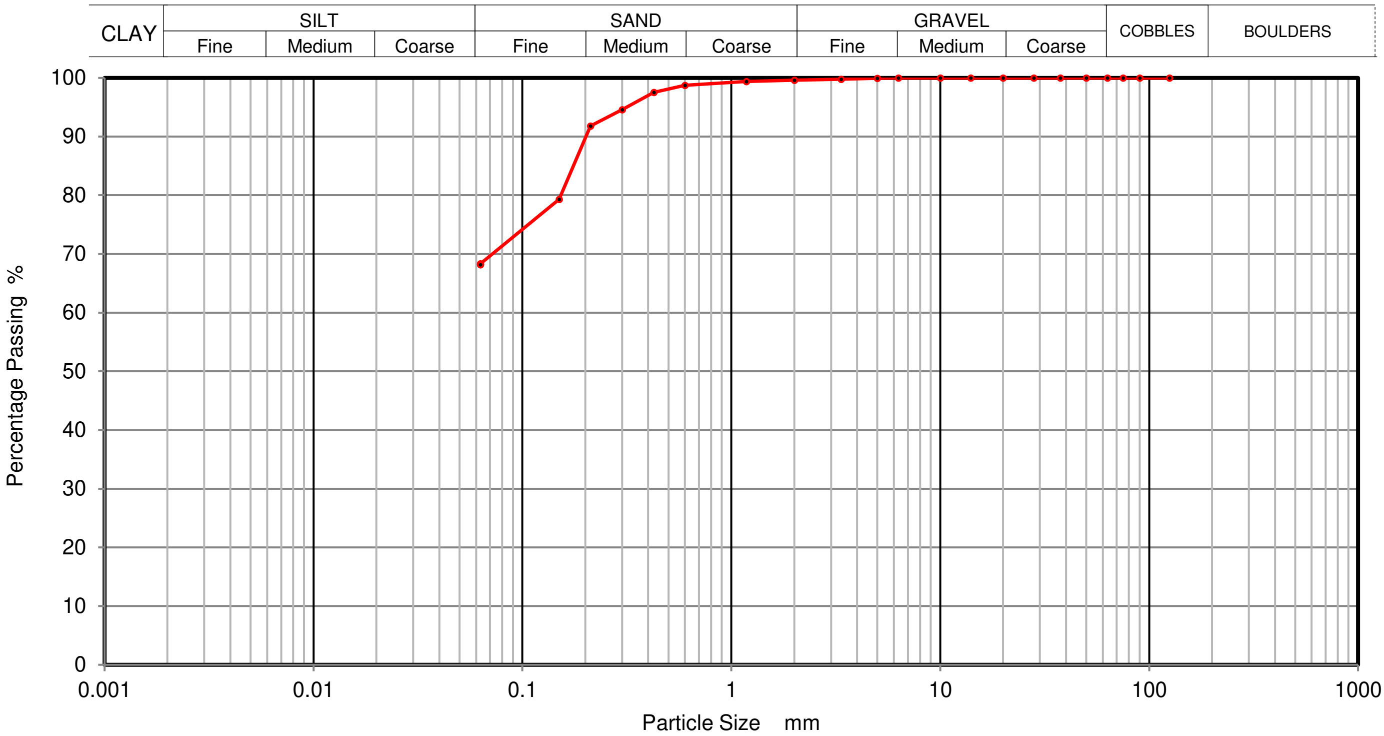
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	26-09-17	Ben Sharp	
RO/MH	Approved	27-09-17	Paul Evans	P Evans

UKAS TESTING 2788

GSTL	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	**36503**
		Borehole/Pit No.	**TP108**
Site Name	**Otterpool Park**	Sample No.	**1**
Soil Description	Brown fine to coarse sandy SILT/CLAY.	Depth Top	**1.50**
		Depth Base	
		Sample Type	**D**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
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	99		
0.6	99		
0.425	98		
0.3	95		
0.212	92		
0.15	79		
0.063	68		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	32
Silt and Clay	68

Grading Analysis	
Uniformity Coefficient	

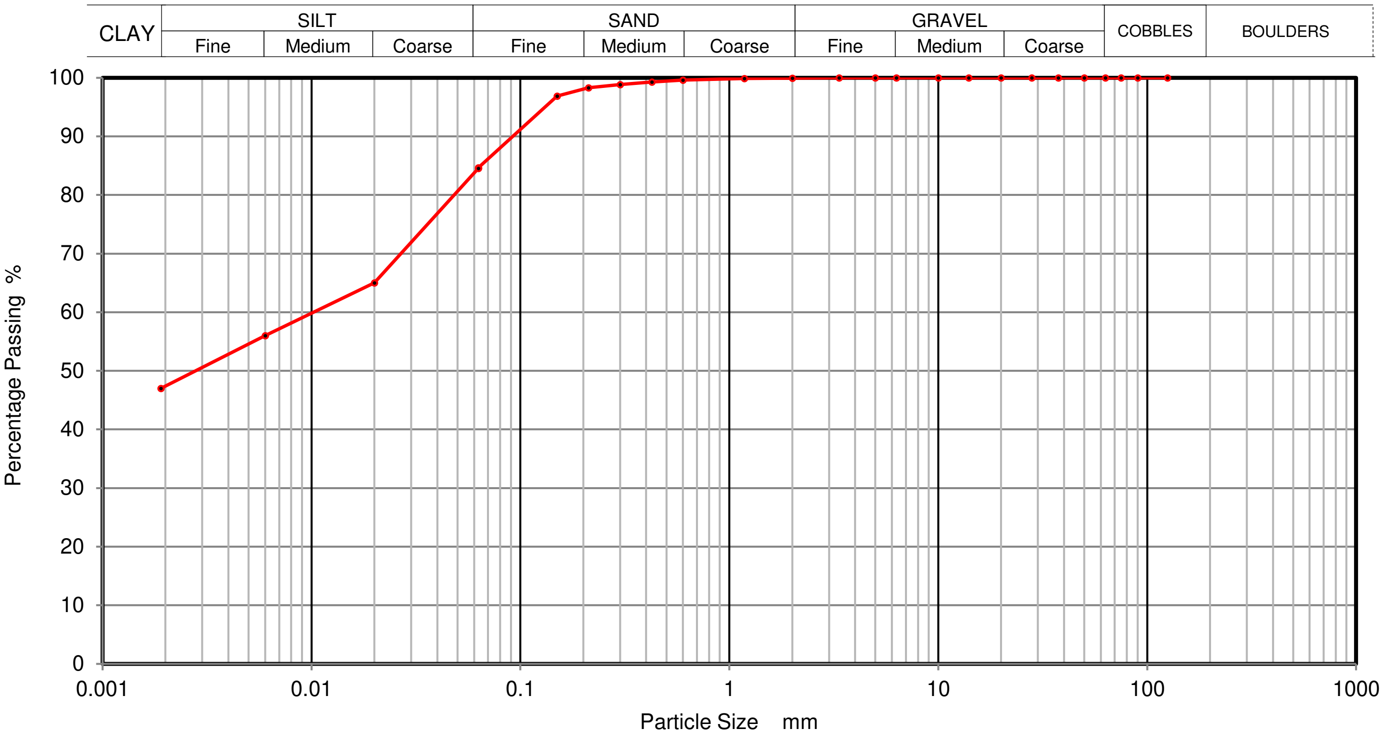
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	26-09-17	Ben Sharp	[signature]
RO/MH	Approved	27-09-17	Paul Evans	P Evans

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	36503
		Borehole/Pit No.	TP109
Site Name	Otterpool Park	Sample No.	7
Soil Description	Brown fine to medium sandy silty CLAY.	Depth Top	1.20
		Depth Base	
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	65
90	100	0.0060	56
75	100	0.0019	47
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	99		
0.3	99		
0.212	98		
0.15	97		
0.063	85		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	15
Silt	38
Clay	47

Grading Analysis	
Uniformity Coefficient	

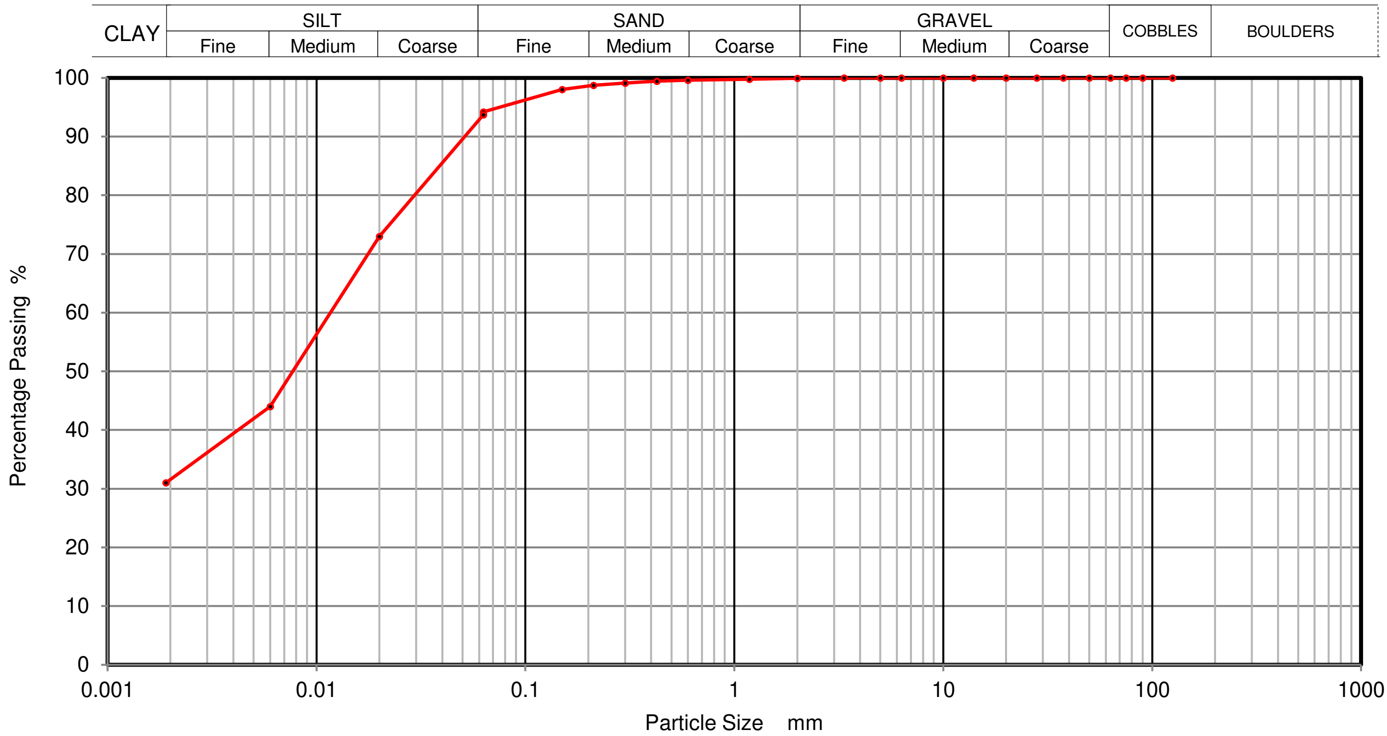
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	26-09-17	Ben Sharp	
RO/MH	Approved	27-09-17	Paul Evans	D P Evans

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	**36503**
		Borehole/Pit No.	**TP110**
Site Name	**Otterpool Park**	Sample No.	**7**
Soil Description	Brown slightly fine to medium sandy clayey SILT.	Depth Top	**1.00**
		Depth Base	
		Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	73
90	100	0.0060	44
75	100	0.0019	31
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	99		
0.3	99		
0.212	99		
0.15	98		
0.063	94		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	6
Silt	63
Clay	31

Grading Analysis	
Uniformity Coefficient	

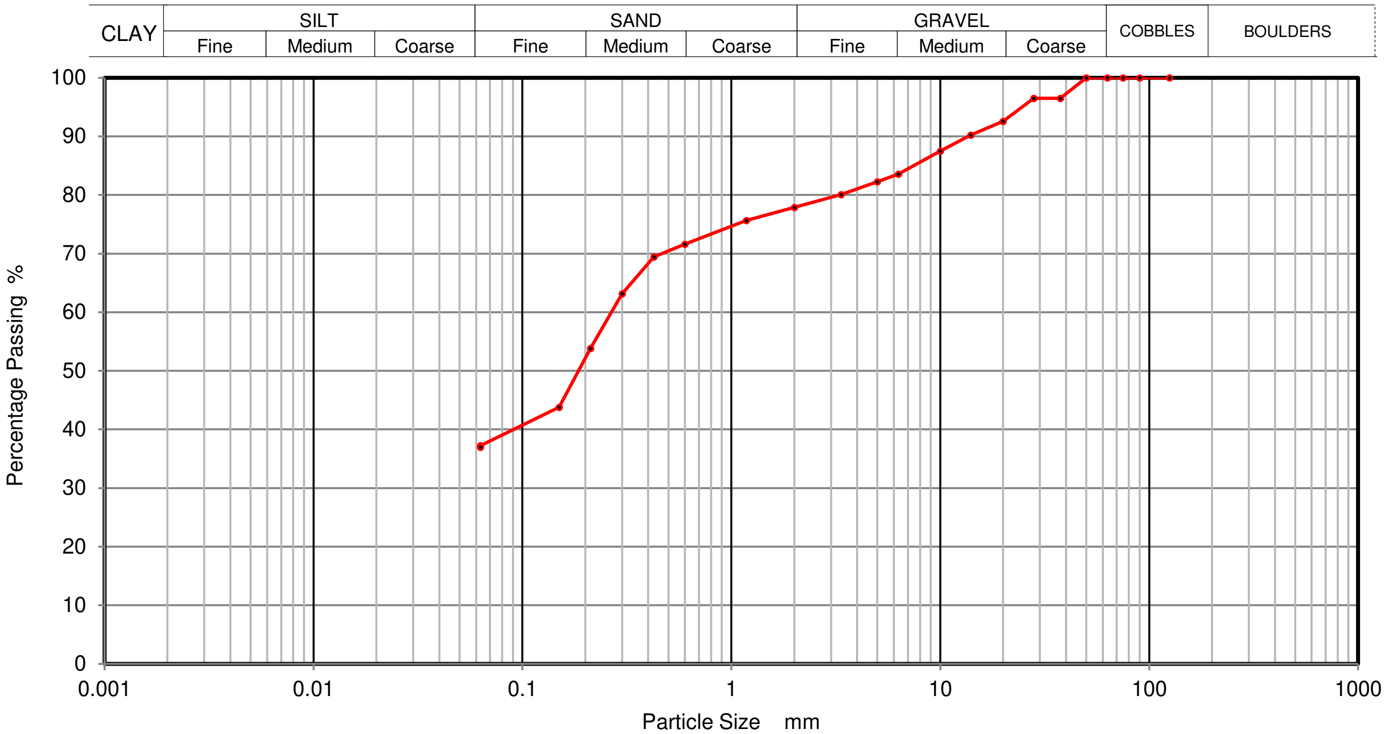
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	26-09-17	Ben Sharp	
RO/MH	Approved	27-09-17	Paul Evans	P Evans

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	36503
		Borehole/Pit No.	TP112
Site Name	Otterpool Park	Sample No.	7
Soil Description	Brown fine to coarse gravelly silty clayey fine to coarse SAND.	Depth Top	1.00
		Depth Base	
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	97		
28	97		
20	93		
14	90		
10	87		
6.3	84		
5	82		
3.35	80		
2	78		
1.18	76		
0.6	72		
0.425	69		
0.3	63		
0.212	54		
0.15	44		
0.063	37		

Sample Proportions	% dry mass
Cobbles	0
Gravel	22
Sand	41
Silt and Clay	37

Grading Analysis	
Uniformity Coefficient	

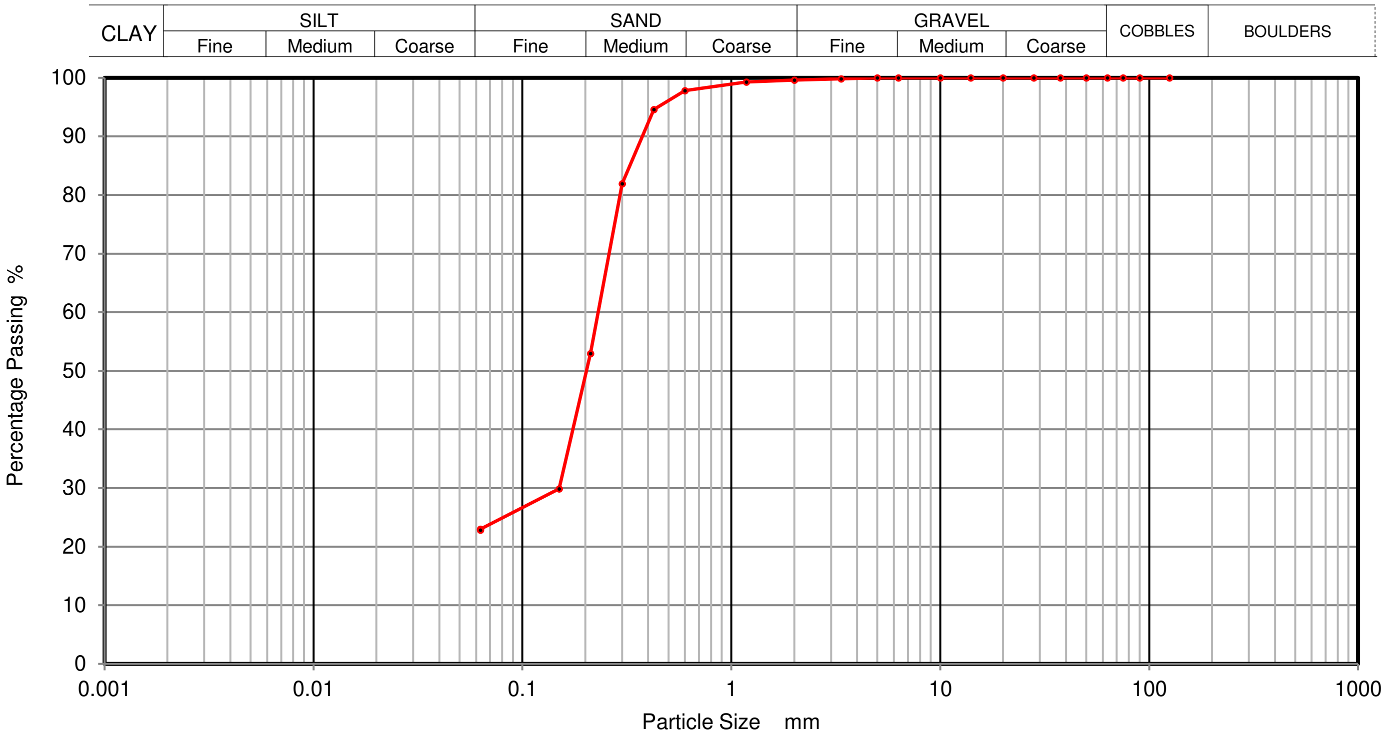
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	26-09-17	Ben Sharp	[signature]
RO/MH	Approved	27-09-17	Paul Evans	D P Evans

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	36503
		Borehole/Pit No.	WS101
Site Name	Otterpool Park	Sample No.	13
Soil Description	Brown silty clayey fine to coarse SAND.	Depth Top	2.00
		Depth Base	2.80
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
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	99		
0.6	98		
0.425	95		
0.3	82		
0.212	53		
0.15	30		
0.063	23		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	77
Silt and Clay	23

Grading Analysis	
Uniformity Coefficient	

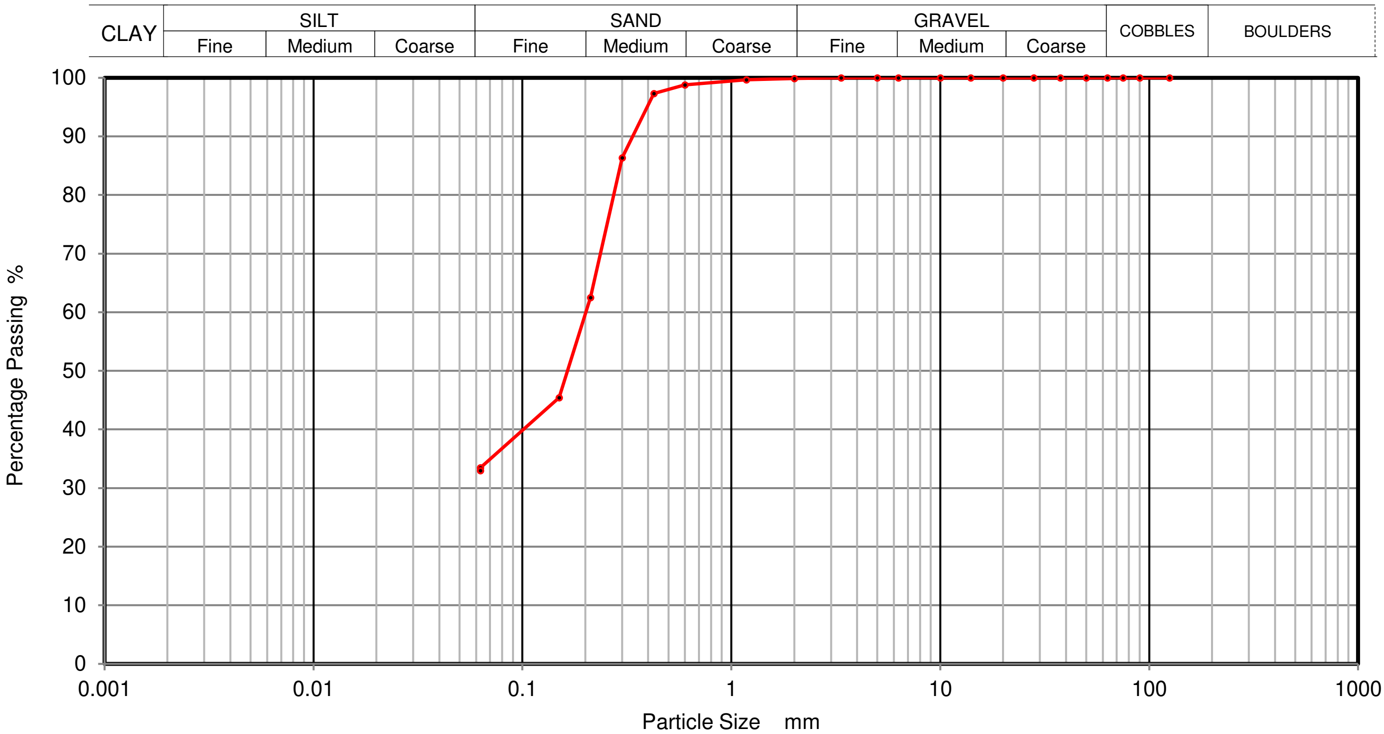
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	26-09-17	Ben Sharp	
RO/MH	Approved	27-09-17	Paul Evans	D P Evans

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	36503
		Borehole/Pit No.	WS103
Site Name	Otterpool Park	Sample No.	16
Soil Description	Brown silty clayey fine to coarse SAND.	Depth Top	2.00
		Depth Base	2.80
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
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	97		
0.3	86		
0.212	63		
0.15	45		
0.063	33		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	67
Silt and Clay	33

Grading Analysis	
Uniformity Coefficient	

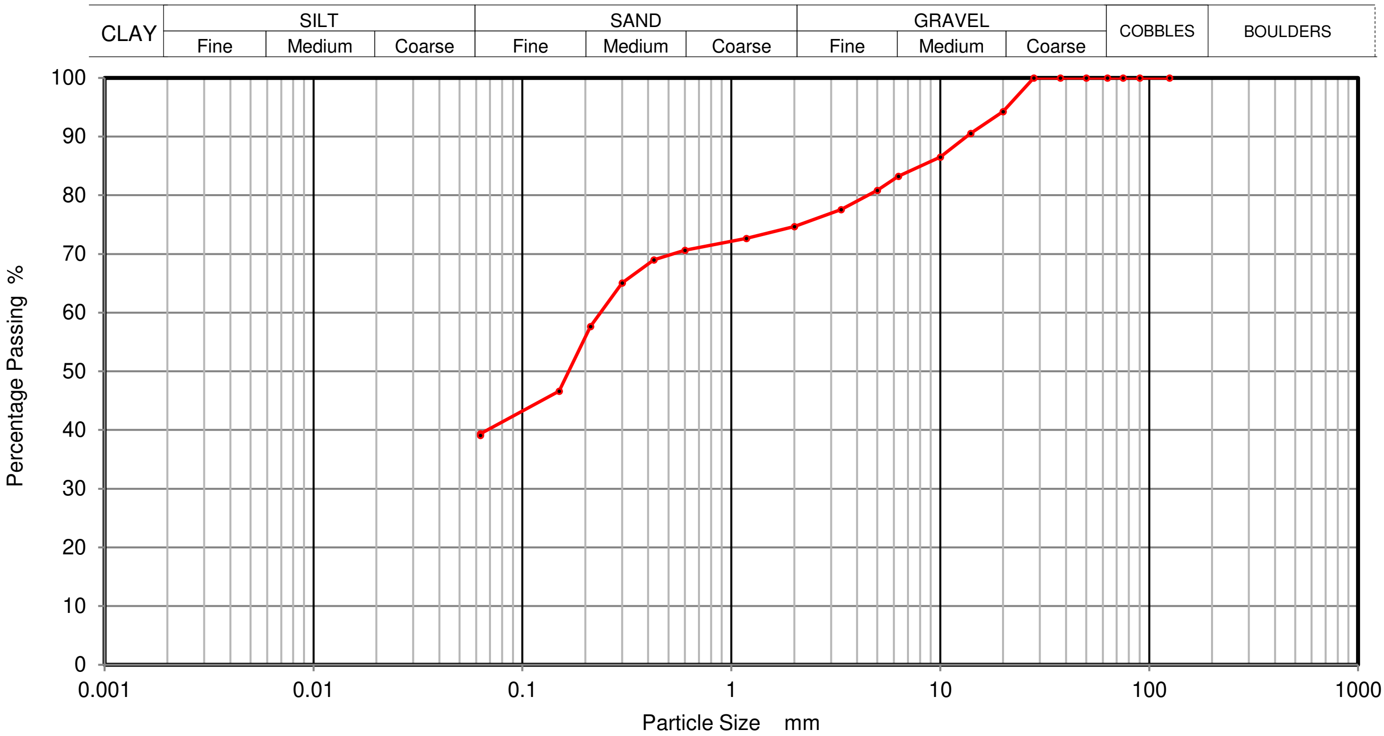
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	26-09-17	Ben Sharp	
RO/MH	Approved	27-09-17	Paul Evans	P Evans

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	36503
		Borehole/Pit No.	WS104C
Site Name	Otterpool Park	Sample No.	16
Soil Description	Brown fine to coarse gravelly fine to coarse sandy SILT/CLAY.	Depth Top	3.00
		Depth Base	3.90
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	100		
20	94		
14	91		
10	87		
6.3	83		
5	81		
3.35	78		
2	75		
1.18	73		
0.6	71		
0.425	69		
0.3	65		
0.212	58		
0.15	47		
0.063	39		

Sample Proportions	% dry mass
Cobbles	0
Gravel	25
Sand	36
Silt and Clay	39

Grading Analysis	
Uniformity Coefficient	

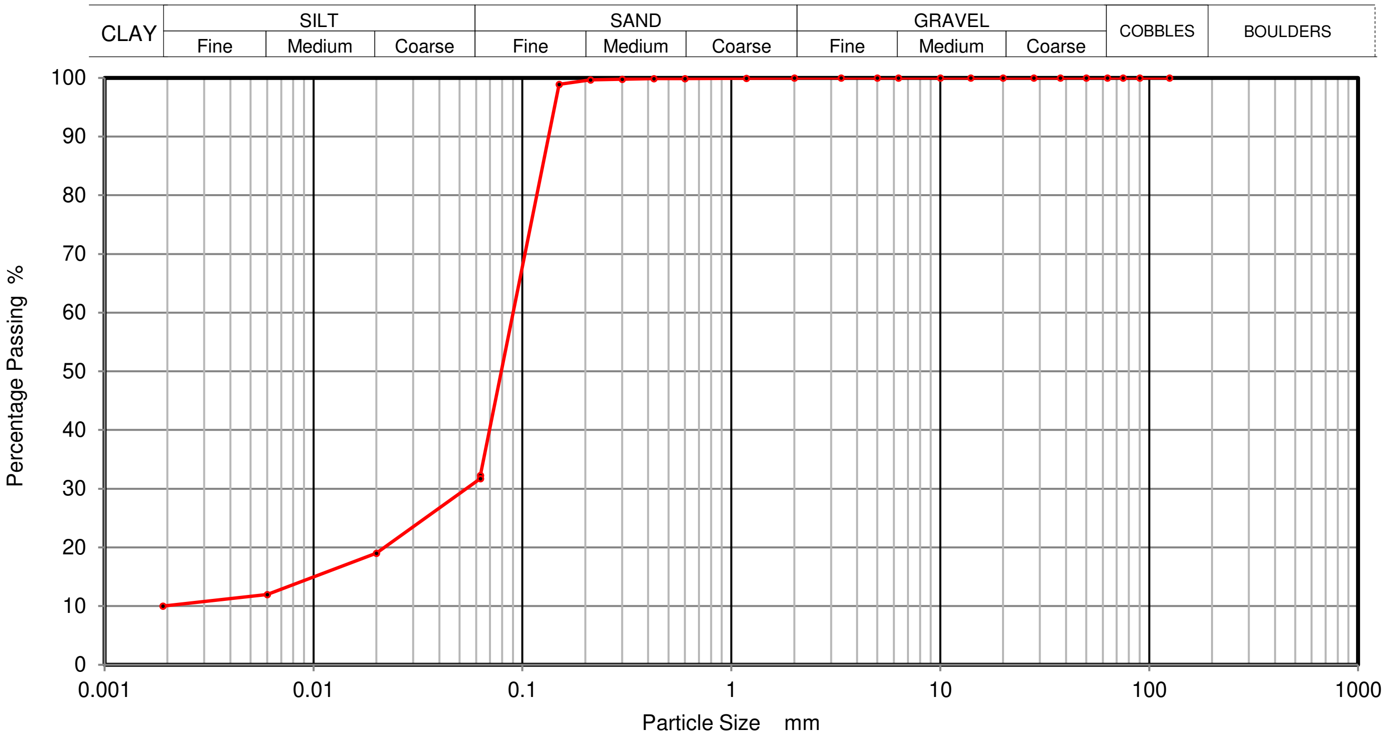
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	26-09-17	Ben Sharp	
RO/MH	Approved	27-09-17	Paul Evans	D P Evans

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	36503
		Borehole/Pit No.	WS105
Site Name	Otterpool Park	Sample No.	12
Soil Description	Brown silty clayey fine SAND.	Depth Top	2.00
		Depth Base	2.25
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	19
90	100	0.0060	12
75	100	0.0019	10
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	100		
0.3	100		
0.212	100		
0.15	99		
0.063	32		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	68
Silt	22
Clay	10

Grading Analysis	
Uniformity Coefficient	

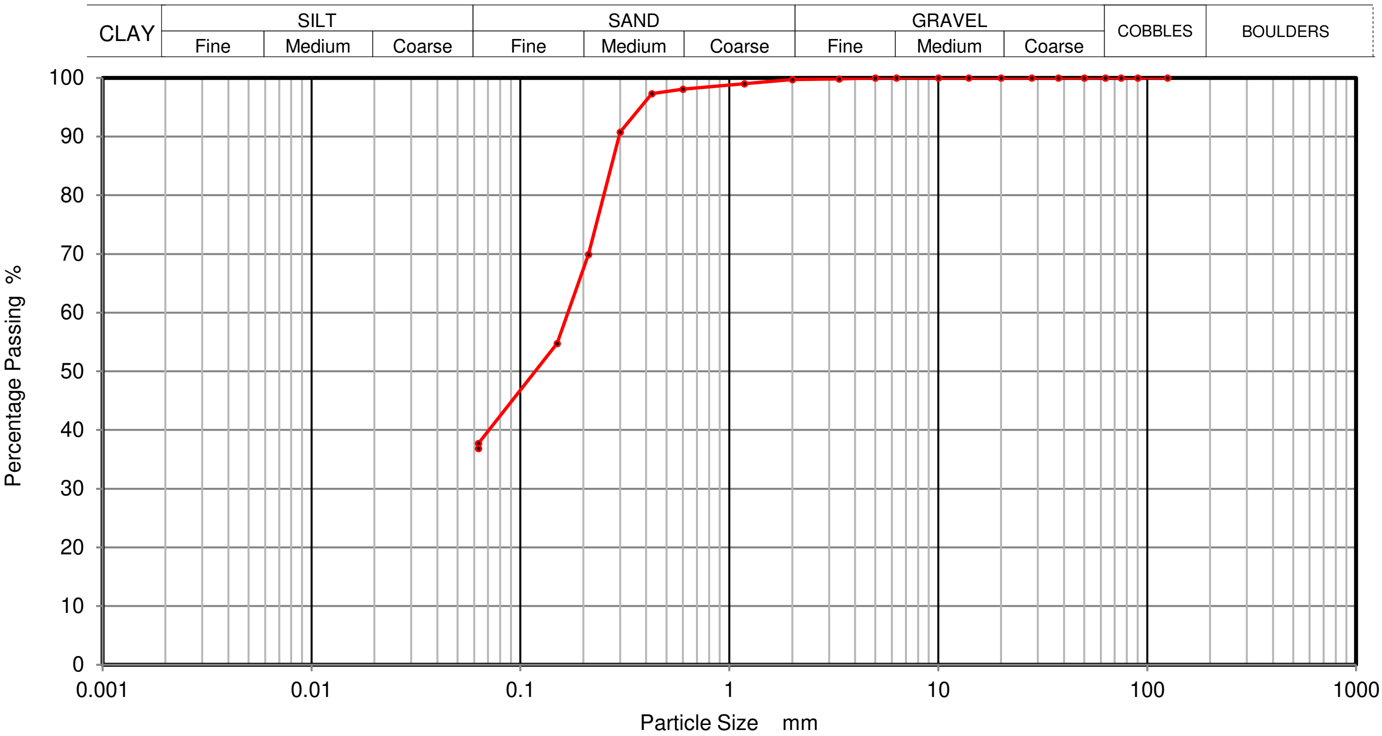
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	26-09-17	Ben Sharp	
RO/MH	Approved	27-09-17	Paul Evans	D P Evans

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	36503
		Borehole/Pit No.	WS112
Site Name	Otterpool Park	Sample No.	14
Soil Description	Brown silty clayey fine to coarse SAND.	Depth Top	2.20
		Depth Base	2.70
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
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	99		
0.6	98		
0.425	97		
0.3	91		
0.212	70		
0.15	55		
0.063	38		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	62
Silt and Clay	38

Grading Analysis	
Uniformity Coefficient	

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	26-09-17	Ben Sharp	
RO/MH	Approved	27-09-17	Paul Evans	

UKAS TESTING 2788

GSTL	Certificate of Chemical Analysis (BRE BR 279)	Contract Number	36503
		Client Reference	UA008926
Client	Arcadis	Date Received	21-09-17
Site Name	Otterpool Park	Date Started	
		Date Completed	27-09-17
		No. of Samples	11

Hole Number	Sample Number	Sample Type	Depth (m)			Acid Soluble Sulphate	Aqueous Extract Sulphate	Chloride Content	Ph Value	Total Sulphur	Magnesium	Nitrate
BH101	4	B	0.75	-	1.00	0.33	0.15	NCP	6.78	0.12	<1	<10
BH104	2	B	7.00	-	8.00	0.29	0.03	NCP	6.92	0.11	<1	10-25
				-								
TP102	7	B	1.10	-		0.29	0.04	NCP	6.39	0.10	<1	<10
TP103	3	D	1.50	-		0.25	0.08	NCP	6.16	0.10	<1	<10
TP104	8	D	1.00	-		0.25	0.03	NCP	6.84	0.09	<1	10-25
TP110	7	B	1.00	-		0.21	0.03	NCP	6.56	0.09	<1	10-25
TP113	10	B	1.40	-		0.23	0.03	NCP	6.89	0.09	<1	<10
WS103	16	B	2.00	-	2.80	0.21	0.02	NCP	5.89	0.08	<1	<10
WS107	7	B	0.70	-	1.00	0.23	0.07	NCP	6.60	0.08	<1	<10
WS109	8	B	1.20	-	1.80	0.25	0.03	NCP	6.24	0.09	<1	<10
				-								
				-								
				-								
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Key	Reported As
Acid Soluble Sulphate	% SO_4
Aqueous Extract Sulphate	g/l SO_4
Chloride Content (Semi)	mg Cl/l
PH Value	@ 25°
Total Sulphur	% S
Magnesium	g/l SO_4
Nitrate	NO_3 mg/l

Remarks

NCP = No Chloride Present

Test Operator	Checked and Authorised by		Ben Sharp	
Neil Edwards	Date	27-09-17		

GSTL	Certificate of Chemical Analysis (BRE BR 279)	**Contract Number**	36503
		Client Reference	UA008926
Client	Arcadis	**Date Received**	
Site Name	Otterpool Park	**Date Started**	
		Date Completed	29-09-17
		No. of Samples	2

Hole Number	Sample Number	Sample Type	Depth (m)			Acid Soluble Sulphate	Aqueous Extract Sulphate	Chloride Content	Ph Value	Total Sulphur	Magnesium	Nitrate
TP108	5	D	0.60	-		0.25	0.03	NCP	6.71	0.09	<1	<10
TP111	10	B	1.60	-		0.23	0.02	NCP	6.82	0.09	<1	<10
				-								
				-								
				-								
				-								
				-								
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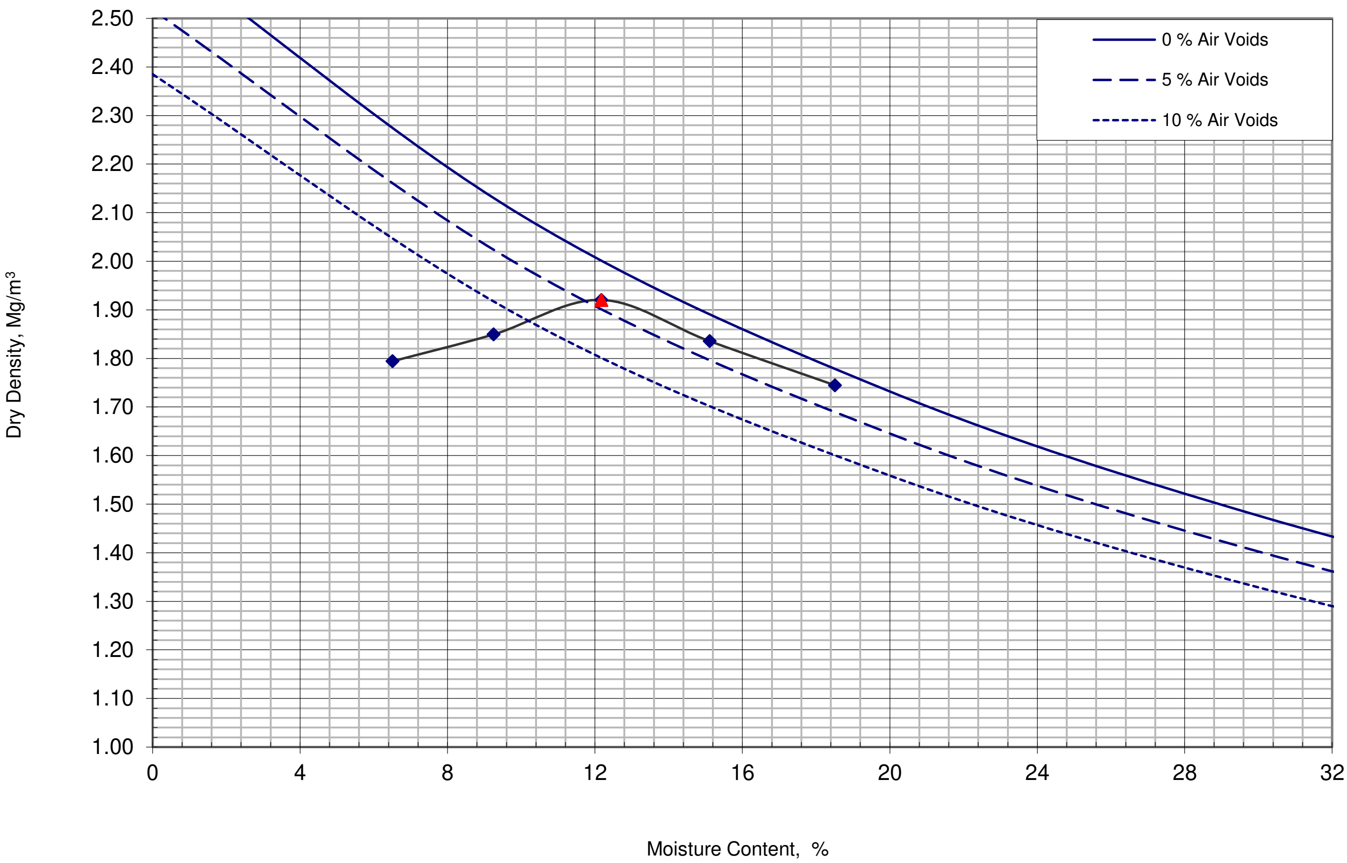
Key	**Reported As**
Acid Soluble Sulphate	% SO_4
Aqueous Extract Sulphate	g/l SO_4
Chloride Content (Semi)	mg Cl/l
PH Value	@ 25°
Total Sulphur	% S
Magnesium	g/l SO_4
Nitrate	NO_3 mg/l

Remarks

NCP = No Chloride Present

Test Operator	Checked and Authorised by		Ben Sharp	
Darren Bourne	Date	29-09-17		

GSTL	Dry Density / Moisture Content Relationship BS 1377:Part 4:1990	Contract Number	36503
		Borehole / Pit No	TP101
Site Name	**Otterpool Park**	Sample No	**4**
		Depth Top	**0.50**
Compaction Method	**2.5 Kg Rammer**	Depth Base	
Compaction Clause	**BS1377:Part 4:1990, Clause 3.4**	Sample Type	**B**



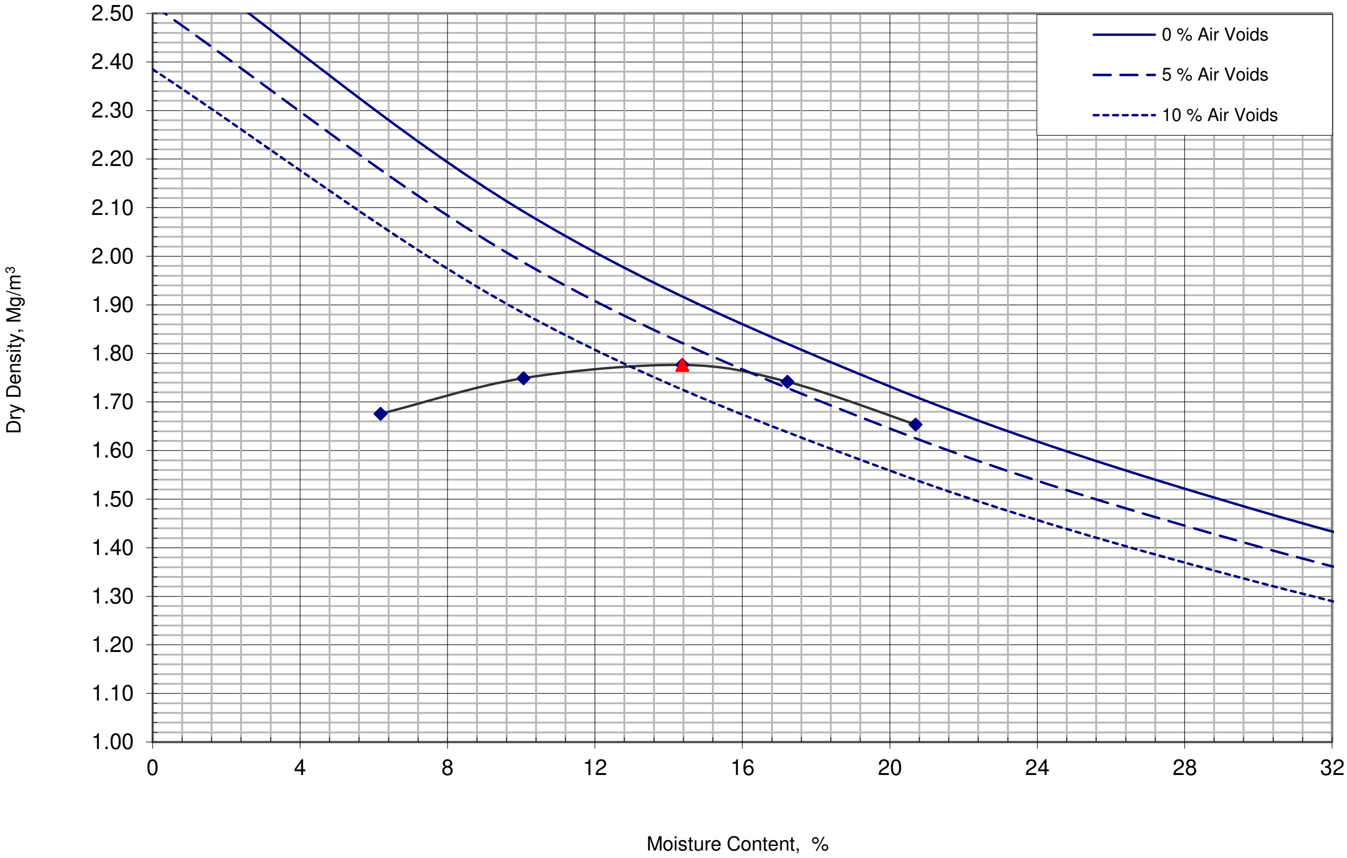
Compaction Point	1	2	3	4	5							
Moisture Content	6.5	9.3	12	15	19							
Bulk Density	1.91	2.02	2.15	2.11	2.07							
Dry Density	1.79	1.85	1.92	1.84	1.74							

Initial Moisture Content	19	%
Maximum Dry Density	1.92	Mg/m3
Optimum Moisture Content	12	%
Paricle Density	2.65 Assumed	Mg/m3
Material Retianed 37.5mm	0	%
Material Retianed 20mm	0	%

Operators	Checked	28-09-17	Ben Sharp	
CA	Approved	29-09-17	Paul Evans	D P Evans

UKAS TESTING 2788

GSTL	Dry Density / Moisture Content Relationship BS 1377:Part 4:1990	Contract Number	36503
		Borehole / Pit No	TP104
Site Name	**Otterpool Park**	Sample No	**2**
		Depth Top	**2.20**
Compaction Method	**2.5 Kg Rammer**	Depth Base	
Compaction Clause	**BS1377:Part 4:1990, Clause 3.4**	Sample Type	**B**



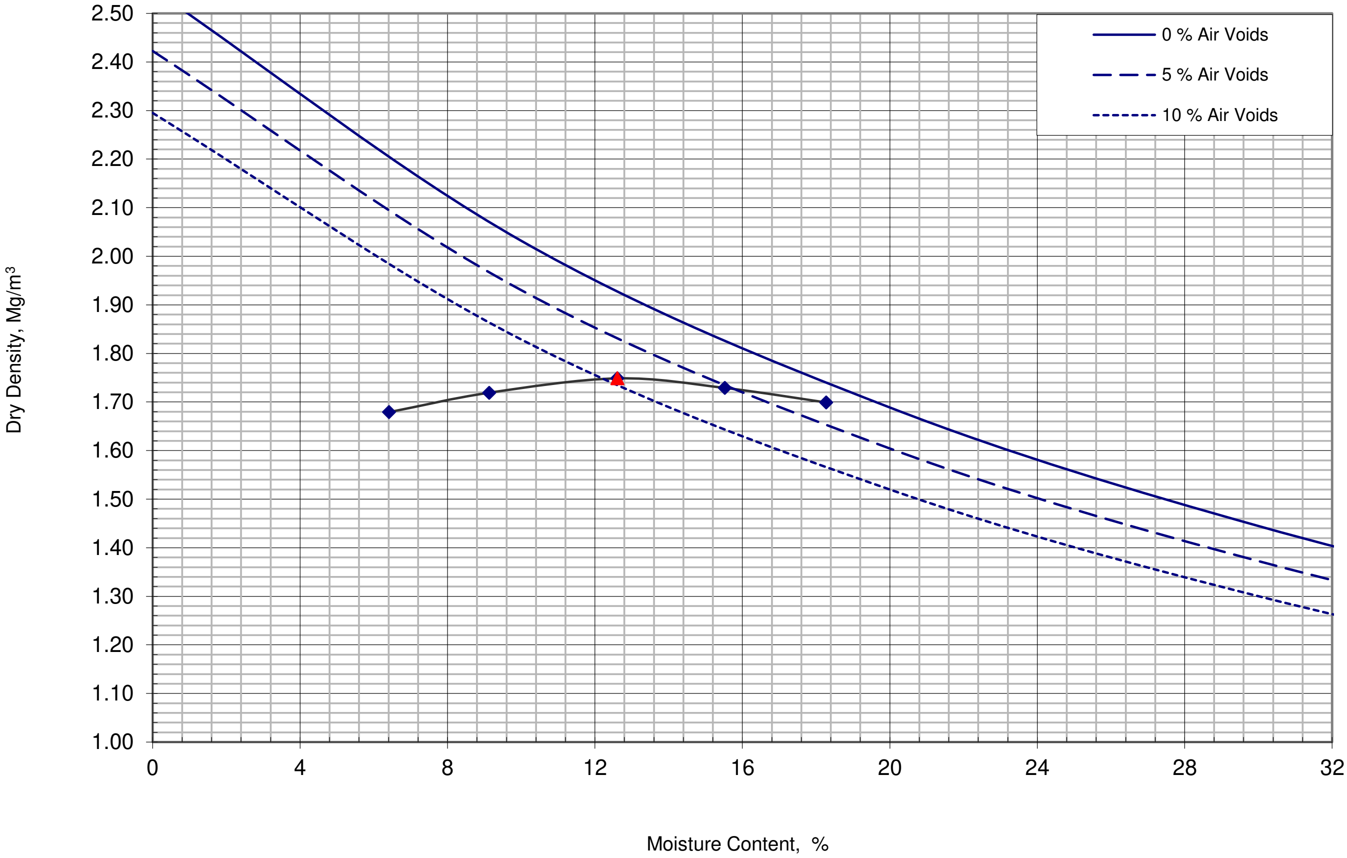
Compaction Point	1	2	3	4	5							
Moisture Content	6.2	10	14	17	21							
Bulk Density	1.78	1.93	2.03	2.04	2.00							
Dry Density	1.68	1.75	1.78	1.74	1.65							

Initial Moisture Content	21	%
Maximum Dry Density	1.78	Mg/m3
Optimum Moisture Content	14	%
Paricle Density	2.65 Assumed	Mg/m3
Material Retianed 37.5mm	0	%
Material Retianed 20mm	0	%

Operators	Checked	28-09-17	Ben Sharp	
CA	Approved	29-09-17	Paul Evans	

UKAS TESTING 2788

	Dry Density / Moisture Content Relationship BS 1377:Part 4:1990	Contract Number	36503
		Borehole / Pit No	TP106
Site Name	**Otterpool Park**	Sample No	**2**
		Depth Top	**2.00**
Compaction Method	**2.5 Kg Rammer**	Depth Base	
Compaction Clause	**BS1377:Part 4:1990, Clause 3.4**	Sample Type	**B**



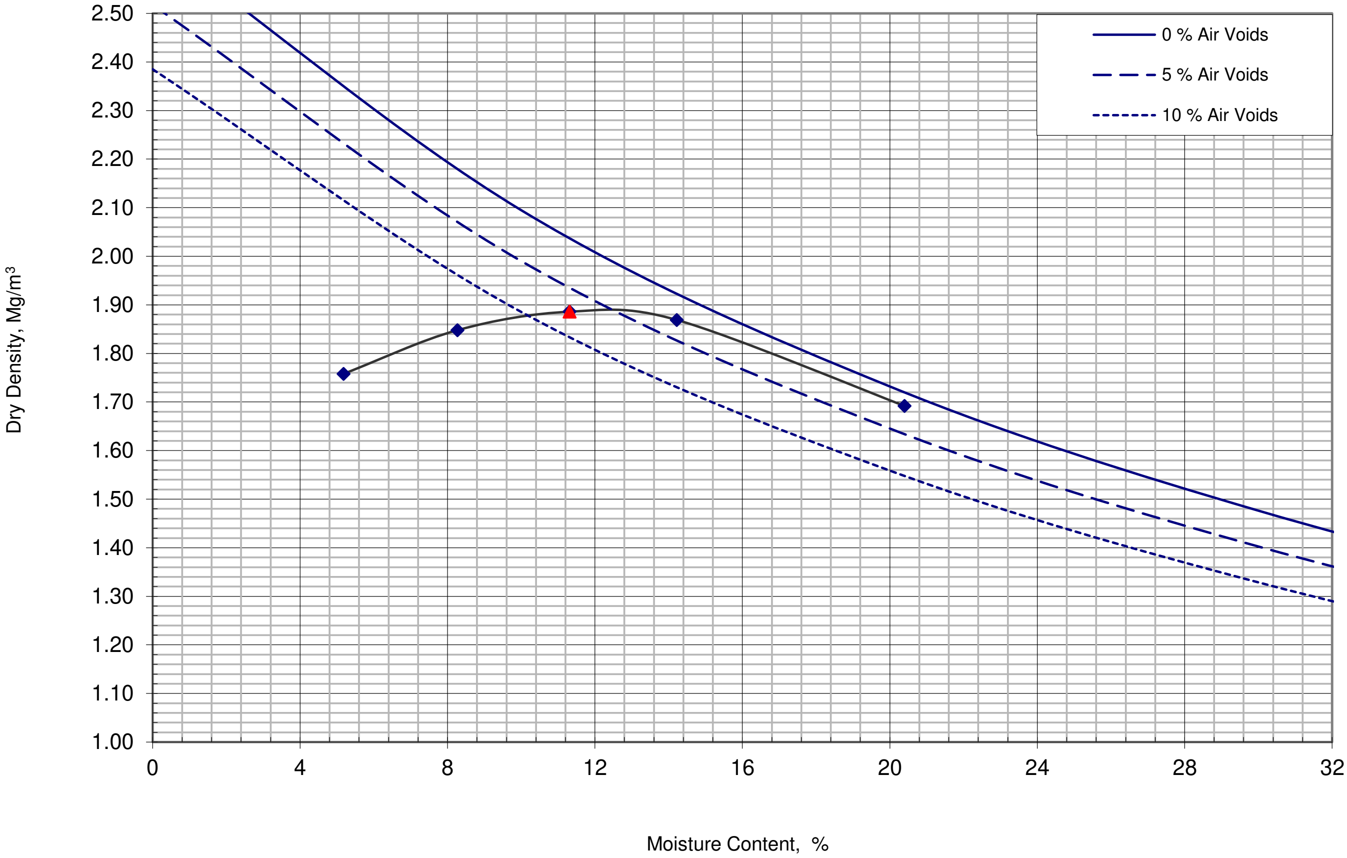
Compaction Point	1	2	3	4	5							
Moisture Content	6.4	9.1	13	16	18							
Bulk Density	1.79	1.88	1.97	2.00	2.01							
Dry Density	1.68	1.72	1.75	1.73	1.70							

Initial Moisture Content	13	%
Maximum Dry Density	1.75	Mg/m3
Optimum Moisture Content	13	%
Paricle Density	2.55 Assumed	Mg/m3
Material Retianed 37.5mm	19	%
Material Retianed 20mm	32	%

Operators	Checked	26-09-17	Ben Sharp	
CA	Approved	27-09-17	Paul Evans	D P Evans

UKAS TESTING 2788

GSTL	Dry Density / Moisture Content Relationship BS 1377:Part 4:1990	Contract Number	36503
		Borehole / Pit No	TP109
Site Name	**Otterpool Park**	Sample No	**7**
		Depth Top	**1.20**
Compaction Method	**2.5 Kg Rammer**	Depth Base	
Compaction Clause	**BS1377:Part 4:1990, Clause 3.4**	Sample Type	**B**



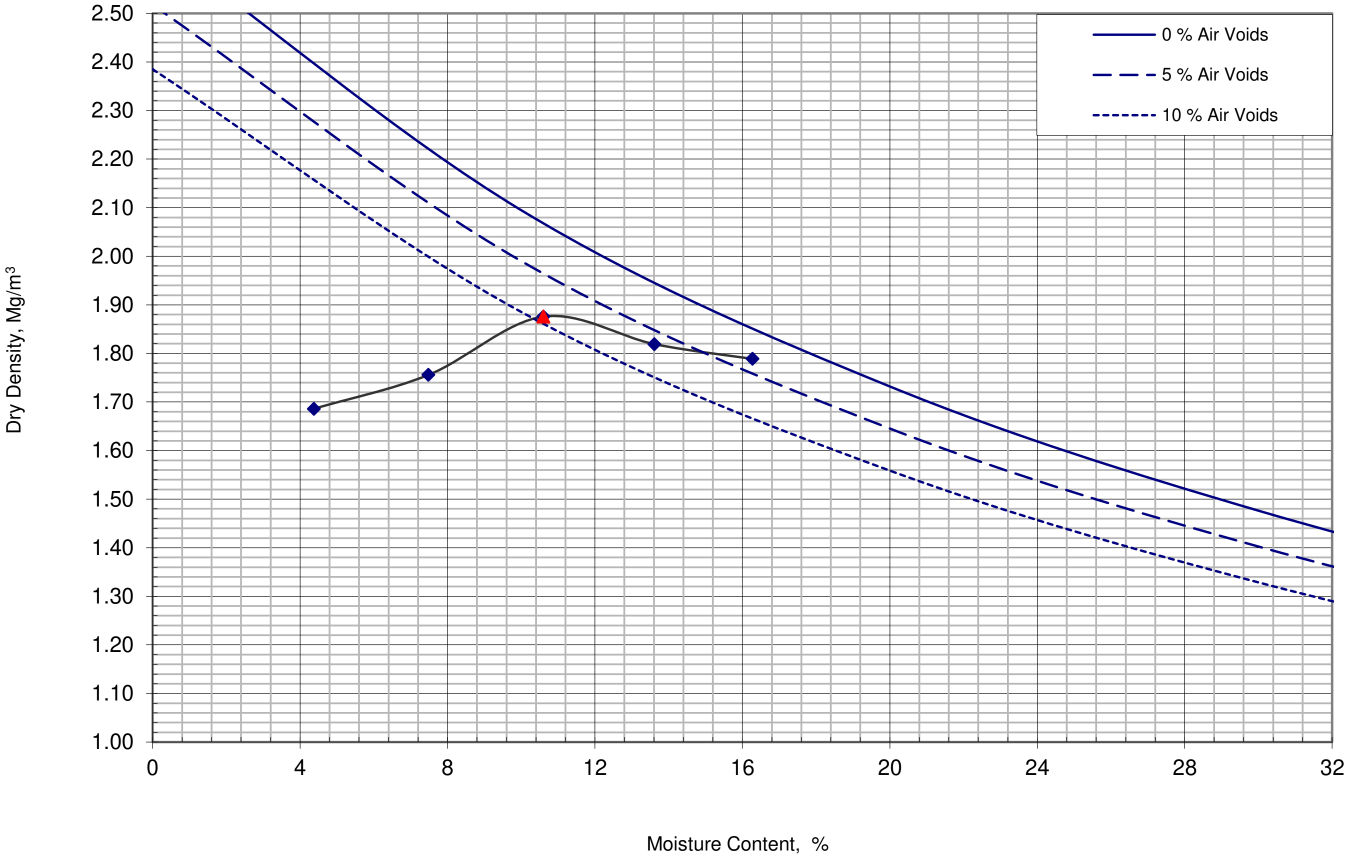
Compaction Point	1	2	3	4	5							
Moisture Content	5.2	8.3	11	14	20							
Bulk Density	1.85	2.00	2.10	2.13	2.04							
Dry Density	1.76	1.85	1.89	1.87	1.69							

Initial Moisture Content	20	%
Maximum Dry Density	1.89	Mg/m3
Optimum Moisture Content	11	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	0	%
Material Retained 20mm	0	%

Operators	Checked	26-09-17	Ben Sharp	
CA	Approved	27-09-17	Paul Evans	D P Evans

UKAS TESTING 2788

GSTL	Dry Density / Moisture Content Relationship BS 1377:Part 4:1990	Contract Number	36503
		Borehole / Pit No	TP110
Site Name	**Otterpool Park**	Sample No	**7**
		Depth Top	**1.00**
Compaction Method	**2.5 Kg Rammer**	Depth Base	
Compaction Clause	**BS1377:Part 4:1990, Clause 3.4**	Sample Type	**B**



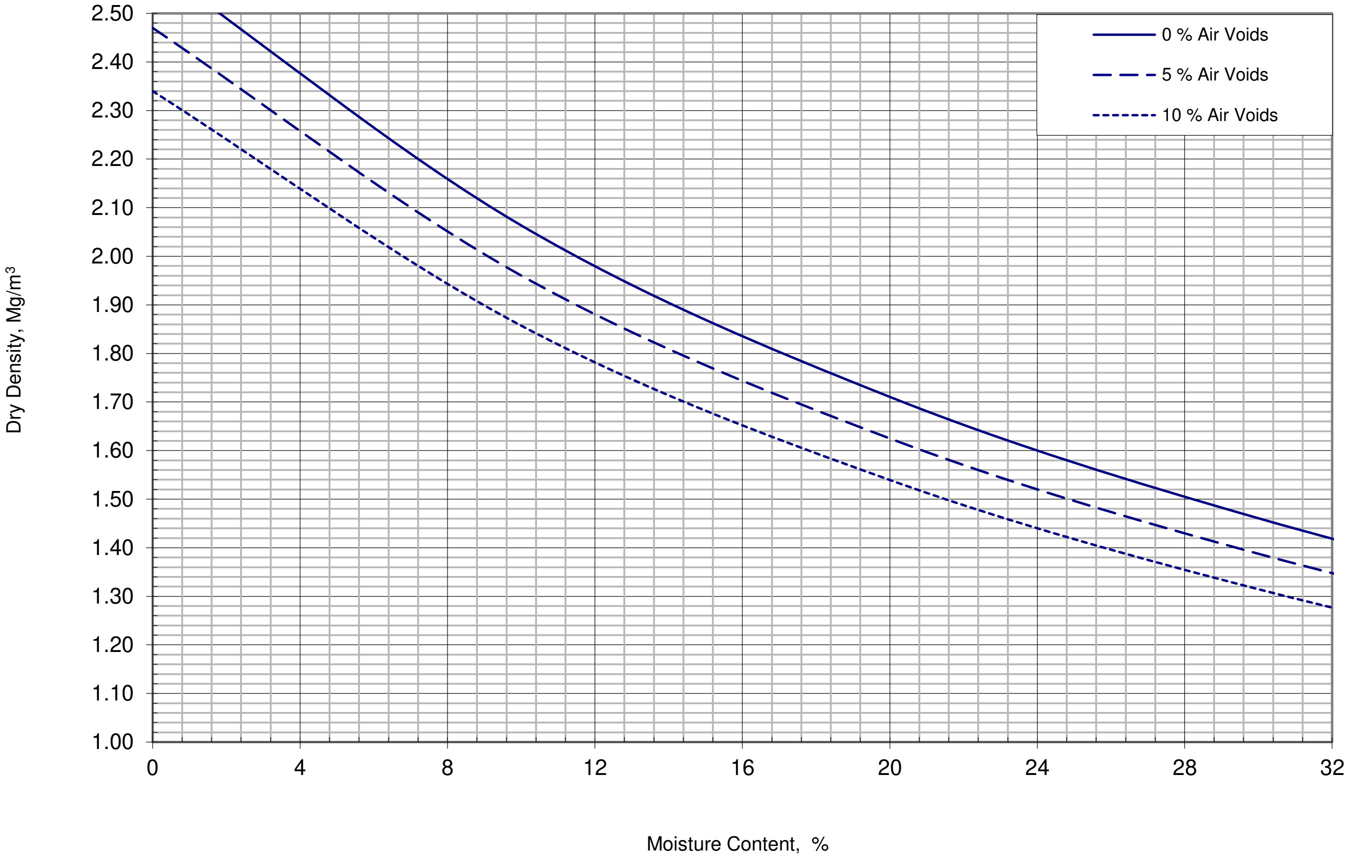
Compaction Point	1	2	3	4	5							
Moisture Content	4.4	7.5	11	14	16							
Bulk Density	1.76	1.89	2.07	2.07	2.08							
Dry Density	1.69	1.76	1.88	1.82	1.79							

Initial Moisture Content	11	%
Maximum Dry Density	1.88	Mg/m3
Optimum Moisture Content	11	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	0	%
Material Retained 20mm	0	%

Operators	Checked	26-09-17	Ben Sharp	
CA	Approved	27-09-17	Paul Evans	D P Evans

UKAS TESTING 2788

GSTL	Dry Density / Moisture Content Relationship BS 1377:Part 4:1990	Contract Number	36503
		Borehole / Pit No	TP112
Site Name	Otterpool Park	Sample No	7
		Depth Top	1.00
Compaction Method	2.5 Kg Rammer	Depth Base	1.50
Compaction Clause	BS1377:Part 4:1990, Clause 3.3	Sample Type	B



Compaction Point	1	2	3	4	5							
Moisture Content	6.5	9.5	12	16	19							
Bulk Density	0.79	0.84	0.89	0.90	0.90							
Dry Density	0.75	0.77	0.79	0.78	0.76							

Initial Moisture Content	12	%
Maximum Dry Density	0.79	Mg/m3
Optimum Moisture Content	12	%
Particle Density	2.6 Assumed	Mg/m3
Material Retained 37.5mm	3	%
Material Retained 20mm	4	%

Operators	Checked	26-09-17	Ben Sharp	
CA	Approved	27-09-17	Paul Evans	

UKAS TESTING 2788

APPENDIX G

GEO-ENVIRONMENTAL LABORATORY TEST DATA

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Business Park,
Watford,
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WD18 8YS

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e: reception@i2analytical.com

Analytical Report Number : 17-58392

Project / Site name:	Otterpool	**Samples received on:**	21/08/2017
Your job number:	UA008926	**Samples instructed on:**	23/08/2017
Your order number:		**Analysis completed by:**	01/09/2017
Report Issue Number:	1	**Report issued on:**	01/09/2017
Samples Analysed:	21 soil samples		

Signed [redacted]

Dr Irma Doyle
Senior Account Manager
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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Analytical Report Number: 17-58392

Project / Site name: Otterpool

Lab Sample Number				805231	805232	805233	805234	805235
Sample Reference				TP101	TP102	TP104	TP106	TP108
Sample Number				3	3	6	3	9
Depth (m)				0.20	0.30	0.50	0.20	1.00
Date Sampled				15/08/2017	15/08/2017	16/08/2017	22/08/2017	17/08/2017
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	20
Moisture Content	%	N/A	NONE	13	11	10	15	7.9
Total mass of sample received	kg	0.001	NONE	1.4	1.7	1.5	1.4	1.6
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	6.6	6.3	6.8	6.1	6.1
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0050	0.0045	0.0043	0.015	0.0058
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.012	0.012	0.0023	0.020	0.0013
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	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 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	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	18	13	14	9.2	9.9
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2	0.8	0.5	0.9	0.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	31	19	24	14	21
Copper (aqua regia extractable)	mg/kg	1	MCERTS	18	14	13	16	8.9
Lead (aqua regia extractable)	mg/kg	1	MCERTS	31	24	12	38	8.9
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	33	10	26	5.1	16
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	60	41	42	28	30

Analytical Report Number: 17-58392

Project / Site name: Otterpool

Lab Sample Number				805231	805232	805233	805234	805235
Sample Reference				TP101	TP102	TP104	TP106	TP108
Sample Number				3	3	6	3	9
Depth (m)				0.20	0.30	0.50	0.20	1.00
Date Sampled				15/08/2017	15/08/2017	16/08/2017	22/08/2017	17/08/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
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
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

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Project / Site name: Otterpool

Lab Sample Number				805231	805232	805233	805234	805235
Sample Reference				TP101	TP102	TP104	TP106	TP108
Sample Number				3	3	6	3	9
Depth (m)				0.20	0.30	0.50	0.20	1.00
Date Sampled				15/08/2017	15/08/2017	16/08/2017	22/08/2017	17/08/2017
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	-	-	-	-	-
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	-	-	-	-	-

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Project / Site name: Otterpool

Lab Sample Number				805231	805232	805233	805234	805235
Sample Reference				TP101	TP102	TP104	TP106	TP108
Sample Number				3	3	6	3	9
Depth (m)				0.20	0.30	0.50	0.20	1.00
Date Sampled				15/08/2017	15/08/2017	16/08/2017	22/08/2017	17/08/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs TICs								
VOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
VOC % Match	%	N/A	NONE	-	-	-	-	-

Analytical Report Number: 17-58392

Project / Site name: Otterpool

Lab Sample Number				805231	805232	805233	805234	805235
Sample Reference				TP101	TP102	TP104	TP106	TP108
Sample Number				3	3	6	3	9
Depth (m)				0.20	0.30	0.50	0.20	1.00
Date Sampled				15/08/2017	15/08/2017	16/08/2017	22/08/2017	17/08/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	mg/kg	0.1	NONE	-	-	-	-	-
Phenol	mg/kg	0.2	ISO 17025	-	-	-	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	-	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	-	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	-	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	-	-	-	-
Isophorone	mg/kg	0.2	MCERTS	-	-	-	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	-	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	-	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	-	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	-	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	-	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	-	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	-	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-	-
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	-	-	-	-	-

Lab Sample Number				805231	805232	805233	805234	805235
Sample Reference				TP101	TP102	TP104	TP106	TP108
Sample Number				3	3	6	3	9
Depth (m)				0.20	0.30	0.50	0.20	1.00
Date Sampled				15/08/2017	15/08/2017	16/08/2017	22/08/2017	17/08/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs TICs								
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-

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Project / Site name: Otterpool

Lab Sample Number				805236	805237	805238	805239	805240
Sample Reference				TP109	TP110	TP113	TP113	TP113
Sample Number				3	3	3	6	2
Depth (m)				0.30	0.30	0.30	0.60	1.40
Date Sampled				21/08/2017	22/08/2017	17/08/2017	17/08/2017	17/08/2017
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	12	15	8.2	13	17
Total mass of sample received	kg	0.001	NONE	1.5	1.6	1.8	1.4	1.6
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	6.3	7.7	9.1	7.2	7.6
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0085	0.015	0.20	0.025	0.060
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.016	0.011	0.018	0.0037	0.0061
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	0.09	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.70	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.24	< 0.05	0.12
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.27	< 0.05	0.14
Phenanthrene	mg/kg	0.05	MCERTS	0.20	0.09	4.2	< 0.05	1.2
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.5	< 0.05	0.29
Fluoranthene	mg/kg	0.05	MCERTS	0.85	0.26	16	< 0.05	1.6
Pyrene	mg/kg	0.05	MCERTS	0.78	0.27	16	< 0.05	1.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.57	0.15	12	< 0.05	0.67
Chrysene	mg/kg	0.05	MCERTS	0.45	0.21	9.1	< 0.05	0.64
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.60	0.15	12	< 0.05	0.48
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.53	0.22	16	< 0.05	0.57
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.73	0.24	19	< 0.05	0.67
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.42	0.13	11	< 0.05	0.36
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.12	< 0.05	3.1	< 0.05	0.08
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.48	0.15	12	< 0.05	0.40
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	5.73	1.87	133	< 0.80	8.54
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	12	8.9	8.3	12	11
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2	1.0	1.0	0.9	1.1
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
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	21	30	20	27
Copper (aqua regia extractable)	mg/kg	1	MCERTS	23	14	36	11	13
Lead (aqua regia extractable)	mg/kg	1	MCERTS	47	17	44	15	31
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	11	14	29	22	24
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	73	46	470	36	44

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Project / Site name: Otterpool

Lab Sample Number				805236	805237	805238	805239	805240
Sample Reference				TP109	TP110	TP113	TP113	TP113
Sample Number				3	3	3	6	2
Depth (m)				0.30	0.30	0.30	0.60	1.40
Date Sampled				21/08/2017	22/08/2017	17/08/2017	17/08/2017	17/08/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 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	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	15	< 2.0	2.7
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	-	33	< 8.0	12
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	-	170	< 8.0	34
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	220	< 10	48
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	2.5	-	8.0	< 2.0	5.1
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	-	110	< 10	19
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	28	-	690	12	36
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	38	-	810	16	61

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Project / Site name: Otterpool

Lab Sample Number				805236	805237	805238	805239	805240
Sample Reference				TP109	TP110	TP113	TP113	TP113
Sample Number				3	3	3	6	2
Depth (m)				0.30	0.30	0.30	0.60	1.40
Date Sampled				21/08/2017	22/08/2017	17/08/2017	17/08/2017	17/08/2017
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	-	-

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Project / Site name: Otterpool

Lab Sample Number				805236	805237	805238	805239	805240
Sample Reference				TP109	TP110	TP113	TP113	TP113
Sample Number				3	3	3	6	2
Depth (m)				0.30	0.30	0.30	0.60	1.40
Date Sampled				21/08/2017	22/08/2017	17/08/2017	17/08/2017	17/08/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs TICs								
VOCs TICs Compound Name		N/A	NONE	-	-	ND	-	-
VOC % Match	%	N/A	NONE	-	-	0	-	-

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Project / Site name: Otterpool

Lab Sample Number				805236	805237	805238	805239	805240
Sample Reference				TP109	TP110	TP113	TP113	TP113
Sample Number				3	3	3	6	2
Depth (m)				0.30	0.30	0.30	0.60	1.40
Date Sampled				21/08/2017	22/08/2017	17/08/2017	17/08/2017	17/08/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	mg/kg	0.1	NONE	-	-	< 0.1	-	-
Phenol	mg/kg	0.2	ISO 17025	-	-	< 0.2	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	-	< 0.2	-	-
Isophorone	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	-	0.09	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	-	< 0.1	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	< 0.1	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	< 0.1	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	0.70	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	0.24	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	< 0.3	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-	0.27	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	4.2	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-	1.5	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	0.5	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	0.5	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	16	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-	16	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	< 0.3	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	12	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	9.1	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	12	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	16	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	19	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	11	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	3.1	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	12	-	-

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Project / Site name: Otterpool

Lab Sample Number				805236	805237	805238	805239	805240
Sample Reference				TP109	TP110	TP113	TP113	TP113
Sample Number				3	3	3	6	2
Depth (m)				0.30	0.30	0.30	0.60	1.40
Date Sampled				21/08/2017	22/08/2017	17/08/2017	17/08/2017	17/08/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs TICs								
SVOCs TICs Compound Name		N/A	NONE	-	-	Benzo[e]pyrene	-	-
SVOC % Match	%	N/A	NONE	-	-	98	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	9-Octadecenamide, (Z)-	-	-
SVOC % Match	%	N/A	NONE	-	-	97	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	3,4:9,10-Dibenzopyrene	-	-
SVOC % Match	%	N/A	NONE	-	-	97	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	Dibenz(a,e)aceanthrylene	-	-
SVOC % Match	%	N/A	NONE	-	-	97	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	1,2:3,4-Dibenzopyrene	-	-
SVOC % Match	%	N/A	NONE	-	-	97	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	Tetradecane	-	-
SVOC % Match	%	N/A	NONE	-	-	96	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	Pyrene, 1-methyl-	-	-
SVOC % Match	%	N/A	NONE	-	-	96	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	Benzo[g]pteridine-10(2H)-acetaldehyde, 3,4-dihydro-7,8-dimethyl-2,4-dioxo	-	-
SVOC % Match	%	N/A	NONE	-	-	96	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	Dibenzothiophene	-	-
SVOC % Match	%	N/A	NONE	-	-	95	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	1H-Cyclopropa[l]phenanthrene,1a,9b-dihydro-	-	-
SVOC % Match	%	N/A	NONE	-	-	95	-	-

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Project / Site name: Otterpool

Lab Sample Number				805241	805242	805243	805244	805245
Sample Reference				TP113	TP113	WS101	WS102A	WS104C
Sample Number				5	1	None Supplied	None Supplied	None Supplied
Depth (m)				2.00	3.00	0.50-0.55	0.00-0.20	0.10-0.20
Date Sampled				17/08/2017	17/08/2017	16/08/2017	17/08/2017	17/08/2017
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	30
Moisture Content	%	N/A	NONE	19	19	13	15	8.5
Total mass of sample received	kg	0.001	NONE	1.8	1.9	1.8	2.0	2.0
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.6	7.7	7.8	7.4	8.2
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.022	0.0077	0.0057	0.0083	0.0090
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.0044	< 0.0010	0.012	0.022	0.020
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	0.10	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.17	< 0.05	0.10
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.36	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.32	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	3.9	< 0.05	0.44
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.1	< 0.05	0.16
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	7.1	< 0.05	1.7
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	5.3	< 0.05	1.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	5.1	< 0.05	1.3
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	2.3	< 0.05	0.57
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	6.2	< 0.05	1.7
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.6	< 0.05	0.55
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	5.2	< 0.05	1.4
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	2.3	< 0.05	0.78
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.43	< 0.05	0.14
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	2.2	< 0.05	0.78
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	43.6	< 0.80	10.9
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	18	14	7.4	15	9.3
Boron (water soluble)	mg/kg	0.2	MCERTS	0.8	0.5	1.5	1.4	0.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	36	24	41	32	43
Copper (aqua regia extractable)	mg/kg	1	MCERTS	15	9.7	13	15	34
Lead (aqua regia extractable)	mg/kg	1	MCERTS	22	11	36	19	30
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	44	33	27	29	21
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	49	34	70	71	81

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Project / Site name: Otterpool

Lab Sample Number				805241	805242	805243	805244	805245
Sample Reference				TP113	TP113	WS101	WS102A	WS104C
Sample Number				5	1	None Supplied	None Supplied	None Supplied
Depth (m)				2.00	3.00	0.50-0.55	0.00-0.20	0.10-0.20
Date Sampled				17/08/2017	17/08/2017	16/08/2017	17/08/2017	17/08/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	< 1.0	< 1.0	-	-	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	-	-	< 1.0
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-	-	-
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	-	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	-	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	-	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	-	-	46
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	13	-	-	53
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	-	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	-	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	2.1	3.2	-	-	2.5
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	-	-	14
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	15	-	-	120
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	11	24	-	-	140

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Project / Site name: Otterpool

Lab Sample Number				805241	805242	805243	805244	805245
Sample Reference				TP113	TP113	WS101	WS102A	WS104C
Sample Number				5	1	None Supplied	None Supplied	None Supplied
Depth (m)				2.00	3.00	0.50-0.55	0.00-0.20	0.10-0.20
Date Sampled				17/08/2017	17/08/2017	16/08/2017	17/08/2017	17/08/2017
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	-	-	-	-	-
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: 17-58392

Project / Site name: Otterpool

Lab Sample Number				805241	805242	805243	805244	805245
Sample Reference				TP113	TP113	WS101	WS102A	WS104C
Sample Number				5	1	None Supplied	None Supplied	None Supplied
Depth (m)				2.00	3.00	0.50-0.55	0.00-0.20	0.10-0.20
Date Sampled				17/08/2017	17/08/2017	16/08/2017	17/08/2017	17/08/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs TICs								
VOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
VOC % Match	%	N/A	NONE	-	-	-	-	-

Analytical Report Number: 17-58392

Project / Site name: Otterpool

Lab Sample Number				805241	805242	805243	805244	805245
Sample Reference				TP113	TP113	WS101	WS102A	WS104C
Sample Number				5	1	None Supplied	None Supplied	None Supplied
Depth (m)				2.00	3.00	0.50-0.55	0.00-0.20	0.10-0.20
Date Sampled				17/08/2017	17/08/2017	16/08/2017	17/08/2017	17/08/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	mg/kg	0.1	NONE	-	-	-	-	-
Phenol	mg/kg	0.2	ISO 17025	-	-	-	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	-	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	-	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	-	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	-	-	-	-
Isophorone	mg/kg	0.2	MCERTS	-	-	-	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	-	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	-	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	-	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	-	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	-	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	-	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	-	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-	-
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	-	-	-	-	-

Analytical Report Number: 17-58392

Project / Site name: Otterpool

Lab Sample Number				805241	805242	805243	805244	805245
Sample Reference				TP113	TP113	WS101	WS102A	WS104C
Sample Number				5	1	None Supplied	None Supplied	None Supplied
Depth (m)				2.00	3.00	0.50-0.55	0.00-0.20	0.10-0.20
Date Sampled				17/08/2017	17/08/2017	16/08/2017	17/08/2017	17/08/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs TICs								
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-

Analytical Report Number: 17-58392

Project / Site name: Otterpool

Lab Sample Number				805246	805247	805248	805249	805250
Sample Reference				WS104C	WS109	WS110	WS110	WS111
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.80-1.90	0.10-0.20	0.05-0.15	0.50-0.55	0.48-0.60
Date Sampled				17/08/2017	16/08/2017	16/08/2017	16/08/2017	17/08/2017
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	42	< 0.1	< 0.1	< 0.1	68
Moisture Content	%	N/A	NONE	13	12	13	11	8.3
Total mass of sample received	kg	0.001	NONE	1.5	2.0	1.2	1.6	2.0
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.1	7.9	7.0	7.1	10.0
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.026	0.012	0.016	0.012	0.18
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.0024	0.010	0.049	0.0097	0.022
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	0.11	0.14	< 0.05	0.43
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	0.57	0.27	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.37	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.47	< 0.05	< 0.05	0.19
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	4.2	0.97	< 0.05	0.67
Anthracene	mg/kg	0.05	MCERTS	< 0.05	1.7	0.26	< 0.05	0.13
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	12	4.4	< 0.05	1.1
Pyrene	mg/kg	0.05	MCERTS	< 0.05	10	3.4	< 0.05	0.88
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	8.4	2.3	< 0.05	0.89
Chrysene	mg/kg	0.05	MCERTS	< 0.05	3.8	1.2	< 0.05	0.46
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	9.8	3.5	< 0.05	1.0
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	3.0	1.1	< 0.05	0.50
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	8.3	2.9	< 0.05	1.0
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	4.2	1.5	< 0.05	0.53
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.79	0.27	< 0.05	0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	3.5	1.4	< 0.05	0.50
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	70.8	23.5	< 0.80	8.45
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	15	14	5.5	16
Boron (water soluble)	mg/kg	0.2	MCERTS	0.6	0.9	4.3	1.2	2.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	0.3	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	22	32	23	18	19
Copper (aqua regia extractable)	mg/kg	1	MCERTS	8.5	11	61	9.7	64
Lead (aqua regia extractable)	mg/kg	1	MCERTS	11	60	340	27	64
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	22	27	22	5.6	29
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.1	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	29	71	240	28	140

Analytical Report Number: 17-58392

Project / Site name: Otterpool

Lab Sample Number				805246	805247	805248	805249	805250
Sample Reference				WS104C	WS109	WS110	WS110	WS111
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.80-1.90	0.10-0.20	0.05-0.15	0.50-0.55	0.48-0.60
Date Sampled				17/08/2017	16/08/2017	16/08/2017	16/08/2017	17/08/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	< 1.0	< 1.0	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	< 1.0
p & m-xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	< 1.0
o-xylene	µg/kg	1	MCERTS	-	< 1.0	< 1.0	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	< 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	-	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	1.3	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	< 2.0	-	12
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	< 8.0	< 8.0	-	47
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	8.4	50	-	130
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	10	58	-	180
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	< 1.0	-	2.3
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	7.1	3.2	-	5.4
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	70	25	-	18
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	230	110	-	22
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	310	140	-	48

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Project / Site name: Otterpool

Lab Sample Number				805246	805247	805248	805249	805250
Sample Reference				WS104C	WS109	WS110	WS110	WS111
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.80-1.90	0.10-0.20	0.05-0.15	0.50-0.55	0.48-0.60
Date Sampled				17/08/2017	16/08/2017	16/08/2017	16/08/2017	17/08/2017
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	-	-	-	-	-
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: 17-58392

Project / Site name: Otterpool

Lab Sample Number				805246	805247	805248	805249	805250
Sample Reference				WS104C	WS109	WS110	WS110	WS111
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.80-1.90	0.10-0.20	0.05-0.15	0.50-0.55	0.48-0.60
Date Sampled				17/08/2017	16/08/2017	16/08/2017	16/08/2017	17/08/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs TICs								
VOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
VOC % Match	%	N/A	NONE	-	-	-	-	-

Analytical Report Number: 17-58392

Project / Site name: Otterpool

Lab Sample Number				805246	805247	805248	805249	805250
Sample Reference				WS104C	WS109	WS110	WS110	WS111
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.80-1.90	0.10-0.20	0.05-0.15	0.50-0.55	0.48-0.60
Date Sampled				17/08/2017	16/08/2017	16/08/2017	16/08/2017	17/08/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	mg/kg	0.1	NONE	-	-	-	-	-
Phenol	mg/kg	0.2	ISO 17025	-	-	-	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	-	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	-	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	-	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	-	-	-	-
Isophorone	mg/kg	0.2	MCERTS	-	-	-	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	-	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	-	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	-	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	-	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	-	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	-	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	-	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-	-
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	-	-	-	-	-

Analytical Report Number: 17-58392

Project / Site name: Otterpool

Lab Sample Number				805246	805247	805248	805249	805250
Sample Reference				WS104C	WS109	WS110	WS110	WS111
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.80-1.90	0.10-0.20	0.05-0.15	0.50-0.55	0.48-0.60
Date Sampled				17/08/2017	16/08/2017	16/08/2017	16/08/2017	17/08/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs TICs								
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-
SVOCs TICs Compound Name		N/A	NONE	-	-	-	-	-
SVOC % Match	%	N/A	NONE	-	-	-	-	-

Analytical Report Number: 17-58392

Project / Site name: Otterpool

Lab Sample Number				805251				
Sample Reference				WS112				
Sample Number				None Supplied				
Depth (m)				0.50-0.55				
Date Sampled				16/08/2017				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	12				
Total mass of sample received	kg	0.001	NONE	1.6				
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected				
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.5				
Total Cyanide	mg/kg	1	MCERTS	< 1				
Free Cyanide	mg/kg	1	MCERTS	< 1				
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.013				
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.0045				
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	< 0.05				
Anthracene	mg/kg	0.05	MCERTS	< 0.05				
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Pyrene	mg/kg	0.05	MCERTS	< 0.05				
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	< 0.80				
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	1.1				
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4				
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	21				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	9.7				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	14				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	14				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	40				

Analytical Report Number: 17-58392

Project / Site name: Otterpool

Lab Sample Number				805251				
Sample Reference				WS112				
Sample Number				None Supplied				
Depth (m)				0.50-0.55				
Date Sampled				16/08/2017				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
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	-				

Analytical Report Number: 17-58392

Project / Site name: Otterpool

Lab Sample Number				805251				
Sample Reference				WS112				
Sample Number				None Supplied				
Depth (m)				0.50-0.55				
Date Sampled				16/08/2017				
Time Taken				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: 17-58392

Project / Site name: Otterpool

Lab Sample Number				805251				
Sample Reference				WS112				
Sample Number				None Supplied				
Depth (m)				0.50-0.55				
Date Sampled				16/08/2017				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs TICs								
VOCs TICs Compound Name		N/A	NONE	-				
VOC % Match	%	N/A	NONE	-				

Analytical Report Number: 17-58392

Project / Site name: Otterpool

Lab Sample Number				805251				
Sample Reference				WS112				
Sample Number				None Supplied				
Depth (m)				0.50-0.55				
Date Sampled				16/08/2017				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	mg/kg	0.1	NONE	-				
Phenol	mg/kg	0.2	ISO 17025	-				
2-Chlorophenol	mg/kg	0.1	MCERTS	-				
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-				
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-				
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-				
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-				
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-				
2-Methylphenol	mg/kg	0.3	MCERTS	-				
Hexachloroethane	mg/kg	0.05	MCERTS	-				
Nitrobenzene	mg/kg	0.3	MCERTS	-				
4-Methylphenol	mg/kg	0.2	NONE	-				
Isophorone	mg/kg	0.2	MCERTS	-				
2-Nitrophenol	mg/kg	0.3	MCERTS	-				
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-				
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-				
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-				
Naphthalene	mg/kg	0.05	MCERTS	-				
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-				
4-Chloroaniline	mg/kg	0.1	NONE	-				
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-				
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-				
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-				
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-				
2-Methylnaphthalene	mg/kg	0.1	NONE	-				
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-				
Dimethylphthalate	mg/kg	0.1	MCERTS	-				
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-				
Acenaphthylene	mg/kg	0.05	MCERTS	-				
Acenaphthene	mg/kg	0.05	MCERTS	-				
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-				
Dibenzofuran	mg/kg	0.2	MCERTS	-				
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-				
Diethyl phthalate	mg/kg	0.2	MCERTS	-				
4-Nitroaniline	mg/kg	0.2	MCERTS	-				
Fluorene	mg/kg	0.05	MCERTS	-				
Azobenzene	mg/kg	0.3	MCERTS	-				
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-				
Hexachlorobenzene	mg/kg	0.3	MCERTS	-				
Phenanthrene	mg/kg	0.05	MCERTS	-				
Anthracene	mg/kg	0.05	MCERTS	-				
Carbazole	mg/kg	0.3	MCERTS	-				
Dibutyl phthalate	mg/kg	0.2	MCERTS	-				
Anthraquinone	mg/kg	0.3	MCERTS	-				
Fluoranthene	mg/kg	0.05	MCERTS	-				
Pyrene	mg/kg	0.05	MCERTS	-				
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-				
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	-				

Analytical Report Number: 17-58392

Project / Site name: Otterpool

Lab Sample Number				805251				
Sample Reference				WS112				
Sample Number				None Supplied				
Depth (m)				0.50-0.55				
Date Sampled				16/08/2017				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs TICs								
SVOCs TICs Compound Name		N/A	NONE	-				
SVOC % Match	%	N/A	NONE	-				
SVOCs TICs Compound Name		N/A	NONE	-				
SVOC % Match	%	N/A	NONE	-				
SVOCs TICs Compound Name		N/A	NONE	-				
SVOC % Match	%	N/A	NONE	-				
SVOCs TICs Compound Name		N/A	NONE	-				
SVOC % Match	%	N/A	NONE	-				
SVOCs TICs Compound Name		N/A	NONE	-				
SVOC % Match	%	N/A	NONE	-				
SVOCs TICs Compound Name		N/A	NONE	-				
SVOC % Match	%	N/A	NONE	-				
SVOCs TICs Compound Name		N/A	NONE	-				
SVOC % Match	%	N/A	NONE	-				
SVOCs TICs Compound Name		N/A	NONE	-				
SVOC % Match	%	N/A	NONE	-				
SVOCs TICs Compound Name		N/A	NONE	-				
SVOC % Match	%	N/A	NONE	-				
SVOCs TICs Compound Name		N/A	NONE	-				
SVOC % Match	%	N/A	NONE	-				

Analytical Report Number : 17-58392

Project / Site name: Otterpool

* 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 *
805231	TP101	3	0.20	Brown clay and loam with vegetation.
805232	TP102	3	0.30	Light brown loam and clay with vegetation.
805233	TP104	6	0.50	Light brown loam and clay with vegetation.
805234	TP106	3	0.20	Brown loam and clay with vegetation and gravel
805235	TP108	9	1.00	Light brown sandy clay with stones.
805236	TP109	3	0.30	Brown loam and clay with vegetation.
805237	TP110	3	0.30	Brown loam and clay with vegetation.
805238	TP113	3	0.30	Grey gravelly loam with vegetation.
805239	TP113	6	0.60	Brown sandy clay.
805240	TP113	2	1.40	Brown sandy clay.
805241	TP113	5	2.00	Brown sandy clay.
805242	TP113	1	3.00	Light brown sandy clay.
805243	WS101	None Supplied	0.50-0.55	Brown loam and clay with vegetation and brick.
805244	WS102A	None Supplied	0.00-0.20	Brown loam and clay with vegetation and gravel
805245	WS104C	None Supplied	0.10-0.20	Brown loam and clay with stones and vegetation.
805246	WS104C	None Supplied	1.80-1.90	Light brown sandy clay with stones.
805247	WS109	None Supplied	0.10-0.20	Brown loam and clay with gravel and vegetation.
805248	WS110	None Supplied	0.05-0.15	Brown loam and clay with vegetation.
805249	WS110	None Supplied	0.50-0.55	Light brown loam and clay with vegetation.
805250	WS111	None Supplied	0.48-0.60	Grey gravelly clay with stones.
805251	WS112	None Supplied	0.50-0.55	Light brown sandy clay with gravel and vegetation.

Analytical Report Number : 17-58392

Project / Site name: Otterpool

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
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
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon 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	L023-PL	D	NONE
Free cyanide in soil	Determination of free 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
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
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	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
Tentatively identified compounds (SVOC) in soil	Determination of semi-volatile organic compounds total ion count in soil by extraction with dichloromethane and hexane followed by GC-MS followed by a full library scan.	In-house method based on USEPA 8270	L064-PL	D	NONE
Tentatively identified compounds (VOC) in soil	Determination of volatile organic compounds total ion count in soil by headspace GC-MS followed by a full library scan.	In-house method based on USEPA8260	L073-PL	W	NONE

Analytical Report Number : 17-58392

Project / Site name: Otterpool

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
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
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	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.

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Analytical Report Number : 17-58613

Project / Site name:	Otterpool	**Samples received on:**	23/08/2017
Your job number:	UA008926	**Samples instructed on:**	29/08/2017
Your order number:		**Analysis completed by:**	06/09/2017
Report Issue Number:	1	**Report issued on:**	06/09/2017
Samples Analysed:	7 soil samples		

Signed:

Rexona Rahman
Reporting Manager
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: 17-58613

Project / Site name: Otterpool

Lab Sample Number				806659	806660	806661	806662	806663
Sample Reference				HD101	HD102	HD103	BH103	BH102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.30	0.50	2.00	0.30
Date Sampled				21/08/2017	21/08/2017	21/08/2017	15/08/2017	24/08/2017
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	11	10	9.9	21	13
Total mass of sample received	kg	0.001	NONE	0.37	0.38	0.35	0.42	0.40
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.9	7.6	7.5	7.7	7.7
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.044	0.023	0.025	0.026	0.016
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.0056	0.0055	0.0048	0.0019	0.0024
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	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 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	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	12	8.8	8.8	10	13
Boron (water soluble)	mg/kg	0.2	MCERTS	1.6	1.1	0.6	0.2	1.0
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19	21	21	34	27
Copper (aqua regia extractable)	mg/kg	1	MCERTS	14	13	18	34	50
Lead (aqua regia extractable)	mg/kg	1	MCERTS	14	12	12	13	14
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	0.7	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	22	20	23	40	24
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	37	35	36	48	47

Analytical Report Number: 17-58613

Project / Site name: Otterpool

Lab Sample Number				806659	806660	806661	806662	806663
Sample Reference				HD101	HD102	HD103	BH103	BH102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.30	0.50	2.00	0.30
Date Sampled				21/08/2017	21/08/2017	21/08/2017	15/08/2017	24/08/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 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	< 0.001	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	-	-

Analytical Report Number: 17-58613

Project / Site name: Otterpool

Lab Sample Number				806664	806665			
Sample Reference				BH105	BH105			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.30	0.50			
Date Sampled				22/08/2017	22/08/2017			
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	12	11			
Total mass of sample received	kg	0.001	NONE	0.42	0.37			
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected			
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.3	7.3			
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.024	0.022			
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.0069	0.0070			
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80			
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	8.7	9.6			
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	0.8			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2			
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15	7.9			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	19	12			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	20	13			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	8.8	5.2			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	17	20			

Analytical Report Number: 17-58613

Project / Site name: Otterpool

Lab Sample Number				806664	806665			
Sample Reference				BH105	BH105			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.30	0.50			
Date Sampled				22/08/2017	22/08/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
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			
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			

Analytical Report Number : 17-58613

Project / Site name: Otterpool

* 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 *
806659	HD101	None Supplied	0.30	Light brown clay and sand with gravel.
806660	HD102	None Supplied	0.30	Light brown clay and sand with gravel.
806661	HD103	None Supplied	0.50	Light brown clay and sand with gravel.
806662	BH103	None Supplied	2.00	Light brown clay.
806663	BH102	None Supplied	0.30	Light brown clay and sand.
806664	BH105	None Supplied	0.30	Light brown clay and sand with gravel.
806665	BH105	None Supplied	0.50	Light brown clay and sand with gravel.

Analytical Report Number : 17-58613

Project / Site name: Otterpool

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
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
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon 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	L023-PL	D	NONE
Free cyanide in soil	Determination of free 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
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
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-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.

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Analytical Report Number : 17-59238

Project / Site name:	Otterpool	**Samples received on:**	01/09/2017
Your job number:	UA008926	**Samples instructed on:**	05/09/2017
Your order number:		**Analysis completed by:**	13/09/2017
Report Issue Number:	1	**Report issued on:**	13/09/2017
Samples Analysed:	7 water samples		

Signed: [redacted]

Emma Winter
Assistant Reporting Manager
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: 17-59238

Project / Site name: Otterpool

Lab Sample Number				810197	810198	810199	810200	810201
Sample Reference				BH104	WS105	WS107	BH103	WS106
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				31/08/2017	31/08/2017	31/08/2017	31/08/2017	31/08/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	7.3	6.8	6.3	7.6	7.2
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Sulphate as SO_4	µg/l	45	ISO 17025	48400	134000	36900	75800	58300
Sulphate as SO_4	mg/l	0.045	ISO 17025	48	130	37	76	58
Alkalinity	mgCaCO3/l	3	ISO 17025	440	400	110	210	370
Phenols by HPLC								
Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Total Phenols								
Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5	< 3.5	< 3.5
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Total PAH								
Total EPA-16 PAHs	µg/l	0.16	NONE	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.59	3.49	1.09	1.60	0.29
Boron (dissolved)	µg/l	10	ISO 17025	35	110	58	58	54
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02	0.04	< 0.02	0.02
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.3	< 0.2	4.0	0.3	3.9
Copper (dissolved)	µg/l	0.5	ISO 17025	1.9	1.1	2.1	2.6	2.1
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	0.25	< 0.05	0.07	0.09	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	4.6	6.9	9.0	3.5	1.7
Selenium (dissolved)	µg/l	0.6	ISO 17025	5.3	0.7	< 0.6	1.3	< 0.6
Zinc (dissolved)	µg/l	0.5	ISO 17025	2.8	8.8	5.5	2.4	2.0

Analytical Report Number: 17-59238

Project / Site name: Otterpool

Lab Sample Number				810197	810198	810199	810200	810201
Sample Reference				BH104	WS105	WS107	BH103	WS106
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				31/08/2017	31/08/2017	31/08/2017	31/08/2017	31/08/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	µg/l	10	ISO 17025	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 17-59238

Project / Site name: Otterpool

Lab Sample Number				810202	810203			
Sample Reference				WS108	BH105			
Sample Number				None Supplied	None Supplied			
Depth (m)				None Supplied	None Supplied			
Date Sampled				31/08/2017	31/08/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	5.2	6.0			
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Sulphate as SO_4	µg/l	45	ISO 17025	39700	173000			
Sulphate as SO_4	mg/l	0.045	ISO 17025	40	170			
Alkalinity	mgCaCO3/l	3	ISO 17025	15	55			
Phenols by HPLC								
Catechol	µg/l	0.5	NONE	< 0.5	< 0.5			
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5			
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5			
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5			
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Total Phenols								
Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5			
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01			
Total PAH								
Total EPA-16 PAHs	µg/l	0.16	NONE	< 0.16	< 0.16			
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.36	1.00			
Boron (dissolved)	µg/l	10	ISO 17025	78	58			
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.23	< 0.02			
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0			
Chromium (dissolved)	µg/l	0.2	ISO 17025	2.1	< 0.2			
Copper (dissolved)	µg/l	0.5	ISO 17025	6.6	1.0			
Lead (dissolved)	µg/l	0.2	ISO 17025	0.6	< 0.2			
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05			
Nickel (dissolved)	µg/l	0.5	ISO 17025	30	5.9			
Selenium (dissolved)	µg/l	0.6	ISO 17025	< 0.6	7.0			
Zinc (dissolved)	µg/l	0.5	ISO 17025	87	8.8			

Analytical Report Number: 17-59238

Project / Site name: Otterpool

Lab Sample Number				810202	810203			
Sample Reference				WS108	BH105			
Sample Number				None Supplied	None Supplied			
Depth (m)				None Supplied	None Supplied			
Date Sampled				31/08/2017	31/08/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0			
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	µg/l	10	ISO 17025	< 10.0	< 10.0			
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			

U/S = Unsuitable Sample   I/S = Insufficient Sample

Analytical Report Number : 17-59238

Project / Site name: Otterpool

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
Alkalinity in Water	Determination of Alkalinity by discreet analyser (colorimetry). Accredited matrices: SW, PW, GW.	In house method based on MEWAM & USEPA Method 310.2.	L082-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Free cyanide in water	Determination of free cyanide by distillation followed by colorimetry.Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water followed by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	W	ISO 17025
Phenols, speciated, in water, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
PRO (Waters)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L0102B-PL	W	NONE
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE

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
BH103		W	17-59238	810200	c	pH at 20oC in water (automated)	L099-PL	c
BH104		W	17-59238	810197	c	pH at 20oC in water (automated)	L099-PL	c
BH105		W	17-59238	810203	c	pH at 20oC in water (automated)	L099-PL	c
WS105		W	17-59238	810198	c	pH at 20oC in water (automated)	L099-PL	c
WS106		W	17-59238	810201	c	pH at 20oC in water (automated)	L099-PL	c
WS107		W	17-59238	810199	c	pH at 20oC in water (automated)	L099-PL	c
WS108		W	17-59238	810202	c	pH at 20oC in water (automated)	L099-PL	c

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature

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Analytical Report Number : 17-62066

Project / Site name:	Otterpool	**Samples received on:**	21/08/2017
Your job number:	UA008926	**Samples instructed on:**	29/09/2017
Your order number:		**Analysis completed by:**	02/10/2017
Report Issue Number:	1	**Report issued on:**	02/10/2017
Samples Analysed:	6 soil samples		

Signed [redacted]

Emma Winter
Assistant Reporting Manager
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: 17-62066

Project / Site name: Otterpool

Lab Sample Number				826421	826422	826423	826424	826425
Sample Reference				TP107	WS103	WS105	WS106	WS107
Sample Number				3	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.50-0.55	0.10-0.23	0.10-0.20	0.10-0.15
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
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	13	11	14	11	11
Total mass of sample received	kg	0.001	NONE	1.5	1.9	1.8	2.0	1.9
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	Chrysotile- Loose Fibres	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Detected	Not-detected	Not-detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	6.3	6.1	6.8	6.6	6.8
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.012	0.0083	0.016	0.018	0.015
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.011	0.0030	0.026	0.011	0.011
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	0.16	< 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	0.51	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.18	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.7	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.7	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.1	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.95	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.1	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.6	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.5	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.3	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.29	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.7	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	13.8	< 0.80	< 0.80
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	9.5	4.9	15	21
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	0.5	1.3	0.8	1.0
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	0.3	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	31	77	29	41	37
Copper (aqua regia extractable)	mg/kg	1	MCERTS	10	3.9	21	12	15
Lead (aqua regia extractable)	mg/kg	1	MCERTS	18	10	40	27	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	29	67	17	19	24
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	57	71	110	56	58

Analytical Report Number: 17-62066

Project / Site name: Otterpool

Lab Sample Number				826426				
Sample Reference				WS108				
Sample Number				None Supplied				
Depth (m)				0.05-0.15				
Date Sampled				Deviating				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	14				
Total mass of sample received	kg	0.001	NONE	1.6				

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-				
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected				

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.6				
Total Cyanide	mg/kg	1	MCERTS	< 1				
Free Cyanide	mg/kg	1	MCERTS	< 1				
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.021				
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.022				

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	0.32				
Anthracene	mg/kg	0.05	MCERTS	< 0.05				
Fluoranthene	mg/kg	0.05	MCERTS	0.72				
Pyrene	mg/kg	0.05	MCERTS	0.62				
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.36				
Chrysene	mg/kg	0.05	MCERTS	0.31				
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.33				
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.31				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.32				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.21				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.20				

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	3.70				

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14				
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	24				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	22				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	140				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	12				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	63				

Analytical Report Number : 17-62066

Project / Site name: Otterpool

* 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 *
826421	TP107	3	0.30	Brown clay and loam with vegetation.
826422	WS103	None Supplied	0.50-0.55	Brown clay and loam with vegetation.
826423	WS105	None Supplied	0.10-0.23	Brown clay and loam with gravel and vegetation.
826424	WS106	None Supplied	0.10-0.20	Brown clay and loam with vegetation.
826425	WS107	None Supplied	0.10-0.15	Brown clay and loam with vegetation.
826426	WS108	None Supplied	0.05-0.15	Brown loam and clay with vegetation.

Analytical Report Number : 17-62066

Project / Site name: Otterpool

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
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
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon 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	L023-PL	D	NONE
Free cyanide in soil	Determination of free 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
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
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

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
TP107	3	S	17-62066	826421	a			
WS103		S	17-62066	826422	a			
WS105		S	17-62066	826423	a			
WS106		S	17-62066	826424	a			
WS107		S	17-62066	826425	a			
WS108		S	17-62066	826426	a			

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature

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APPENDIX B

Update from the local planning authority regarding evidence in relation to the SHLAA and the capacity of the existing built up areas or smaller peripheral sites

FHDC EX 051

Folkestone & Hythe District

Core Strategy Review Examination

Update from the Local Planning Authority regarding evidence in relation to the SHLAA and the capacity of the existing built up areas or smaller peripheral sites.

08 January 2021

1 Introduction

1.1 This purpose of this note is to set out the availability of evidence in relation to the potential housing sites and the capacity of the existing built up areas or smaller peripheral sites in the Folkestone & Hythe District.

2 Core Strategy Local Plan (2013)

2.1 Folkestone & Hythe District Council (formally Shepway until April 2018) carried out an initial SHLAA in 2009/2010 and updated this in 2011/2012.

2.2 The SHLAA 2009/10 Consolidated Document (EB 04.40) and the SHLAA 2011/12 Update Document (EB 04.50) formed part of the evidence base for the preparation of the Core Strategy (2013).

2.3 The SHLAA sought to identify residential sites to meet the Core Strategy (2013) housing target of 7,000 new homes. The SHLAA update found 138 sites to be deliverable/developable i.e. suitable and available and achievable from the start of the year 2011/2012. These deliverable/developable sites were calculated to have an estimated capacity of 8,543 dwellings in 2011/12 – 2030/31 (inclusive) - not including any 'windfall' supply or sites producing under five dwellings.

2.4 Table 8 of document (EB 04.50) sets out the deliverable and developable sites along with estimated site capacities.

2.5 National Policy and guidance from the Planning Inspectorate, at the time, set out clear criteria for the inclusion of strategic sites within Local Development Framework Core Strategy documents this is summarised in PPS12 paragraph 4.6 which stated:

> *'Core Strategies may allocate strategic sites for development. These* ***should be those sites considered central to the achievement of the strategy. Progress on the core strategy should not be held up by inclusion of non-****strategic sites'*

2.6 Consequently, the SHLAA process culminated in the identification and inclusion of strategic sites for a variety of uses in the Core Strategy Proposed Submission document July 2011. These included:

- Folkestone Seafront
- Shorncliffe Garrison
- Folkestone Racecourse, Westenhanger.
- Nickolls Quarry (reference only – due to planning consent)

2.7 It also identified the presence of 'broad locations' at New Romney and Sellindge. These do not have specific boundaries, instead criteria in the policy guides the spatial outputs required for a proposal to meet Core Strategy needs in the locality. This is illustrated on the maps for New Romney and Sellindge, recognising the presence of SHLAA sites but without confirming any collective boundary.

2.8 Folkestone Racecourse, Westenhanger was deleted from the Core Strategy Local Plan during the Examination in Public for reasons set out in the Inspectors Report (EB 01.96), paragraphs 74 -84.

3 Places and Policies Local Plan

3.1 Following the adoption of the Core Strategy 2013, the Council subsequently undertook a new Strategic Housing Land Availability Assessment (SHLAA) to inform the preparation of its Places and Policies Local Plan in order to address the residual housing need not met by the Core Strategy with a focus on small to medium sized sites; however, there was no maximum threshold to the size of site that was considered.

3.2 An initial 'call for sites' was held between 9 December 2013 and 3 February 2014, whilst a further 'call' ran concurrently with the Issues and Options consultation between 29 January and 11 March 2015.

3.3 The assessment methodology and criteria used to assess these sites was updated in light of the publication of the National Planning Policy Framework and Planning Practice Guidance; as well as the adopted policies in the Shepway Core Strategy. The SHLAA 2015/16 Consolidated Document (EB 04.60) details the SHLAA site assessment methodology at paragraphs 4.1–4.7.

3.4 The SHLAA exercise identified and assessed 179 sites and found 120 to be suitable, available and achievable. Further analysis showed that the majority of those (38) could be considered as already in the planning process – leaving 82 deliverable/developable sites with an estimated capacity of 4,443 dwellings.

3.5 Table 1 of document (EB 04.60) sets out the number of deliverable and developable sites by ward area with cumulative capacity estimates.

3.6 Appendix 2 of Document (EB 04.60) summarises the performance of 141 individual SHLAA sites (excluding those already considered to be in the planning process); with those considered to be deliverable/developable scored either ‘green’ or ‘amber’. The individual site appraisal forms can be found in Appendix 3.

3.7 Appendix 1 of this document seeks to provide an update as to the status of each of the ‘successful’ SHLAA sites listed in EB 04.60 Appendix 2, and has been presented by settlement in line with the settlement hierarchy.

3.8 In total, 61 sites were assessed as ‘green’. Of these, eleven were not allocated – 3 sites were allocated in Preferred Options (405 and 656, 1020) but were withdrawn following representations at Regulation 18; 3 sites (689, (317 & 416), and 636) were pursued separately through planning applications; 4 sites (602, 158, 388 and 457) were not considered suitable due to impact on landscape and highways; and 1 site (457) was no longer available.

3.9 A total of 21 sites were assessed as ‘amber’. Of these, 13 were not allocated – 3 sites (303a, 615 and 617) encroached on the Kent Downs AONB, 3 sites (373, 640, and 1015) would have been detached from the settlement boundary (640 also impacted on a Local Landscape Area); 2 sites (329 and 335) were citied as having flood risk issues; 3 sites (613, 620, 627 and 674) related to highway access and capacity; and 1 site (1014) had land ownership concerns.

3.10 For green and amber sites not allocated – estimated capacities have been provided.

3.11 A total of 58 sites were assessed as ‘red’. These were assessed as not being suitable due to significant policy constraint(s); the majority of these related to impacts and/or encroachment on the Kent Downs AONB, areas of extreme and significant flood risk according to the SFRA 2115 modelling or situated within an SSSI. Other reasons for excluding included impact on listed buildings, conservation areas, ancient woodlands, settings of scheduled ancient monuments; or failing to meet the minimum site thresholds. However, 9 sites (204A, 326, 428a, 428b, 606, 614, 632, 690; and 1006) now fall within the new garden settlement boundary covered by policies SS6-9; and a further site (609) was allocated as part of the PPLP. No estimated capacities have been set against these sites for the purpose of this note as they are deemed not suitable for development, other than through the comprehensive development of the new garden settlement proposed through Core Strategy Review Policies SS6-SS9.

3.12 The PPLP Sustainability Appraisal Report Regulation 18 (EB 02.97), Section 7, appraised all preferred allocations and reasonable alternatives for development in the PPLP (i.e. the sites scored green and amber). A policy-off approach to the appraisal was taken, i.e. the principle of housing development on each site was appraised without consideration of the measures that might be implemented at each site to mitigate adverse effects or enhance positive effects.

3.13 Further opportunities were available for ‘reasonable alternatives’ to be put forward as part of the plan making process during the Regulation 18 Preferred Options consultation, which ran between 7th October and 18th November 2016; and Regulation 19 consultation between 6th February and 19th March 2018 .

3.14 A total of 31 site submissions were received during the Regulation 18 consultation. A full list and the individual site appraisal forms can be found in the

SHLAA 2016/17 document (EB 04.70). In total, 15 of those sites were considered to be potentially deliverable/developable by officers.

3.15 Sites that were thought to be potential ‘reasonable alternatives’ to the suite of sites that made up the ‘preferred development option’ were considered as part of the PPLP Sustainability Appraisal Report Regulation 19 (EB 02.96), Section 7.

3.16 Subsequently, only 3 sites (PO18, PO19; and PO20) were allocated for housing as part of the Places and Policies Local Plan, and 2 sites (PO25 and PO28) were pursued separately through planning applications. The remaining sites were not taken forward to their perceived impact on landscape, protected habitats and flood risk; as well as deliverability issues such as achieving suitable access. It should also be noted that a further 2 sites (PO2 and PO6), which had not been considered as ‘reasonable alternatives’ as part of the preparation of the PPLP now fall within the new garden settlement boundary.

3.17 Appendix 2 of this document seeks to provide an update as to the status of each of the SHLAA sites listed in EB 04.70, and has been presented by settlement in line with the settlement hierarchy. Estimated site capacities have been included for those sites considered as potentially developable and deliverable.

3.18 The approach taken to the SHLAA and allocation of sites for the Places and Polices Local Plan was adjudged to have been sound by the planning inspector in 2019/20 and no omission site was added to the preferred development suite of sites.

4 Core Strategy Review

4.1 In response to the stepped increase to the minimum housing requirement, the Council commissioned a study to assess the capacity of the whole of the district for strategic growth, the High Level Options Report (AECOM, December 2016, Document EB 04.20), to inform the Core Strategy Review. This was supported by a comprehensive High Level Landscape Appraisal (AECOM, February 2016, Document EB 04.30).

4.2 The conclusion of the High Level Options Report was that the great majority of the district – the Folkestone and Hythe and surrounding areas, Kent Downs and Romney Marsh – was unsuitable for strategic-scale growth. It was found that Sellindge and surrounding area, may have opportunities to accommodate strategic growth and this area was therefore carried forward into the more detailed (Phase 2) analysis, which identified the specific boundaries of individual sites, including the proposed garden settlement.

4.3 The CSR has been subject to Sustainability Appraisal (SA), incorporating Strategic Environmental Assessment (SEA), throughout its preparation.

4.4 The Preferred Options Core Strategy Review SA (EB 02.70) Section 6, report on the appraisal of the High Level Growth Options and Section 7 on the spatial options at Otterpool and Sellindge.

4.5 A Sustainability was carried out specifically for the revised housing requirement, 'Sustainability Appraisal Addendum - Proposed Changes to the Proposed Submission Folkestone & Hythe Core Strategy Review' (EB 02.10).

4.6 Given the outcomes of the High Level Options work, the Council considers that there were no reasonable alternatives to the strategy put forward in the Core Strategy Review. Nevertheless, the Council run a further call for sites alongside the Regulation 18 consultation between the 29th March and 18th May 2018.

4.7 Overall, the further 'call' resulted in 5 new site submissions, 1 site (Land behind Rhodes House) was already be considered as already in the planning process with outline planning permission for 162 dwellings and fell within land identified for Phase 2 housing at Sellindge, leaving 4 sites for further assessment.

4.8 Whilst the 'call for sites' indicated that the Council was seeking land that could deliver housing at a strategic level and identified an indicative capacity of 250 dwellings – comparable with that identified at Sellindge (Phase 1), this did not preclude submission of sites of a smaller scale being submitted.

4.9 A full list and the individual site appraisal forms can be found in the SHLAA 2018 document (EB 04.80).

4.10 The Proposed Submission Core Strategy Review Sustainability Appraisal (EB 02.40) did not consider any of the additional SHLAA sites, as at the time of preparation, in the Council's view, it had sufficient land in its supply to meet the identified housing requirement; and none represented 'reasonable alternatives' to the preferred development option.

4.11 No further new sites were submitted to the planning making processes during the Regulation 19 Consultation.

5 Conclusion

5.1 In conclusion, the Council considers that it has demonstrated that it has kept an up-to-date review of potential SHLAA sites available in the Folkestone & Hythe District throughout the plan making process; and exhausted those that have been submitted and assessed as being suitable for development. The majority of those sites not allocated have constraints relating to impact on the Kent Downs AONB, internationally and nationally protected habitats; and flood risk, which is consistent with the highly constrained nature of the District. The Inspectors should therefore be confident that there is extremely little or no latent housing land capacity within existing built up areas or smaller peripheral sites and that the spatial strategy set out in the Core Strategy Review is the only deliverable option to meet the housing requirements for the District. Sites of nine dwellings or below are already accounted for in the Core Strategy Review trajectory through the windfall allowance, which has been based on evidence of past completions of small sites of this nature across the district.

5.2 The High Level Growth Options Study (EB 04.20) illustrates the constraints operating in the district. The sections below briefly summarise the main settlements of the character areas in turn.

Folkestone and Sandgate (see EB 04.20, Figure 8, page 3-55)

5.3 Looking at Folkestone and Hythe, to the immediate east of the built-up area, is the district boundary with Dover. The Folkestone and Dover Heritage Coast designation is to the east, with the Kent Downs Area of Outstanding Natural Beauty, Folkestone Warren Site of Special Scientific Interest and Local Nature Reserves to the immediate east.

5.4 To the immediate north-east of the built-up area the area is constrained by the Special Area of Conservation, Folkestone to Etchinghill Escarpment Site of Special Scientific Interest and Kent Downs Area of Outstanding Natural Beauty designations.

5.5 To the north of the built-up area is a large area of land in use for the Channel Tunnel terminal, immediately bordered by and in places overlapping with the Kent Downs Area of Outstanding Natural Beauty designation, Folkestone to Etchinghilll Escarpment Site of Special Scientific Interest and Special Area of Conservation.

5.6 To the immediate west of Folkestone and Sandgate is an area of the Kent Downs Area of Outstanding Natural Beauty, Paraker Wood and Seabrook Stream Local Wildlife Site and Seabrook Stream Site of Special Scientific Interest. There is a small area of land adjoining, but not within the Kent Downs Area of Outstanding Natural Beauty that is in active use by the Ministry of Defence (Dibgate Camp).

Hythe (see EB 04.20, Figure 9, page 3-63).

5.7 To the south and west of Hythe is the Hythe Ranges Local Wildlife Site, in active use by the Ministry of Defence, and areas of high flood risk. The immediate north-west is the Kent Downs Area of Outstanding Natural Beauty. To the north-east are areas of high flood risk (Flood Zone 3) except for a former landfill site, allocated for development in the Places and Policies Local Plan. Within the built up area to the east is the Eaton Lands Meadow natural/semi-natural greenspace. There is a narrow area at risk of landslide, identified by the British Geological Survey, follow the steeper ground that crosses Folkestone, Standgate, Seabrook and West Hythe, and further across the district running east-west.

Romney Marsh Area (EB 04.20, Figure 12, page 3-90)

5.8 **Lydd** is an elongated settlement in the Romney Marsh character area. To the north and south of the settlement development is constrained by the Romney Marsh and Rye Bay Site of Special Scientific Interest. Close to the south and east of the settlement are overlapping designations of Ramsar, Special Protection Area, Special Conservation Area and Dungeness National Nature Reserve. Areas of high flood risk (Flood Zone 3) closely surround the settlement on all sides and in places overlap the built form.

5.9 **Dungeness** is a small dispersed settlement. It is entirely covered by the Dungeness National Nature Reserve, Special Area of Conservation and Dungeness, Romney Marsh and Rye Bay Site of Special Scientific Interest designations.

5.10 **Lydd-on-Sea** and **Greatstone-on-Sea** are small, linear, coastal settlements. The coastline is to the immediate east of these settlements, covered variously by overlapping designations of Special Area of Conservation, Ramsar, Dungeness, Romney Marsh and Rye Bay Site of Special Scientific Interest and Special Protection Area. Inland at Lydd-on-Sea the built-up area is immediately bordered by the Dungeness National Nature Reserve, Special Area of Conservation and Dungeness, Romney Marsh and Rye Bay Site of Special Scientific Interest designations. Inland at Greatstone, the area to the immediate west is bordered variously by the Site of Special Scientific Interest and areas of Flood Zones 2 and 3.

5.11 **New Romney** is a larger, linear coastal settlement. Areas of Flood Zone 3 abut the settlement to the north, east and, in part to the south. Areas to the immediate north are within the Dungeness, Romney Marsh and Rye Bay Site of Special Scientific Interest and Ramsar designations. There is an area of land between New Romney and Greatstone-on-Sea relatively free of constraints that was put forward for development during the Places and Policies Local Plan process, but this was withdrawn by the land-owners (1020).

5.12 **Brenzett**, **Brookland** and **Old Romney** are smaller settlements within the Romney Marsh Area (EB 04.20, Figure 11, page 3-81). These settlements are either entirely covered by or surrounded by areas of high Flood Risk (flood zone 3).

5.13 **St Mary's Bay** and **Dymchurch** are coastal settlements, either covered by or entirely surrounded by, areas of high flood risk (Flood Zone 3).

North Downs Area (EB 04.20, Figure 7, page 3-46)

5.14 The majority of the North Downs Area is largely covered by the Kent Downs Area of Outstanding Natural Beauty designation. There are a number of smaller sites within the larger North Downs settlements that were allocated in the Places and Policies Local Plan, having been judged not to have a significant impact on the AONB.

5.15 The area within the North Downs, outside the Kent Downs AONB is considered in the Core Strategy Review through the Phase Two Growth Options work (EB 04.21)

Appendix 1: SHLAA 2015/16

SHLAA Sites Scored 'Green'

Ward	SHLAA Ref	Address of site	Status	Est. Capacity
FOLKESTONE				
East Folkestone	27B	Shepway Close, Folkestone	PPLP allocation Policy UA6	
	346	Former Gas Works, Ship Street, Folkestone	PPLP allocation Policy UA7	
Folkestone Central	46	Ingles Manor, Castle Hill Avenue, Folkestone	PPLP allocation Policy UA5	
	625	3-5 Shorncliffe Road, Folkestone	PPLP allocation Policy UA4	
	689	Westbrook School playing field, Shorncliffe Road, Folkestone	Developed. Planning app ref: Y15/0550/SH	
Folkestone Cheriton	602	Land between Valebrook Close and Valestone Close, Folkestone	Site not allocated due to concerns of highway access and capacity on Horn Street; and potential for settlement coalescence.	45
	637	Brockman Family Centre	PPLP allocation Policy UA9	
	687	Cherry Pickers, Cheriton	PPLP allocation Policy UA10	
	425C	Affinity Water, Land at Cherry Garden Avenue, Folkestone	PPLP allocation Policy UA11	
Folkestone Harbour	45	Car and Coach Park, Marine Parade, Folkestone	PPLP allocation Policy UA2	
	342	Rotunda Car Park, Lower Sandgate Road, Folkestone	PPLP allocation Policy UA2	
	382	East Station Goods Yard, Southern Way, Folkestone	PPLP allocation Policy UA1	
Folkestone Park	458	Highview School, Moat Farm Road, Folkestone	PPLP allocation Policy UA6	
Broadmead	103	Royal Victoria Hospital, Radnor Park Avenue	PPLP allocation Policy UA3	
Sandgate & West Folkestone	113	Former Encombe House, Sandgate	PPLP allocation Policy UA12	
	636	Shepway Resource Centre. Sandgate	Developed. Planning app ref: Y16/0463/SH	
	405	Coolinge Lane Land, Sandgate	Site was allocated PPLP preferred options; withdrawn following	54

			objection from Sport England at Reg. 18	
HYTHE				
Hythe	317 & 416	Land off Range Road (Fishermans Beach), Hythe	Developed. Planning app ref: Y11/0284/SH	
	137	Smith's Medical, Boundary Road, Hythe	PPLP allocation Policy UA13	
	158	Vale Farm (The Piggeries) Horn Street, Folkestone	Site not allocated due to concerns of encroachment into countryside and impact on local landscape area, settlement coalescence; and contamination	26
	621	Land opposite 24 Station Road, Hythe	PPLP allocation Policy UA14	
	313	Foxwood School, Seabrook Road, Hythe	PPLP allocation Policy UA7	
	155	Rectory Field, Eversley Way, Seabrook, Hythe	Site is no longer available. It was submitted by KCC as part of plans for the relocation of Seabrook Primary School.	n/a
	153	Princes Parade, Hythe	PPLP allocation Policy UA18	
	1018	St Saviours Hospital	PPLP allocation Policy UA16	
	142	Hythe Swimming Pool	PPLP allocation Policy UA19	
Hythe Rural	457	Land opposite Rock Cottage, Botolphs Bridge Road, Hythe	Site not allocated as it is effectively an island within an SFRA Extreme Flood Risk	10
NEW ROMNEY (INC. LITTLESTONE)				
Romney Marsh	403	Land west of Ashford Road, New Romney	PPLP allocation Policy RM4	
	415/430	Land east of Ashford Road, New Romney	CSR allocation Policy CSD 8	
	409	Land at Cockreed Lane, New Romney	CSR allocation Policy CSD 8	
	638	Marsh Academy, Station Road, New Romney	PPLP allocation Policy RM5	
	639	St Nicholas Playing Field, Rolfe Lane, New Romney	CSR allocation Policy CSD 8	
	1020	New Romney Southern Extension	Site was allocated in PPLP Preferred Options; withdrawn following	400

			objections from site owner at Reg. 18	
	230	Land RO The Old School House, Church Lane, New Romney	PPLP allocation Policy RM3	
	289A	Romney Marsh Potato Company, New Romney	CSR allocation Policy CSD8	
	437	Cherry Gardens, New Romney	PPLP allocation Policy RM1	
HAWKINGE				
North Downs East	1002	Land at Spitfire Way, Hawkinge	Developed. Planning app ref: Y15/1035/SH	
	244	Former Officers Mess, Aerodrome Road, Hawkinge	PPLP allocation Policy ND1	
	344	Mill Lane r/o Mill Farm, Hawkinge	PPLP allocation Policy ND2	
	388	Land west of Canterbury Road, Hawkinge	Site not allocated due to concerns that development would encroach North Downs AONB scarp.	10
	404	Land adj Kent Battle of Britain Museum, Aerodrome Road, Hawkinge	PPLP allocation Policy ND3	
LYDD				
Walland & Dengemarsh	390	Peak Welders, Romney Marsh, Lydd	PPLP allocation Policy E1 (Employment)	
	195	Station Yard, Station Road, Lydd	PPLP allocation Policy RM8	
	306A	Land at Kitewell Lane, Lydd	PPLP allocation Policy RM6	
	306B	Land at Kitewell Lane, Lydd	PPLP allocation Policy RM7	
ELHAM				
North Downs East	656	Land at Duck Street, Elham	Site was allocated in PPLP preferred options; withdrawn following objections on highways, flooding and ecology at Reg. 18	5
LYMINGE				
North Downs West	605	Land South of Canterbury Road, Lyminge	PPLP allocation Policy ND4	

SELLINDGE				
North Downs West	623	South of Ashford Road, Taylor Wimpey lands, Sellindge	CSR allocation Policy CSD9 (Phase 1)	
	618	Land west of Jubilee Cottage, Swan Lane, Sellindge	PPLP allocation Policy ND5	
	402	The Piggery, Main Road, Sellindge	PPLP allocation Policy ND5	
	1005	Land at Barrow Hill, Sellindge	PPLP allocation Policy ND5	
	1007	Silver Spray, Sellindge	PPLP allocation Policy ND5	
ST MARYS BAY				
Romney Marsh	004	Former Sands Motel, St Mary's Bay	PPLP allocation Policy RM9	
GREATSTONE				
Romney Marsh	462	Land rear Varne Boat Club, Coast Drive, Greatstone	PPLP allocation Policy RM10	
	1013	Car Park, Coast Drive, Greatstone	PPLP allocation Policy RM11	
LYMPNE				
Hythe Rural	209	Former Lympne Airfield, Lympne	PPLP allocation Policy UA6	
BROOKLAND				
	431	The Old Slaughterhouse 'Rosemary Corner', Brookland	PPLP allocation Policy RM12	
DENSOLE, ETCHINGILL, STELLIN MINNIS and WESTENHANGER				
North Downs East	1003	Land adjoining 385 Canterbury Road, Densole	PPLP allocation Policy ND8	
	418	Etchinghill Nursery, Etchinghill	PPLP allocation Policy ND9	
	419	Land adjacent the Golf Course, Etchinghill	PPLP allocation Policy ND10	
	635	Camping and Caravan Site, Minnis Lane	PPLP allocation Policy ND7	
North Downs Wes	204A	Folkestone Racecourse (parts), Westenhanger	CSR allocation Policy SS6-10 (Garden Settlement)	

SHLAA Sites Scored 'Amber'

Ward	SHLAA Ref	Address of site	Status	Est. Capacity
FOLKESTONE				
Broadmead Sandgate & West Folkestone	656	Silver Spring, Park Farm	PPLP allocation Policy RL11 (retail)	
	674	Digby Road, Folkestone	Site not allocated due to objection from Kent Highways concerning the potential loss of the car park.	10
HYTHE				
Hythe	615	Land north west of Blackhouse Hill, Hythe	Site not allocated due to prominent location in the North Downs AONB and would be a significant encroachment into the countryside; and other extensive natural constraints. Some potential in SW corner of the site?	5
	622	Saltwood Care Centre, Tanners Hill, Hythe	PPLP allocation Policy UA15	
	640	Adj 43 Horn Street, Folkestone	Site not allocated due to concerns of physical separation and encroachment into countryside, impact on a local landscape area, and distance from services.	8
NEW ROMNEY (INC. LITTLESTONE)				
New Romney	379	Land off Victoria Road West, Littlestone	PPLP allocation Policy RM3	
	436	Land at Church Road, New Romney	PPLP allocation Policy RM3	
Romney Marsh	373	Land North of Cockreed Lane, New Romney	Site was considered unsuitable for development given its separation from the main settlement. Whilst (CSD8) will bridge the gap over the course of the CS period, at this stage it would constitute	100

			encroachment into the countryside. Low SFRA 2115 hazard.	
	1014	Craythorne Farm	Site not allocated due to issues of dual site ownership issues.	3
	1015	Brickyard Poultry Farm, New Romney	Site was considered unsuitable for development given its separation from the main settlement. Whilst (CSD8) will bridge the gap over the course of the CS period, at this stage it would constitute encroachment into the countryside.	40
LYDD				
Walland & Dengemarsh	335	Fisher Field, Dungeness Road, Lydd	Site not allocated due to its situation in Flood Zone 3, with 'significant' SFRA hazard. In addition, it is a minerals safeguarding area.	10
	620	Land at Harden Road, Lydd	Site not allocated due to encroachment into the countryside; and not possible to create suitable access.	25
SELLINDGE				
North Downs West	328	Sellindge East, Sellindge	CSR allocation Policy CSD9 (Phase 2b)	
	610	Grove House land, Main Road, Sellindge	CSR allocation Policy CSD9 (Phase 2a)	
	627	Land rear of Brook Lane Cottages, Brook Lane, Sellindge	Site not allocated due to vehicular access not being able to be achieved.	10
BROOKLAND				
Romney Marsh	329	Pepperland Nurseries, Boarmans Lane, Brookland	Site not allocated due to flood risk, impacts on the Conservation Area; and remoteness from services.	10
	407A	Land N Pod Corner, Brookland	PPLP allocation Policy RM13	
BRENZETT				

Romney Marsh	612	Land adjacent Moore Close, Brenzett	PPLP allocation Policy RM14	
DENSOLE and STANFORD				
North Downs East	303A	Land south of Little Densole Farm, Densole	Site not allocated as considered that there were other sites in Densole that more contained, integrated and defendable, given the sites location in the Kent Downs AONB.	50 - 100
	617	Black Horse Caravan Site, 385 Canterbury Road, Densole	Site not allocation due to concerns regarding impact on AONB land immediately adjoining the settlement boundary.	5
North Downs West	613	Land rear Barnstormers, Stone Street, Stanford	Site was allocated PPLP preferred options; withdrawn due to concern regarding site access at Reg.18	5

Appendix 2: Further SHLAAs submitted during PPLP Regulation 18 Consultation

Ward	SHLAA Ref	Address of site	Status	Est. Capacity
FOLKESTONE				
Broadmead	PO16	Three Acres, Park Farm, Folkestone	Site not suitable as within an existing employment designation and would result in poor residential amenity.	
	PO17	Five Acres, Park Farm, Folkestone	Site not suitable as within an existing employment designation and would result in poor residential amenity.	
NEW ROMNEY				
New Romney	PO25	Land adjacent to Josephs Way, New Romney	Site had ransom strip at point of assessment. This was subsequently resolved and planning application ref: Y19/0553/FH is being determined.	25
	PO26	Cemex Station Approach, New Romney	Site not suitable due to concerns about flood risk zone 2&3; impact on townscape / urban form; and in close proximity to a recycling centre and sewage treatment works resulting in potentially poor residential amenity.	20
	PO20	Cherry Garden, Littlestone	Resubmission of SHLAA 437. PPLP allocation Policy RM1	
	PO28	Land at St Andrews Road, Littlestone	Planning App ref: Y19/0918/FH	
HAWKINGE				
North Downs East	PO3	Hawkinge East	Re-submission of SHLAA 316 (reduced in size). Concerns about expansion into Kent Downs AONB remain and sequentially would not be	50

			a preferred site while brownfield sites remain within the settlement boundary.	
LYDD				
Walland and Dengemarsh	PO23	Land at Harden Road, Lydd	Resubmission of SHLAA 620. Concerns about expansion into open countryside; and not possible to create suitable access.	20
	PO24	Land at Harden Road, Lydd (a larger area incorporating PO23)	Resubmission of SHLAA 620. Concerns about expansion into open countryside; and not possible to create suitable access.	30
ELHAM				
North Downs East	PO10	Cherry Gardens, Elham	Site not available; and is landlocked offering no available access to the public highway.	
	PO11	Cock Lane, Elham	Site not available; and access is considered to be unsuitable to accommodate additional traffic movements.	
	PO12	Cullens Hill, Elham	Site not available, impact on Kent Downs AONB, setting of a conservation area; and access is considered to be unsuitable to accommodate additional traffic movements.	
	PO13	Land at Canterbury Road, Elham	Site not available; and impact on Kent Downs AONB.	
	PO14	Land West of Canterbury Road, Elham	Site not available; and impact on Kent Downs AONB.	
	PO15	Land East of Canterbury Road, Elham	Site not available; and impact on Kent Downs AONB.	
LYMINGE				
North Downs East	PO4	Land West of Canterbury Road, Lyminge	Site not suitable due to concerns about	50

			expansion into Kent Downs AONB.	
	PO5	Red House Lane, Lyminge	Site not suitable due to concerns about expansion into the Kent Downs AONB.	10
SELLINDGE				
North Downs West	PO1a	Land at Sellindge West	Site not suitable due to concerns about expansion into open countryside and impact on the setting of the AONB.	10
	PO1b	Land at Sellindge West (Smaller parcel of PO1a)	Site not suitable due to concerns about expansion into open countryside and impact on the setting of the AONB.	
LYMPNE				
North Downs West	PO6	Port Lympne Zoo Park	CSR allocation Policy SS6-10 (Garden Settlement)	
	PO7	Land South of Aldington Road, Lympne	Site not suitable due to concerns about expansion into the Kent Downs AONB; impact on SSSI; and setting of a Listed Building	
DYMCHURCH				
Romney Marsh	PO21	Land behind Village Hall Car Park, Dymchurch	Extreme Flood Risk (SFRA 2115)	
	PO27	Recreational Ground, Dymchurch	Site not suitable due to designation as an open sports facility; proposed enabling development for new pavilion.	15
ST MARYS BAY				
Romney Marsh	PO31	Land off Jenner's Way	Resubmission of SHLAA 380. Concerns regarding Extreme Flood Risk (SFRA 2115); and encroachment into countryside, remain.	

BROOKLAND				
Romney Marsh	PO19	Land adjacent to Framlea, Brookland	PPLP allocation Policy RM15	
	PO22	Fairfield Court Farm, Brookland	Site not suitable due to concerns about expansion into open countryside and impact on local landscape.	
	PO30	Land off Boarmans Road, Brookland	Resubmission of SHLAA 1016. Concerns regarding flood zone 2 & 3; and coalescence of two distinct parts of the settlement remain.	
BRENZETT				
Romney Marsh	PO18	Land between Hillside and Brandet House, Brenzett	PPLP allocation Policy RM14	
ETCHINGHILL, STANFORD, PEENE and NEWINGTON				
North Downs East	PO29	Land off Teddars Leas Road, Etchinghill	Re submission of SHLAA 432a. Concern regarding impact on Kent Downs AONB remain.	
North Downs West	PO8	Land rear of Touchwood, Stanford	Unsustainable location (Stanford); and objections from KCC Highways regarding access.	5
North Downs East	PO9	Land opposite Underhill Cottages, Peene	Unsustainable location (Peene)	
North Downs West	PO2	Cydonia, Newingreen	CSR allocation Policy SS6-10 (Garden Settlement)	

Appendix 3: SHLAA 2018

Ward	SHLAA Ref	Address of site	Status	Est. Capacity
Broadmead	CSR2	Booker Wholesale, Park Farm Road, Folkestone	Site not suitable as within an existing employment designation and would result in poor residential amenity.	
North Downs West	CSR3	Land at Elm Tree Farm, Main Road, Sellindge	Site not allocated as it would extend development west as well as north towards the AONB. It is considered that there are more preferable areas for growth in Sellindge that would have a lesser impact on the setting of the AONB. Impact also on highways and setting of a listed building.	188
	CSR4	Land at the Piggery, Main Road, Sellindge	Site not allocated as it would extend development west as well as north towards the AONB. The Growth Options Report identified that strategic development in this area would have an unacceptable landscape impact.	
North Downs East	CSR1	Etchinghill Nursery, Canterbury Road, Etchinghill	Site does not quality as a strategic site. It could be pursued as a planning application as part of an extension of the draft housing allocation in the PPLP (Policy ND10).	20

APPENDIX C

Stakeholder comments

Stakeholder	Comments	Resolution
Environment Agency	We are generally satisfied that the applicant appears to be seeking to avoid locating any development within any of the areas identified as lying within Flood Zones 2 or 3. Should any development be proposed within the Flood Zones, we would expect a formal planning application to be accompanied by a relevant Sequential Test as required under NPPF in order to justify the need for development in those locations. We would appreciate the opportunity to be fully involved with the evolution of this scheme to ensure the flood risk from all sources (both to and from the site) is fully mitigated.	Information included in the WCS, FRA & SWDS to sufficiently address comments.
	On page 17 of the submitted 'Blue and Green Infrastructure' Place Panel document (23 April 2018), it is stated that there is an intent to reduce the discharge rate from the site from 3.04 to 1l/s/ha. Although this would potentially result in flows of a longer duration but lower overall rate from the site during dry periods, it may not be enough of a flow to provide the ecological benefits to the system that would be provided under the existing natural condition.	
	With this particularly low rate of discharge there would be an associated requirement for significant surface water storage volumes. It must be carefully considered whether any such system would be capable of accommodating successive rainfall events (i.e. the half-drain times could be prohibitively long).	
	A Flood Risk Activity Permit (FRAP) will be required for any structures or works in, under, over or within 8m of 'Main River'.	
	If access bridges are required over the River East Stour the Environment Agency has the following design criteria: - • The bridge should be clear span across the river and the bridge abutments should not extend into the channel • The soffit level of the bridge should not be lower than 600mm above the undefended 1%AEP /1 in 100 annual chance plus climate change flood level. • The river channel profile should be maintained, ensuring no reduction in capacity	
Kent County Council	There needs to be a clear statement of the what is the recommended/preferred approach to discharge rates per phase.	Comment has been fully addressed within the FRA and SWDS Strategy.
	However, final discharge points to the River East Stour need to be identified (shown in Figure 15, page 36 of 300) and need further discussion. There will need to be a pre-development scenario against which future development is measured/assessed. This needs to be summarised within the FRA.	

Stakeholder	Comments	Resolution
*KCC – **Extracts from Post Consultation Planning Report for the current Outline Planning Application Otterpool Park Y19/2057/FH***	*The Flood Risk Assessment and Drainage Strategy submitted to support this development applications demonstrates how surface water will be managed within the scale of development. It is proposed that surface water will discharge from the site at rates not to exceed greenfield runoff rates. It is agreed that this is an appropriate approach to ensure flood risk is managed. This states principles which need to be assessed as further detail design is undertaken for the next stages of planning.* *It is particularly important as noted within the FRA that downstream flood volumes on the River East Stour are not increased. The development proposal identifies areas where infiltration can be utilised, and these opportunities should be maximised within detailed design. Re-use of surface water provides additional benefit in management of surface water volumes and reduction of potential flood risk downstream of the proposed development, though this is discussed, further detail should be provided to KCC as Lead Local Flood Authority.*	*Comment has been suitably addressed within this updated WCS and FRA&SWDS, including three technical workshops.* *(Further detail on the surface water reuse proposals and associated flood risk benefits will be provided during Tier 2 and Tier 3 stages.)*
Folkestone and Hythe District Council	Draft Policy SS7 of the CSLPR states sustainable drainage systems (SuDS) to maximise landscape and biodiversity value and to prevent downstream flooding of the River East Stour, should be developed as part of an integrated water management solution. In addition, the A fundamental requirement will be the need to plan for the supply of water and control water usage, as the district is an area of 'severe water stress'.	Comment has been fully addressed within the WCS, FRA&SWDS, Water Environment Chapter of the Environment Statement
	As noted by the Place Panel, water could be a defining feature of the Garden Town. Section 5.1 recognises the emerging planning policy position which flags the potential for the garden settlement to become an example of best practice for environmental sustainability. Water is a leading example of this and the LPA is generally encouraged by the potential scope for innovation which it would like to see explored further and secured through a forthcoming planning application.	
	It is acknowledged development parcel SuDS is currently excluded but it would be helpful to gain an overall appreciation of how much SuDS will be strategic and how much is 'at source'.	
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APPENDIX D

Otterpool Park surface water management design criteria

Design Principle	Design Criteria Delivery
Water Quantity	a. Reduce the risk of flooding from surface and foul water and its contribution to fluvial flooding. b. Provision of a surface water management strategy that works with the natural drainage of the site, retaining surface water within the site and manage the risk of flooding during severe storms. c. Surface water not collected for use to be discharged per the following discharge hierarchy; to ground, to a surface water body, a surface water sewer, to a combined sewer. d. Protect people and property within the area of study from flooding and does not create any additional flood risk outside the proposed Development. e. Ensure that the site drainage and earthworks strategy is sufficiently designed and appropriate freeboard and exceedance flow routes are provided so as not to cause any property flooding and public nuisance in the development during a 1 in 30 annual chance event and 1 in 100 annual chance event, including 40% climate change and 10% urban creep allowances. f. Runoff rates should match greenfield runoff rates for all events up to the climate change adjusted 1 in 100 annual chance event. g. The proposed Development to not have an adverse impact on drinking water resources. h. Existing ordinary watercourses should be identified and accommodated and preferably retained.
Water Quality	a. Surface water discharges should not adversely impact the water quality of the receiving water bodies, both during construction and when operational. b. The first 5mm of any rainfall event should be accommodated and disposed of on-site, rather than being discharged to any receiving watercourse or surface water sewer. c. Industrial areas will have appropriate pollution control operation processes in place to minimise the risk of serious pollution events occurring. d. Provide treatment of surface water runoff to meet the requirements of local and national standards. e. Ensure that the impact of periodic extended wet and dry periods do not invalidate treatment performance. f. Ensure that where infiltration is proposed that a sufficient treatment train is in place to ensure no pollution contamination.
Amenity	a. Respect and enhance hey historic features of conservation interest. b. Integrate car parking, recreational and amenity space, identified green corridors and public open space areas with the surface water management system. c. Use water to support vegetation to enhance civic space, the road environment and public open space. d. Keep sides sloped to accessible water features, swales and detention basins shallow, easily accessible and easy to maintain. e. Ensure the safest access as far as reasonably practical for learning and community engagement activities.

Design Principle	Design Criteria Delivery
Habitat and Biodiversity	a. To conserve and enhance biodiversity and avoid a net loss of biodiversity. b. Contribute to habitat connectivity through the provision of blue/green corridors. c. Contribute to the connectivity and enhancement to and of the SSSI and AONB that are located close to the site. d. Increase the resilience and the self-sustainability of the ecosystems.

Otterpool Park Drainage Zones Details

Drainage Zone* (*Area is given in brackets)	Sub-zone	Sub-zone Area (ha)	Paved Plot Area (ha)	Soft Plot Area (ha)	Strategic GI Area (ha)	Infiltration Viable (Y or N)	Covered Plot Areas
Westhanger (*97.71ha)	DR-WH1	32.80	10.90	1.92	19.98	N	TC.2
	DR-WH2	30.48	18.41	2.05	10.02	N	TC.1 and TC.3
	DR-WH3	10.22	7.25	1.28	1.69	N	TC.4 and part RS.1
	DR-WH4	15.79	5.42	1.36	9.01	N	TC.5 part and RS.2 (very small)
	DR-WH5	8.42	5.00	2.14	1.28	N	TC.5 part and RS.2 (very small)
East Otterpool (*79.11ha)	DR-EO1	29.60	11.51	3.84	14.25	Y	CP.1
	DR-EO2	18.00	4.26	1.42	12.32	Y	CP.2 and small part of CP.1
	DR-EO3	18.61	2.95	0.74	14.92	Y	CP.3
	DR-EO4	8.06	5.55	0.62	1.89	Y	CP.4 and part of TC.6
	DR-EO5	4.84	0.00	0.00	4.84	Y	open space
West Newingreen (*24.47ha)	DR-WN1	17.92	8.40	0.93	8.59	N	CP.5 and part of small part of TC.6
	DR-WN2	6.55	5.16	1.29	0.10	N	TC.6 and small part of CP.5
East Triangle (*39.92ha)	DR-ET1	8.63	4.43	0.49	3.71	N	Part of HF.1
	DR-ET2	31.29	19.88	3.06	8.35	N	HF.2, part of HF.1 and HF.3
East Triangle South (*9.31ha)	DR-ETS	9.31	4.89	0.54	3.88	N	TC.7, TC.8 and part of HF.3
South Otterpool (*69.39ha)	DR-SO1	14.22	7.18	3.08	3.96	Y	AP.2 (part)
	DR-SO2	26.18	12.68	5.43	8.07	Y	AP.2 (part)
	DR-SO3	5.70	3.02	0.75	1.93	Y	AP.1 (part)
	DR-SO4	9.50	4.02	1.01	4.47	Y	AP.1 (part)
	DR-SO5	3.91	1.68	0.42	1.81	Y	AP.2 (part)
	DR-SO6	9.88	0.00	0.00	9.88	Y	open space

Drainage Zone* (*Area is given in brackets)	Sub-zone	Sub-zone Area (ha)	Paved Plot Area (ha)	Soft Plot Area (ha)	Strategic GI Area (ha)	Infiltration Viable (Y or N)	Covered Plot Areas
West Otterpool (*77.25ha)	DR-WO1	27.78	13.10	5.62	9.06	Y	WR.2 and WR.1 (part)
	DR-WO2	20.89	10.30	2.58	8.01	Y	WR.1 (part) and HT.2 (part)
	DR-WO3	22.16	11.74	2.93	7.49	Y	WR.1 (part), WR.3 and HT.2 (part)
	DR-WO4	6.42	5.31	0.59	0.52	Y	WR.1 (part) and HT.2 (Part)
Barrow Hill (*131.90ha)	DR-BH1	12.38	3.07	1.31	8.00	Y	HT1 (part)
	DR-BH2	12.75	2.56	1.10	9.09	Y	HT.3
	DR-BH3	20.76	10.96	4.70	5.11	Y	HT1 (part)
	DR-BH4	21.04	5.42	2.32	13.30	Y	HT.3
	DR-BH5	12.76	1.06	0.45	11.25	Y	HT.5
	DR-BH6	18.64	10.00	4.28	4.36	Y	HT1 (part)
	DR-BH7	13.80	4.19	1.79	7.82	Y	HT.4, HT! (part) and HT.2 (part)
	DR-BH8	19.77	0.00	0.00	19.77	Y	open space
	DR-BH9	4.71	1.36	0.15	3.20	N	HT.5
River Stour (*55.23ha)	DR-RS1	12.73	9.44	1.67	1.62	N	RS.1 (part)
	DR-RS2	8.61	1.71	0.19	6.71	N	RS.1 (part)
	DR-RS3	12.18	6.48	1.14	4.56	N	RS.3
	DR-RS4	2.25	1.29	0.32	0.64	N	RS.4
	DR-RS5	19.46	12.45	1.38	5.63	N	RS.2
TOTAL		**589.00**	**253.01**	**64.90**	**271.09**		

APPENDIX C

Stakeholder comments

Stakeholder	Comments	Resolution
Environment Agency	We are generally satisfied that the applicant appears to be seeking to avoid locating any development within any of the areas identified as lying within Flood Zones 2 or 3. Should any development be proposed within the Flood Zones, we would expect a formal planning application to be accompanied by a relevant Sequential Test as required under NPPF in order to justify the need for development in those locations. We would appreciate the opportunity to be fully involved with the evolution of this scheme to ensure the flood risk from all sources (both to and from the site) is fully mitigated.	Information included in the WCS (ES Appendix 15.2), FRA & SWDS to sufficiently address comments.
	On page 17 of the submitted 'Blue and Green Infrastructure' Place Panel document (23 April 2018), it is stated that there is an intent to reduce the discharge rate from the site from 3.04 to 1l/s/ha. Although this would potentially result in flows of a longer duration but lower overall rate from the site during dry periods, it may not be enough of a flow to provide the ecological benefits to the system that would be provided under the existing natural condition.	
	With this particularly low rate of discharge there would be an associated requirement for significant surface water storage volumes. It must be carefully considered whether any such system would be capable of accommodating successive rainfall events (i.e. the half-drain times could be prohibitively long).	
	A Flood Risk Activity Permit (FRAP) will be required for any structures or works in, under, over or within 8m of 'Main River'.	
	If access bridges are required over the River East Stour the Environment Agency has the following design criteria: - • The bridge should be clear span across the river and the bridge abutments should not extend into the channel • The soffit level of the bridge should not be lower than 600mm above the undefended 1%AEP /1 in 100 annual chance plus climate change flood level. • The river channel profile should be maintained, ensuring no reduction in capacity	
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APPENDIX D

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	DR-WO4	6.42	5.31	0.59	0.52	Y	WR.1 (part) and HT.2 (Part)
Barrow Hill (*131.90ha)	DR-BH1	12.38	3.07	1.31	8.00	Y	HT1 (part)
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	DR-BH3	20.76	10.96	4.70	5.11	Y	HT1 (part)
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	DR-BH6	18.64	10.00	4.28	4.36	Y	HT1 (part)
	DR-BH7	13.80	4.19	1.79	7.82	Y	HT.4, HT! (part) and HT.2 (part)
	DR-BH8	19.77	0.00	0.00	19.77	Y	open space
	DR-BH9	4.71	1.36	0.15	3.20	N	HT.5
River Stour (*55.23ha)	DR-RS1	12.73	9.44	1.67	1.62	N	RS.1 (part)
	DR-RS2	8.61	1.71	0.19	6.71	N	RS.1 (part)
	DR-RS3	12.18	6.48	1.14	4.56	N	RS.3
	DR-RS4	2.25	1.29	0.32	0.64	N	RS.4
	DR-RS5	19.46	12.45	1.38	5.63	N	RS.2
TOTAL		**589.00**	**253.01**	**64.90**	**271.09**		