

**Land at Bayards Eastergate
Minerals Resource & Waste Infrastructure Assessment
August 2021**

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Document Control

Document:	Minerals Resource and Waste Infrastructure Assessment
Project:	Land at Bayards Lane, Eastergate
Client:	Reside Developments
Job Number:	784-B030685
File Origin:	\\southampton14\Data\Projects\Reside Developments Ltd\784-B030685 (Bayards, Eastergate Mins and Waste Assessment)\

Revision:	V1	Status:	Issued
Date:	August 2021		
Prepared by: Chris Muir		Checked by: Michael Jones	Approved by: Michael Jones
Description of revision:			

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1.0 INTRODUCTION

- 1.0.1 Tetra Tech has been instructed by Reside Developments to prepare a Minerals Resource and Waste Infrastructure Assessment to support an outline planning application for residential development at Land at Bayards, Level Mare Lane, Eastergate in West Sussex.
- 1.0.2 A Minerals Resource Assessment is required because the site is located within a Minerals Safeguarding Area for Sharp Sand and Gravel as identified by West Sussex County Council (WSCC) on its policies map included at Appendix E of their Minerals Local Plan. This is confirmed in the pre-application advice received from Arun District Council and is also displayed on the Arun Local Plan Proposals Map.
- 1.0.3 A Waste Infrastructure Assessment is considered likely to be required as the site is partly within 500m of the SRC Recycling Metal Recycling Facility on Fontwell Avenue. The pre-application advice states the site is partly within the buffer zone of the Bognor Regis Household Waste Recycling Site, although this site is some 4 miles from the application site and is presumed to be in error. This SRC site is identified as an operational metal recycling facility in the most recent Annual Monitoring Report, which is generally* for the period April 2019 – March 2020 (*includes some information up to December 2020).
- 1.0.4 The purpose of the report is therefore twofold. The report provides an assessment of the most suitable and sustainable management of any identified mineral resource at the site taking into account the economic viability of the resource and environmental constraints. The report also provides an assessment of any potential impact on the metal recycling facility on Fontwell Avenue.
- 1.0.5 This report has been written and informed by a site visit completed by an experienced minerals and waste planning professional. The report is also informed by ground investigation works.

1.1 PROPOSED DEVELOPMENT

- 1.1.1 The proposals comprise the development of up to 69 residential dwellings, a new access via land west of Fontwell Avenue and associated landscaping and works. A second access from Level Mare Lane would serve 6 of the dwellings. A Site Layout Plan (Appendix A) is attached to this report, which shows how the site (land to the west of tree line) would link to the adjoining site to the east. The adjoining site has planning permission (BN/50/20/PL) for the construction of 42 dwellings. The land subject to this assessment and planning application is the section of the site to west of the tree line as shown in the appended Proposed Residential Development drawing. The drawings show the intention to retain the majority of the tree and hedge line between the two sites and around its perimeter.

2.0 SITE LOCATION AND SETTING

2.1 LOCATION & DESCRIPTION

- 2.1.1 The proposed development site is located in Eastergate to the south of Level Mare Lane. The site area is approximately 2 hectares and is centred at National Grid Reference SU 94613 06277. The site predominantly comprises agricultural pasture land used for grazing in association with a private equestrian use at Bayard Stables. Established tree lines border the majority of the site.

2.2 SITE SETTING

- 2.2.1 The site is fairly rural in character and is located between Eastergate and Fontwell. Bayard Stables is located immediately the north west of the site and Northfield Country House is located to the west of the stables. Level Mare Lane abuts the northern boundary of the site and Fontwell Park Racetrack is located to the north of this section of Level Mare Lane.
- 2.2.2 As described in the introduction the land to the east of the site has been granted planning permission for the construction of 42 houses. Fontwell Avenue is approximately 70 metres to the east of the site at its closest point.
- 2.2.3 The Herbarry, The Beeches and Northfield Farm/ Farmhouse are located to the south west of the application site and Northfield Cottages are located to the south east. Agricultural land is located further south of these properties. A small group of mature trees are located between Northfields Country House and The Herbarry and the Beeches properties to the west of the site.

Access

- 2.2.4 Current access to the site is from Level Mare Lane, an unmade road, to the north. The main access to the proposed dwellings would be through the development site to the east, which will be accessed from Fontwell Avenue. A second access, to serve 6 of the dwellings, is proposed from Level Mare Lane. It is understood that construction access is proposed from Level Mare Lane.
- 2.2.5 The site benefits from good access to the A27, which is within a 1.5km of the site. The A27 can be accessed from the A29 (Fontwell Avenue).

Ecology

- 2.2.6 The Arun District Council Proposals Map, which forms part of the Arun Local Plan 2011 – 2031 (July 2018), shows that a section of Fontwell Park Racetrack is a designated Site of Nature Conservation Importance (SNCI). The Proposals Map also shows there is an area of Local Green Space located approximately 335m to the north west of the site.
- 2.2.7 There are no ecologically statutory designated sites within a 2km radius of the site boundary shown on the Proposals Map or on Natural England's MAGIC website. South Downs National Park, designated for its landscape value, is located approximately 1km to the north of the site and does comprise varied habitats including chalk grassland and woodland which supports varied flora and fauna. The MAGIC website shows that the land within Fontwell Park Racetrack is classified as Priority Habitat Inventory – Lowland Meadows. Land between Northfield Farm and Northfield Country House is classified as Priority Habitat Inventory – Deciduous Woodland and National Forest Inventory – Broadleaved Woodland.
- 2.2.8 As described previously mature tree lines border most of the site. The trees are more scattered along the northern boundary although the scrub vegetation also forms this field boundary.

Landscape

- 2.2.9 As described above, South Downs National Park extends from east to west to north of the site and is located approximately 1km to the north at its closest point.
- 2.2.10 The WSCC Imap shows there are no Public Rights of Way or Permissive Paths located at the site or near its boundaries.

Heritage

- 2.2.11 There are no scheduled monuments or listed buildings within 500m of the site. Denmans Garden, a Grade II Registered Park and Garden is located 580m north of the site. A Heritage Desk Based Assessment has been prepared and provides a thorough review of the heritage and archaeological value of the site and surrounding area. Arun District Council have identified the proposed development has the potential to affect the setting and significance of Denmans Garden.

Geology

- 2.2.12 The geology at the site has been inferred from a review of the British Geological Survey (BGS) Geology of Britain Viewer website. BGS indicate Head superficial deposits, which comprise Gravel, Sand, Silt and Clay

underly the site. The deposits were formed up to 3 million years ago in the Quaternary Period in a local environment previously dominated by subaerial slopes.

2.2.13 BGS indicate that the bedrock geology that underlies the southern part of the site, is the London Clay Formation Clay, Silt and Sand. This is sedimentary bedrock formed approximately 48 to 56 million years ago in the Palaeogene Period, formed in a local environment previously dominated by deep seas. The bedrock geology in the northern part of the site is the Lambeth Group, which also comprises clay, silt and sand. This Sedimentary Bedrock formed approximately 48 to 59 million years ago in the Palaeogene Period in a local environment previously dominated by swamps, estuaries and deltas.

2.2.14 The site-specific ground investigation works are summarised in Section 3 of this report.

Water Environment

2.2.15 The generalised hydrogeology of the site is published on the MAGIC website. This classifies the Head deposits as a Secondary A Aquifer. The Environment Agency (EA) state that these aquifers are *'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.'* The MAGIC website indicates that the London Clay Formation and Lambeth Group bedrock geology is also a Secondary A Aquifer's.

2.2.16 There are no open surface water features within the site.

2.2.17 The GOV.UK Flood Map for Planning Service shows that the whole site is located within a Flood Zone 1 – land least likely to flood. A Flood Zone 1 is described as land having a less than 1 in 1,000 annual probability of river or sea flooding.

2.2.18 The site is located within a Source Protection Zone 1 (Subsurface Activity). The EA define the zones by how long it will take for a pollutant to travel from the groundwater to the source where water is taken and the area around the source which needs protecting from potential pollutants. The EA state: *'This zone (Zone 1) is 50 day travel time of pollutant to source with a 50 metres default minimum radius.'*

Utilities

2.2.19 A utility survey, summarised in Appendix C, has been completed at the site. A waterpipe extends from west to east across the north of the site, approximately 10m inside the site boundary. The pipe turns off at a 45-degree angle in the north east corner of the site. An orange line, shown in the key as an 'Unidentified EML', also extends from west to east across the north of the site, approximately 4m inside the site boundary.

Electric cables extend from east to west just outside the northern boundary of the site. A series of water pipes are shown to the north of the site and underly Level Mare Lane and the adjacent field to the north.

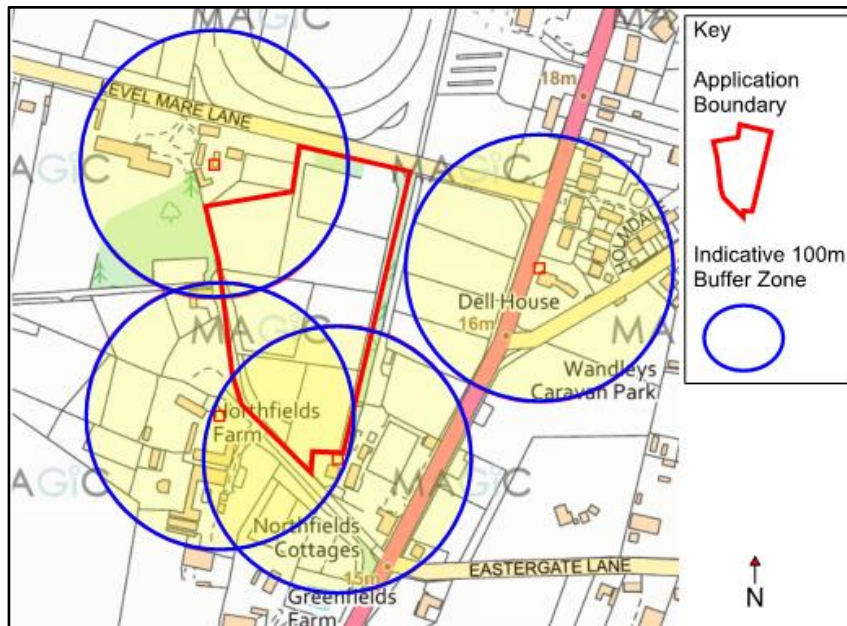
- 2.2.20 An electric cable is also shown further south dissecting a more central area of the site from south west to north east. A small length of electric cabling is also shown just outside of the site boundary by the all-weather surface facility, which is understood to be retained.

2.3 SUMMARY OF CONSTRAINTS TO MINERAL EXTRACTION

- 2.3.1 The setting of the site, as described in this section, has the potential to constrain the physical extraction of the underlying mineral resource.
- 2.3.2 Paragraph 2.10 of the West Sussex Minerals and Waste Safeguarding Guidance states: *‘Proposals for prior extraction must not cause unacceptable adverse impacts to the environment or communities and will be considered in the same way as a mineral application, taking into account matters such as flood risk, noise and dust, highways impacts, the historic environment, and biodiversity. Conditions will be included to control prior extraction including those that ensure that the site can be adequately restored to a satisfactory after use should the main development be delayed or not implemented.’*
- 2.3.3 Although quarrying operations are subject to stringent controls in respect of issues such as noise generation and dust management, it would be expected that appropriate buffer zones would be maintained, in the case of full prior mineral extraction, between mineral working and existing sensitive land uses.
- 2.3.4 Paragraph 18 of The Minerals National Planning Practice Guidance (NPPG) states that *‘any proposed separation distance should be established on a site-specific basis...’*
- 2.3.5 As described earlier in this section, the site is underlain by Head Deposits, which could potentially contain economically viable sand and gravel. Tetra Tech have carried out an exercise looking at suitable buffer zone distances that are used for sand and gravel quarries by other Mineral Planning Authorities (MPAs). Hampshire County Council state that a *minimum* 100m buffer is used for sand and gravel quarries, whilst Leicestershire County Council use a 200m buffer zone and Staffordshire County Council use a 250m buffer zone. West Sussex use a 250m buffer zone from underlying mineral resources to define mineral safeguarding consultation areas. This buffer zone is used to *‘protect the resources from inappropriate proximal development’*. It is however acknowledged that Mineral Planning Authorities, in generally more constrained areas, will use smaller buffer zones.
- 2.3.6 This assessment has used a 100m buffer zone from sensitive land uses for indicative purposes and to provide a positive indication of the potential mineral resource that could be recovered. Hampshire County

Council state that buffer zones should be used around sensitive land uses, which for example, would include housing, schools and hospitals.

Figure 1 – Indicative Constraints Plan (annotated extract from MAGIC.GOV.UK)



- 2.3.7 In regard to a full mineral extraction, Figure 1 shows that 100m buffer zones from the surrounding housing would significantly constrain the potential workable area of the site in relation to the future recovery of minerals.

Biodiversity

- 2.3.8 It is proposed that much of the tree and hedgerows around the perimeter of the site would be retained (and protected and enhanced). Root protection zones would be required, which would further reduce the workable area shown in Figure 1. This is indicated in the Site Layout Plan and Tree Constraint Plan in Appendix A and B. The Arboricultural Impact Assessment and Method Statement provides more detail on root protection zones.

Water Environment

- 2.3.9 The site is entirely located with Groundwater Source Protection Zone 1, which could constrain any significant mineral working at the site. In our experience Minerals Planning Authorities (MPAs) show preference to sites that are not within a Source Protection Zones or are within a higher category zone. For example, when conducting sustainability appraisals as part of a minerals local plan site suitability exercise, MPA's will score sites with a fail or a zero if located within a Source Protection Zone 1.

- 2.3.10 The extraction of surface mineral deposits, such as sand and gravel, requires the removal of overlying surface soils and vegetation and the winning of mineral deposits can impact on hydrogeological and hydrological water flows.
- 2.3.11 If required, any extraction below the water table would likely require de-watering activities which could, for example, give rise to hydrological and ecological considerations. Consent would be required from the Environment Agency (EA) to allow for the water collected from the pumping exercise to be discharged into the local watercourses.

Utilities

- 2.3.12 It is likely that the identified utilities would constrain mineral extraction to some degree. An easement would likely be required either side of the water pipes located approximately 10m inside the northern boundary. This would further constrain the workable area shown in Figure 1. It is not known if the electric cabling within the more central area of the site serves the current site and can be removed, would be re-routed or would need to remain in place. Should the cabling need to be retained, an easement would likely be required, and this would also constrain any future mineral workings.

Other Constraints

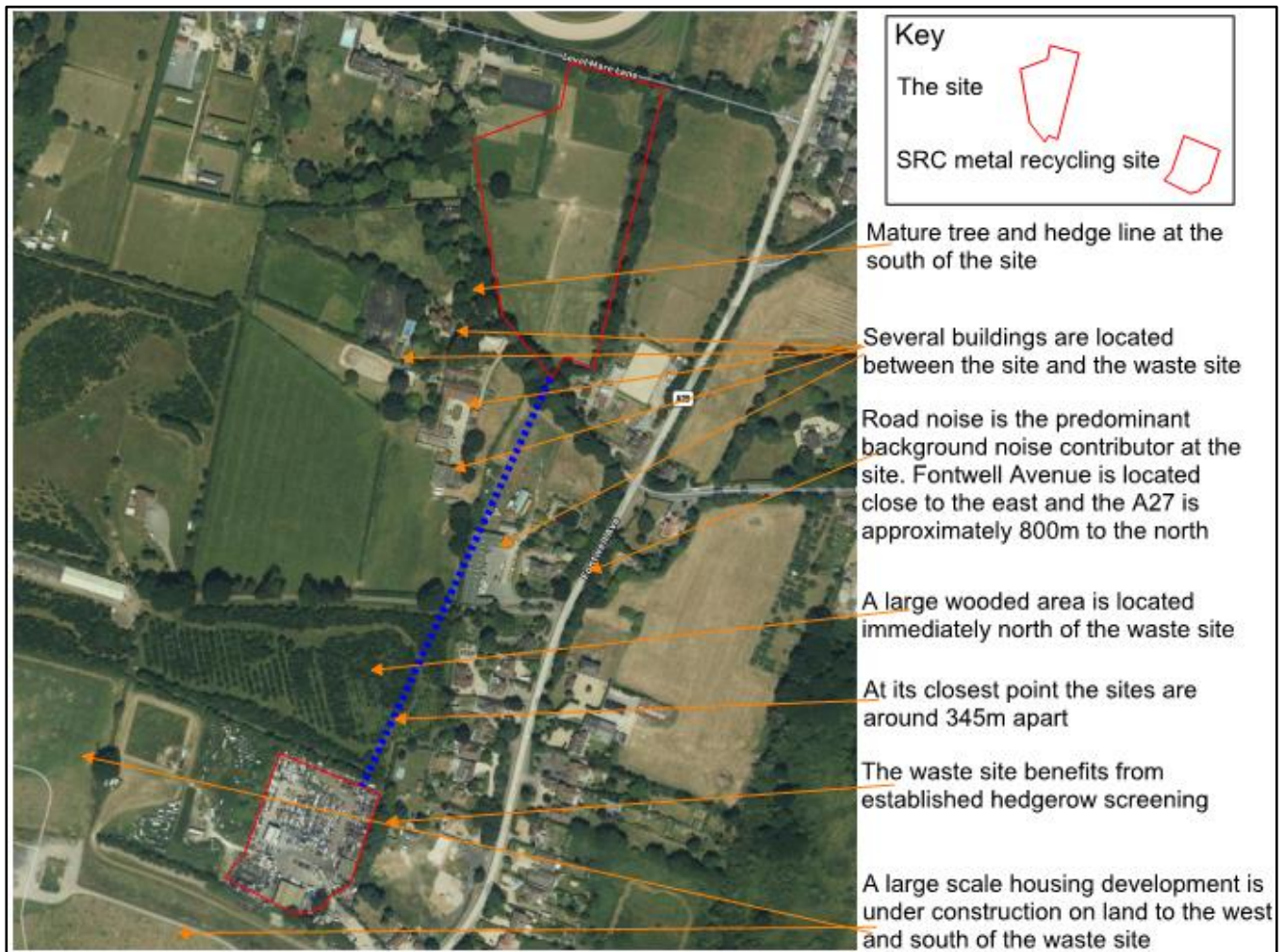
- 2.3.14 The site is around 2 hectares in area before the implementation of any buffer zones. It is considered unlikely that a mineral operator would consider the site viable to be worked as a standalone quarry. After the implementation of buffer zones, which would be required for a full mineral extraction, it is considered very unlikely the site would be economically viable to be worked as a standalone resource.
- 2.3.15 The full working of the site for minerals would likely require subsequent infilling, which would likely be impracticable due to land stability issues, although it may be possible to build at a lower level.

2.4 WASTE INFRASTRUCTURE ASSESSMENT

- 2.4.1 As described in Section 1 the site is partly within 500m of the SRC Recycling Metal Recycling Facility on Fontwell Avenue.
- 2.4.2 It is considered that the proposed development would have no detrimental impact on the SRC metal recycling site. The proposed development site is located 345m to the north of the waste site at its closest point.
- 2.4.3 Paragraph 1.9 of West Sussex Minerals and Waste Safeguarding Guidance is set out below: -

'It is essential for the network of waste management sites to be safeguarded as they could be lost to higher value land uses, or their operations prevented or prejudiced by non-compatible neighbouring development. The approach to safeguarding waste management sites and infrastructure is set out in Policy W2 of the WLP. The existing (active and permitted) waste sites that are safeguarded by Policy W2 are listed in the AMR and will be updated as necessary. The sites are included in the WCA shown in Appendix D and Appendix E with a 250-metre buffer to capture proximal development.'

Figure 2 – Waste Infrastructure Assessment



- 2.4.4 The SRC metal recycling site is 345m to the south of the proposed development site at its closest point. The proximal development buffer distance used for Waste Infrastructure in West Sussex County Council's (the Waste Planning Authority) waste safeguarding document is 250m. This is again reiterated in paragraph 3.3 of the safeguarding guidance.

2.4.5 It is considered that the proposals will therefore have no impact on the day to day operations of the waste facility. Noise from built waste sites is a typical reason for complaint by nearby residents. It is however considered the sites are too distant for there to be any impact. On the site visit to the proposed development site it was evident that only road noise could be heard. This is backed up by a Noise Assessment completed by Hepworth Acoustics, which has been submitted as a separate document as part of the planning application. Figure 3, an extract from the noise assessment, shows that noise was monitored at five locations across the site, including a location (point b) in the southern tip of the site. This location point was in part chosen to monitor if any noise could be heard from the waste site (see paragraph 3.6 of Noise Assessment).

Figure 3 – Noise Monitoring Location (Extract from Noise Assessment)



2.4.6 The noise assessment shows that noise levels were recorded at a higher level in the north of the site than in the south and states *'noise levels incident upon the development land are fairly low. The proposed development land was generally quiet, with the prevailing noise source from distant road traffic noise and the occasional passing vehicle of Level Mare Lane.'* The Noise Assessment does not reference the waste site when discussing sources of background noise at the site.

- 2.4.7 As above this is likely due to the distance between the sites. Furthermore, both the site and the waste facility benefit from established screening on the southern and northern boundaries respectively. There are also several buildings and an area of woodland, which will screen noise between the two sites. There are no direct views available from the site to the waste site. Existing and proposed houses are located significantly closer to the waste site than the development site. This is summarised above in Figure 2.
- 2.4.8 The waste infrastructure site will need to operate in accordance with an Environmental Permit and an Environmental Management System, which will control the environmental impacts of the site. This will include operating in accordance with a noise management plan.
- 2.4.9 In conclusion it is considered that the proposed development would have no bearing on how the waste site operates and would be completely unaffected.

3.0 GROUND INVESTIGATION WORKS

3.1 SUMMARY OF COMPLETED WORKS

3.1.1 The ground investigation works completed at the site comprise twelve boreholes and three trial pits. Thirteen Particle Size Density (PSD) tests have been completed on recovered soil samples and five soakaway tests, confirming groundwater level, were carried out at two of the trial pits.

3.1.2 A Ground Investigation Location Plan is included in Appendix D of this report.

3.2 BOREHOLE LOGS

3.2.1 The twelve boreholes range between 2.8m and 4m in depth and are summarised in Table 1 below. The full borehole logs are provided in Appendix E.

Table 1 – Borehole Log Summary (all figures show the thickness of bands of stratum in metres)

	WS1 (4m)	WS2 (2.8m)	WS3 (3.5m)	WS4 (3.35m)	WS5 (3.8m)	WS6 (4m)
Strata 1	0.6 Topsoil (SILT)	0.45 Topsoil (SILT)	0.65 Topsoil (SILT)	0.4 Topsoil (SILT)	0.45 Topsoil (SILT)	0.5 Topsoil (SILT)
Strata 2	0.4 Gravel	1.15 Clay	0.25 Gravel	2.85 Clay	1.4 Clay	1.2 Clay
Strata 3	1.85 Clay	0.5 Gravel	2.3 Clay	0.1 Gravel	0.1 Gravel / Clay	0.5 Silt
Strata 4	1.15 Gravel	0.5 Clay	0.3 Gravel		0.55 Gravel	1.45 Gravel
Strata 5		0.2 Gravel			1.3 Silt	0.35 Clay
	WS7 (4m)	WS8 (3.8m)	WS9 (3.6m)	WS10 (3.7m)	WS11 (3.3m)	WS12 (3.4m)
Strata 1	0.2 Silt	0.35 Topsoil (SILT/CLAY)	0.4 Topsoil (SILT)	0.3 Topsoil (SILT)	0.25 Silt	0.55 Silt
Strata 2	2.3 Clay	0.45 Clay	1.4 Clay	1.25 Clay	0.75 Clay	0.65 Clay
Strata 3	1.5 Gravel	2.2 Gravel	0.6 Gravel	1 Gravel	1.15 Gravel	0.3 Gravel
Strata 4		0.8 Silt	0.5 Clay	0.3 Clay	0.45 Clay	0.8 Clay
Strata 5			0.7 Silt/ Gravel	0.4 Gravel	0.7 Silt	0.7 Silt
Strata 6				0.45 Silt		0.4 Clay

3.2.2 The borehole logs show the underlying strata to mainly comprise clay with some bands of gravel and silt. The clay is generally described as 'very gravelly' and 'slightly sandy, slightly silty'. The gravels are generally described as 'very silty' or 'very clayey'. The silt is generally described as 'gravelly' with the topsoil silt generally described as 'slightly sandy'.

Particle Size Density Testing

3.2.3 Three PSD tests were completed on recovered gravel samples from the boreholes. The results of the PSD tests are shown in full in Appendix G and summarised in Table 2 below.

Table 2 – Summary of PSD Tests

Borehole	Depth of sample	BH log description	Cobbles	Gravel	Sand	Silt & Clay
WS7	2.6 - 3.1	Gravel	0	81	13	6
WS8	1.6 - 2.1	Gravel	0	80	10	10
WS9	3 - 3.5	Silt / Gravel	0	75	10	15

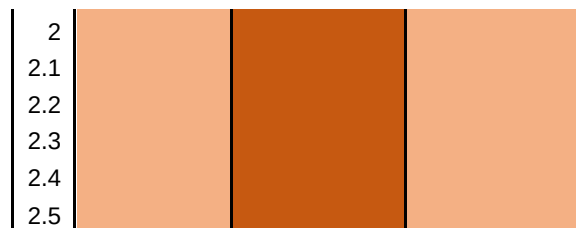
3.2.4 The PSD tests show that the combined sand and gravel within the gravel samples ranged between 85% and 94% with the silt and clays, or fines, ranging between 6% and 15%.

3.3 TRIAL PITS

3.3.1 The three trial pits were each excavated to 2.5m below ground level and the logs are provided in full in Appendix F. A summary of the logs is provided in Table 3 below.

Table 3 – Trial Pit Summary (figures in metres below ground level (MBGL))

	TP1	TP2	TP3
0.1	Slightly sandy slightly gravelly SILT	Slightly sandy slightly gravelly SILT	Slightly sandy slightly gravelly SILT
0.2			
0.3			
0.4			
0.5		Slightly sandy, slightly gravelly silty CLAY	Slightly sandy, clayey GRAVEL
0.6			
0.7			
0.8			
0.9	Clay and Gravel		
1			
1.1			
1.2			
1.3	CHALK HEAD MATERIAL AND GRAVEL	CLAY and GRAVEL	
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			



- 3.3.2 As with the borehole logs, each of the trial pits comprise silt topsoil, with the strata underneath comprising bands of clay and gravel. Some chalk deposits were also encountered with some gravels in trial pit 1.

Soakaway Testing

- 3.3.3 Five soakaway tests were carried out at trials pits one and two. These tests are shown in full in Appendix H. The depths of the first groundwater reading were recorded for the tests and these readings are shown in Table 4 below.

Table 4 – Groundwater Levels Recorded for Soakaway Testing

Trial Pit	Test No.	Depth of first reading
TP1	Test 1	2.02 mbgl
TP1	Test 2	1.94 mbgl
TP1	Test 3	1.94 mbgl
TP2	Test 2	1.72 mbgl
TP2	Test 3	1.69 mbgl

- 3.3.4 The results show a variance in water level at the two locations with the water level around 1.95mbgl at trial pit one and around 1.7mbgl at trial pit two.
- 3.3.5 Water strikes were not recorded in the boreholes or trial pits.

3.4 ANALYSIS

- 3.4.1 The ground investigation and subsequent laboratory works show that whilst the site is mainly underlain by clay, there are some pockets of gravels and some of which, as demonstrated in the PSD testing is of reasonable quality.
- 3.4.2 The gravel is however located between bands of clay and it can be expected that a considerable amount of treatment, through soil washing, would be required to recover any meaningful quantities. It is considered likely that this would make the full extraction of the underlying mineral resource very difficult and in all

likeliness not viable. The mineral is simply not of a quality and quantity that is likely to be of interest to a mineral operator.

- 3.4.3 In three of the ground investigation locations, WS1, WS3 and TP3, gravels were encountered immediately below the topsoil. This gravel was not subject to PSD testing, although the strata descriptions provided in the logs would suggest that this gravel is not of any lower quality. Clay was encountered beneath the silty topsoil in the other twelve locations.
- 3.4.4 The water level was only recorded for the purposes of five soakaway tests at two locations. Even on the assumption that the water level was 2mbgl across the site, the unsaturated strata would largely comprise silt and clay. For example, at the twelve boreholes, a total of 4.6m of gravel, was recorded within 2 metres of the ground level. This is an average of 0.38 metres of unsaturated gravel at each borehole.

4.0 MINERAL SAFEGUARDING AND WASTE INFRASTRUCTURE POLICY

4.0 NATIONAL POLICY

- 4.0.1 The safeguarding of non-renewable resources, such as minerals, is a key aspect of sustainable development. Paragraph 204 of the National Planning Policy Framework (NPPF), which was last updated in June 2019, obliges Mineral Planning Authorities to define MSAs when preparing local plans.
- 4.0.2 MSAs are produced to define known locations of specific mineral resources of local or national importance and to ensure these resources are not needlessly sterilised by non-mineral development, though MSAs carry no presumption that the resource will be worked.
- 4.0.3 Whilst the protection of existing waste sites from other forms of development is not specifically mentioned in National Planning Policy (NPPF, NPPW, Waste Management Plan for England or NPPG for Waste) there are policy references to waste minimisation and providing suitable infrastructure which potentially could be impacted through inappropriate development in proximity of a waste management site.

4.1 WEST SUSSEX JOINT MINERALS LOCAL PLAN

- 4.1.1 The development site is located within West Sussex and the County Council (WSCC) act as the mineral planning authority. The West Sussex Joint Minerals Local Plan (MLP) was adopted in July 2018 and covers the period to 2033. Revisions were made to the MLP in March 2021 following a 'Soft Sand Review'. The MLP includes **Policy M9: 'Safeguarding Minerals'** which states: -

'...sharp sand and gravel, brick-making clay, building stone resources and chalk reserves are safeguarded against sterilisation. Proposals for non-mineral development within the Minerals Safeguarded Areas (as shown on maps in Appendix E) will not be permitted unless:

(i) Mineral sterilisation will not occur; or

(ii) it is appropriate and practicable to extract the mineral prior to the development taking place, having regards to the other policies in this Plan; or

(iii) the overriding need for the development outweighs the safeguarding of the mineral and it has been demonstrated that prior extraction is not practicable or environmentally feasible.'

- 4.1.2 The appropriateness and practicability of a full mineral extraction has been discussed in Section 2.

4.1.3 Page 58 of the MLP set out how Policy M9 will be implemented and monitored. Paragraph 6.9.13 states: *'In order to ensure that consultation takes place between the County and District planning authorities a Mineral Consultation Area (MCA) has been defined. The MCA, which is published separately from the Minerals Local Plan, covers the same area as the MSA but also includes safeguarded minerals infrastructure.'*

4.1.4 Paragraph 6.9.14 of the MLP states: *'Where non-mineral development is proposed, developers may be required to carry out investigation work to ascertain whether economically viable mineral resources are present and whether prior extraction is practicable. The results of this work should be reported in a 'Minerals Resource Assessment... For the Authorities to raise no objection to the non-mineral development, they will need to be satisfied that either minerals sterilisation will not occur (either because the mineral resources are not economically viable or that an appropriate and practicable level of prior extraction can take place) or because there is an overriding need for the development.'*

4.1.5 Further guidance is provided in the West Sussex Minerals and Waste Safeguarding Guidance (March 2020). Page 8 of the guidance document sets out an indicative list of the content that may be included within a minerals resource assessment. The indicative contents are shown below in bullet points and are followed by a comment showing where / if they have been addressed in this assessment:

An explanation of the viability of prior extraction and how it will be carried out (e.g. environmental impacts, timescales, availability of the market to deal with the increase in the mineral);

4.1.6 The site setting has been described in Section 2 of this assessment. The section sets out the constraints that would need to be considered in relation to any full mineral extraction. A discussion on the proposed approach to managing the mineral is presented in Section 5.

An assessment of the geological information about the site including quarrying history, Geological memoirs, mineral assessments and market appraisals;

Site investigations/borehole data (applicants may be required to carry out borehole testing if this information is not already available);

4.1.7 The site investigation data is described in Section 3 of this assessment.

Consideration of other locations for the development that are outside the MSA;

4.1.8 It is not considered that this is necessary for this development. It is considered that the full prior extraction of the underlying resource is not viable and the site is mainly underlain by clay. It is therefore considered that the site is not suitable as a future minerals extraction site.

Assessment of whether the proposal can be modified to avoid sterilisation;

Discussions with potential 'users' of the mineral;

Assessment of the potential for the use of the mineral in the proposed development and whether it is feasible and viable to extract the mineral resource ahead of the development;

- 4.1.9 Due to the findings of Section 2 of the report and the site investigation works, it was not considered necessary to include information relating to these points. A proposed approach to mineral extraction is set out in Section 7 of this assessment.
- 4.1.10 The requirements and guidance within the safeguarding document are similar to that included in the Minerals Products Association and Planning Officers' Society Minerals Safeguarding Practice Guidance (2019) and therefore this document is not referred to in this section to avoid repetition.

4.2 NEED

- 4.2.1 The third policy clause of MLP includes Policy M9 is: -

*(iii) **the overriding need for the development outweighs the safeguarding of the mineral and it has been demonstrated that prior extraction is not practicable or environmentally feasible.*** (Bold text added for emphasis)

- 4.2.2 Arun District Council (ADC) stated in their pre-application response: *'The proposal would likely comply with criteria (iii) of the policy as there is an overriding need for new residential land development to counter the Council's current HLS deficit.'*
- 4.2.3 The preparation of a full minerals planning application, which would be subject to Environmental Impact Assessment (EIA), and for the subsequent mineral extraction and complete restoration would cause a significant delay to the residential application, and dependent on the volume and rate of mineral extraction and subsequent restoration, it could impact upon ADC delivering their required housing numbers during the Local Plan period.
- 4.2.4 The most recent Local Aggregate Assessment (LAA) is a 'dashboard' style report for the year 2020 and was published in May 2021. The dashboard shows the landbank as '9/7.4' years. The landbank reserves are confidential and it is presumed the range is provided because of this. The dashboard states that although there is only one dedicated sharp sand and gravel site, incidental sales are also made from sales from soft sand sites (62% from the last 10 years and 34% from the last 3 years). The dashboard also shows

that sales of soft sand far outweighs recent sales of sharp sand gravel by 3:1 over the past 3 years and over 5:1 from the past 10 years.

- 4.2.5 MLP Policy M1: 'Sharp sand and gravel' shows that proposals for sand and gravel extraction will be permitted provided that the proposal is needed to maintain at least a 7-year landbank.
- 4.2.6 The landbank figures in the LAA differs considerably from that provided in the MLP. Paragraph 6.2.7 of the MLP states *'For land-won sharp sand and gravel, the average 10-year sales value is 10,676 tonnes per annum (for the period 2007-2016) and other relevant local information suggests the average demand may be as high as 13,585 tonnes per annum. As the reserve (in 2017) is 900,000 tonnes this suggests an existing landbank of nearly 65 years.'*
- 4.2.7 Furthermore, paragraph 6.2.7 goes on to state the *'vast majority'* of sharp sand and gravel was supplied from marine dredged aggregate and paragraph 6.2.9 states: *'In light of the level of existing reserves there are sufficient supplies of sharp sand and gravel to last for the Plan period (which is to 2033). The strategy for the provision of land won sharp sand and gravel is therefore to safeguard existing permitted reserves and make provision for additional reserves only if needs cannot be met from other sources in West Sussex including landings of marine won aggregate landed at ports in West Sussex.'*
- 4.2.8 Therefore, there is a demonstrable need for the residential development whereas a planning application for a sharp sand and gravel site would likely struggle to demonstrate need, which is a key consideration of a minerals (or any other) planning application.

4.3 ANALYSIS

- 4.3.1 This section has identified that there is a clear framework of planning policy in respect of minerals safeguarding. This policy is designed to ensure that valuable mineral resources are not unnecessarily sterilised, and that where non-mineral development is permitted that due consideration is given to ensuring that appropriate investigations are undertaken to establish if any viable mineral deposits can be recovered as part of the development process (from full prior extraction to incidental extraction).
- 4.3.2 However, the planning policy also acknowledges the presence of physical and environmental constraints and the limitations they might place on mineral extraction. The policy is also flexible in allowing effective sterilisation where the merits of the development outweigh safeguarding (for example if there is an overriding need for quick delivery of the proposed development that would be compromised by any delay to facilitate mineral extraction in full or in part).

- 4.3.3 WSCC set out clear guidance both for local planning authorities and developers in respect of progressing potential development where issues of minerals safeguarding are present.

5.0 APPROACH TO RESOURCE MANAGEMENT

- 5.0.1 It is considered that a full mineral extraction at the site is not viable. West Sussex County Council's Minerals Safeguarding Guidance document shows that a Minerals Resource Assessment should assess a site as if it was a minerals application. As described in Section 2, the site is not of a size that would be expected to be of commercial interest to a mineral operator, especially once buffer zones and easements have been applied. The site is also within Groundwater Source Protection Zone 1 and the ground investigation works at the site show although there are some pockets of higher quality gravels the site is mainly underlain by clay. The gravels are also generally within thin bands either side of bands of clay.
- 5.0.2 In our professional opinion as Minerals and Waste Planning Consultants we do not consider the site would gain planning permission to be worked as a standalone minerals resource.
- 5.0.3 There is also a demonstrable need for the housing development whereas WSCC states in their MLP '*In light of the level of existing reserves there are sufficient supplies of sharp sand and gravel to last for the Plan period (which is to 2033). The strategy for the provision of land won sharp sand and gravel is therefore to safeguard existing permitted reserves and make provision for additional reserves only if needs cannot be met from other sources in West Sussex including landings of marine won aggregate landed at ports in West Sussex.*'
- 5.0.4 Any deep working of mineral reserves at the site would make the proposed residential development impracticable.
- 5.0.5 It is therefore considered that the policy tests ii and iii have been met and the mineral safeguarding provision should be uplifted. Nevertheless, there remains an opportunity to part extract some of the resource and any resource that is incidentally encountered should be managed in the most sustainable way possible. As described in Section 3 of this report gravel was encountered immediately beneath the topsoil in three of the ground investigation locations, and whilst PSD testing was not completed on these higher lying gravels, the descriptions in the borehole logs are similar to those included in the strata descriptions of the samples that were tested. If these gravels are of similar quality, it is possible they would be of use on site as construction aggregate material.
- 5.0.6 Given the risk of quarrying below the water table for what would be for a small yield of mineral, especially given the site is in a Groundwater Source Protection Zone, it is considered that gravels should only be recovered from above groundwater level.

- 5.0.7 The winning of surface mineral deposit such as gravel can impact on hydrogeological and hydrological water flows. Any extraction below the water table would likely require de-watering activities which could, for example, give rise to hydrological and ecological considerations. Consent would be required from the EA to allow for the water collected from the pumping exercise to be discharged into the local watercourses. This would clearly not be practicable for the limited amount of gravel that could likely be recovered from the site.
- 5.0.8 An incidental extraction for this site would comprise the excavation of any pockets of gravel resource that are encountered through the preparatory earthworks required for the construction of the development. Excavation would also be required for all roads and drainage systems. An incidental extraction approach would not unduly delay the construction of the development as it is understood that this material would have to be extracted in any event (whether it be clay (which would typically be exported as muck-away) or gravel which could be put to a beneficial use on site. It is considered unlikely there would be any surplus gravel encountered and excavated that would require to be taken off site.

6.0 CONCLUSIONS AND RECOMMENDATIONS

- 6.0.1 Tetra Tech has been instructed by Reside Developments to prepare a Minerals Resource and Waste Infrastructure Assessment to support a planning application for the residential development of up to 69 residential dwellings at Land at Bayards, Level Mare Lane, Eastergate in West Sussex.
- 6.0.2 A Minerals Resource Assessment is required because the site is located within a Minerals Safeguarding Area (MSA) for sharp sand and gravel. Section 2 of this report has explained that the site, which is around 2ha, is highly unlikely to be considered (by a minerals operator) commercially viable to be worked as a standalone mineral resource. This is based on our considerable experience of minerals planning work. The workable area of the site would be reduced by buffer zones required on account on the houses on the site's perimeter, easements around underlying utilities and for root protection zones from the retained trees, which border the site. Section 2 also explained that the site is located within Groundwater Source Protection Zone 1. In our experience Mineral Planning Authorities will look to avoid quarrying in these locations where possible. It is therefore considered that the full prior extraction of the resource is not viable.
- 6.0.3 Ground investigation works have been completed and a summary of the results was set out in Section 3. The investigation works have shown that there are some pockets of higher quality gravels, although most of the underlying strata comprises clay. The gravel is located between bands of clay and it can be expected that a considerable amount of treatment, through soil washing, would be required to recover any meaningful quantities. It is considered likely that this would make the full extraction of the underlying mineral resource unviable. The mineral is simply not of a quality and quantity that is likely to be of interest to a mineral operator.
- 6.0.4 A thorough review of minerals safeguarding planning policy was completed in Section 4. As well as a requirement to demonstrate practicability and appropriateness of a minerals development, which was provided in Section 2, West Sussex County Council's minerals safeguarding policy also includes a clause to assess need. Arun District Council (ADC) stated in their pre-application response: *'The proposal would likely comply with criteria (iii) of the policy as there is an overriding need for new residential land development to counter the Council's current HLS deficit.'*
- 6.0.5 Section 4 of this report showed that the current sand and gravel landbank is in excess of the 7 year requirement and included the following extract from the county's MLP: *'In light of the level of existing reserves there are sufficient supplies of sharp sand and gravel to last for the Plan period (which is to 2033). The strategy for the provision of land won sharp sand and gravel is therefore to safeguard existing permitted reserves and make provision for additional reserves only if needs cannot be met from other sources in West Sussex including landings of marine won aggregate landed at ports in West Sussex.'* It was therefore

considered, as well not being appropriate, practicable or environmentally acceptable, that a full mineral planning application for the site would also struggle to demonstrate need.

- 6.0.6 Based on the information detailed in Section 2, 3 and 4, Section 5 provided a summary of the most suitable method to manage the underlying resource. This would be through an incidental approach to mineral extraction, which would recover any gravels encountered during the construction works. An incidental approach would not sterilise the whole resource and would also not delay the residential development, for which there is an overriding need.
- 6.0.7 Following a review of the site setting in Section 2, a Waste Infrastructure Assessment was completed. The SRC metal recycling site is 345m to the south of the proposed development site at its closest point. The proximal development buffer distance used for Waste Infrastructure in West Sussex County Council's (the Waste Planning Authority) waste safeguarding document is 250m.
- 6.0.8 Furthermore, both the site and the waste facility benefit from established screening on the southern and northern boundaries respectively. Noise survey work has been undertaken and no noise from the waste facility was recorded. There are several buildings and an area of woodland, which will screen noise between the two sites. There are no direct views available from the site to the waste site. Existing and proposed houses are located significantly closer to the waste site than the development site.
- 6.0.9 The waste infrastructure site will need to operate in accordance with an Environmental Permit and an Environmental Management System, which will control the environmental impacts of the site. This will include operating in accordance with a noise management plan.
- 6.0.10 In conclusion it is considered that the proposed development would have no bearing on how the waste site operates and would be completely unaffected.

APPENDICES

APPENDIX A – PROPOSED SITE LAYOUT PLAN

APPENDIX B – TREE CONSTRAINTS PLAN



Legend

- Site Survey Boundary.**
- Tree and Shrub Numbers.**
- Tree Root Protection Areas**
Tree Root Protection Areas calculated and specified in accordance with BS 5837:2012 - 'Trees in Relation to Design, Demolition and Construction - Recommendations'.
- Category A Trees**
Trees of High Quality and Value.
- Category B Trees**
Trees of Moderate Quality and Value.
- Category C Trees**
Trees of Low Quality and Value.
- Category U Trees**
Trees unsuitable for retention.
- Category B Treelines**
Treelines of Moderate Quality and Value.
- Category C Hedges**
Hedges of Low Quality and Value.

PLANNING ISSUE

Rev	Description	Date	Initials
01	Planning Issue	20.07.21	GS
00	Draft Issue	15.06.21	GS

LIZARD
Landscape Design and Ecology

The Old Bank, 34 South Street, Tarring, Worthing, West Sussex, BN14 7LH
T. 01903 216033 E. lizardlandscape@btconnect.com W. lizardlandscapeology.com

Client
Reside Developments Ltd

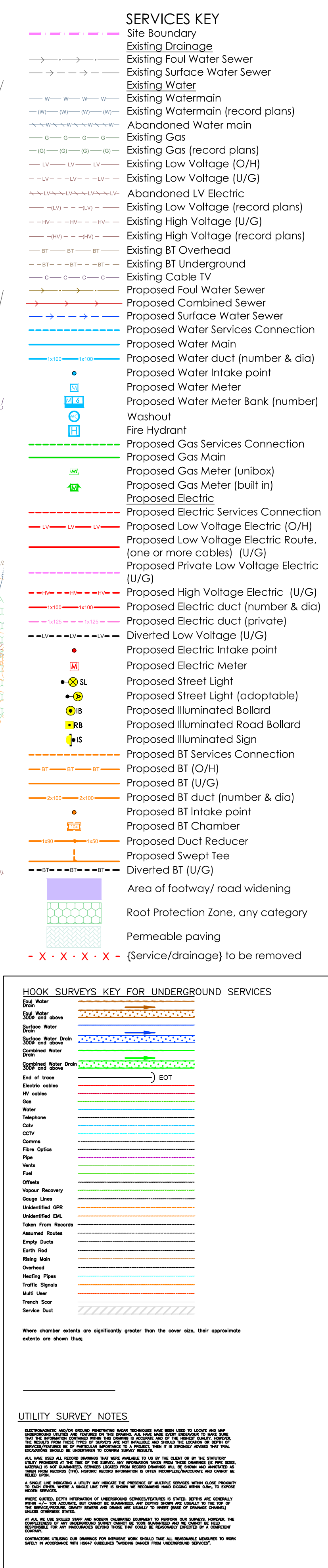
Project Title and Location
Land at Bayards
Level Mare Lane, Eastergate

Drawing Title
Tree Constraints Plan

Scale	Drawn	Approved	Date
1:500@A1	MG	GS	15.06.21

Drawing No	Revision
LLD2327-ARB-DWG-001	01

APPENDIX C – UTILITY SURVEY



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APPENDIX D – GROUND INVESTIGATION LOCATION PLAN

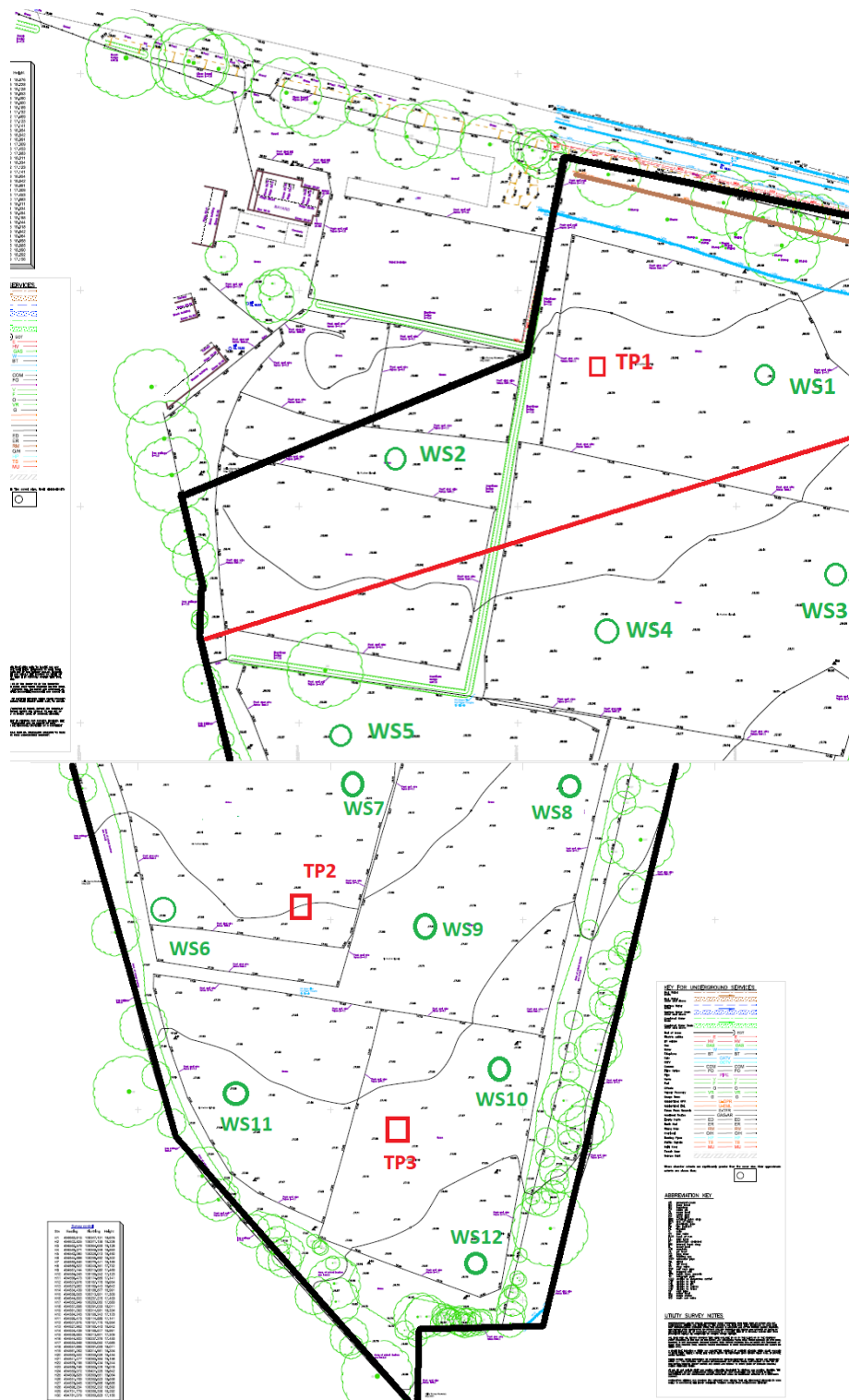


Figure 2 – Trial Hole Location Plan

Job Number
19469

Project

Land at Bayards, Level Mare Lane, Eastergate,
Fontwell - Chichester, West Sussex PO20 3RX

Client
Miller Homes

Date
July 2021

APPENDIX E – BOREHOLE LOGS

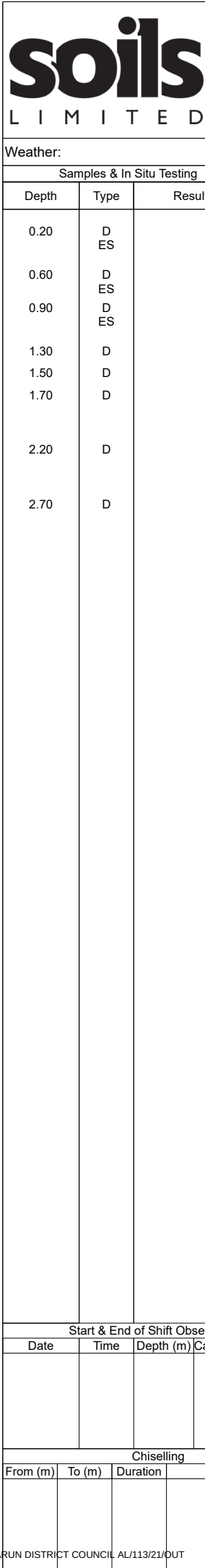


Contract Name: Land at Bayards, Level Mare Lane, Eastergate, Fontwell - Chichester, West Sussex PO20 3RX		Client: Miller Homes			Hole ID: WS1
Contract Number: 19469	Start and End Date: 24/06/21	Logged By: DW	Checked By: RB	Status: DRAFT	Hole Type: WS
Easting:	Northing:	Ground Level:	Plant Used: Premier 1	Print Date: 07/07/2021	Scale: 1:50

Weather:	Termination:	Sheet 1 of 1
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Samples & In Situ Testing				Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		Water Strike	Backfill/ Installation
0.10	D			(0.60)		Stiff brown slightly gravelly, slightly sandy SILT. Sand is fine. Gravel is angular to sub-angular, fine to coarse flint. Frequent rootlets. TOPSOIL.			
0.50	D			0.60		Brown slightly sandy, very silty GRAVEL. Gravel is angular to sub-angular, fine to coarse flint. Occasional rootlets.			
0.70	D			(0.40)					
1.10	D			1.00		Stiff brown slightly sandy very clayey gravel/very gravelly CLAY. Gravel is angular to sub-angular, fine to coarse flint. Rare rootlets. <i>Light brown mottling with coarse sand sized chalk at 1.4m bgl.</i>		1	
1.60	D			(1.85)		Light brown, slightly sandy, very silty GRAVEL. Gravel is angular to sub-angular, fine to coarse flint. Occasional coarse sand sized chalk.		2	
2.10	D								
2.60	D			2.85				3	
2.90	D			(1.15)		End of Borehole at 3.50m			
3.50	D								
3.90	D			4.00				4	
								5	
								6	
								7	
								8	
								9	
								10	

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Rootlets observed to 1.6m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
					0.00	1.00	PLAIN	24				0	0.00	No groundwater encountered.
					1.00	3.50	SLOTTED	24						
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

				Contract Name: Land at Bayards, Level Mare Lane, Eastergate, Fontwell - Chichester, West Sussex PO20 3RX				Client: Miller Homes				Hole ID: WS2			
				Contract Number: 19469		Start and End Date: 24/06/21		Logged By: DW		Checked By: RB		Status: DRAFT		Hole Type: WS	
				Easting:		Northing:		Ground Level:		Plant Used: Premier 1		Print Date: 07/07/2021		Scale: 1:50	
Weather:				Termination:								Sheet 1 of 1			
Samples & In Situ Testing				Strata Details										Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description						Water Strike	Backfill/Installation		
0.20	D ES			(0.45)		Stiff brown slightly gravelly, slightly sandy SILT. Sand is fine. Gravel is angular to sub-angular, fine to coarse flint. Frequent rootlets. TOPSOIL.									
0.60	D ES			0.45		Stiff brown mottled dark brown, slightly sandy, silty CLAY. Sand is predominantly fine. Frequent rootlets. Rare angular to sub-angular, fine to coarse flint gravel.									
0.90	D ES			(1.00)		Slightly gravelly.						1			
1.30	D			1.45		Soft to firm, black speckled, greyish brown, slightly sandy, very gravelly CLAY. Gravel is angular to sub-angular, fine to coarse flint.									
1.50	D			1.60		Light brown, slightly sandy, very silty GRAVEL. Gravel is angular to sub-angular, fine to coarse flint. Occasional coarse sand sized chalk.						2			
1.70	D			(0.50)		Firm to stiff brown and light brown mottled, yellowish brown, slightly sandy, gravelly CLAY. Gravel is angular to sub-angular, fine to coarse flint.									
2.20	D			2.10		Light brown, slightly sandy, very silty GRAVEL. Gravel is angular to sub-angular, fine to coarse flint. Occasional coarse sand sized chalk.						3			
2.70	D			2.60		End of Borehole at 2.80m						4			
				2.80								5			
												6			
												7			
												8			
												9			
												10			
Start & End of Shift Observations				Borehole Diameter		Casing Diameter		Remarks:							
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Rootlets observed to 1.45m bgl.						
Chiselling				Installation				Water Strikes							
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	
												0	0.00	No groundwater encountered.	
									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.						



Contract Name: Land at Bayards, Level Mare Lane, Eastergate, Fontwell - Chichester, West Sussex PO20 3RX			Client: Miller Homes			Hole ID: WS3
Contract Number: 19469	Start and End Date: 24/06/21	Logged By: DW	Checked By: RB	Status: DRAFT	Hole Type: WS	
Easting:	Northing:	Ground Level:	Plant Used: Premier 1	Print Date: 07/07/2021	Scale: 1:50	

Weather:			Termination:				Sheet 1 of 1			
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Samples & In Situ Testing			Strata Details						Groundwater		
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description				Water Strike	Backfill/ Installation
0.30	D ES			(0.65)		Stiff yellowish brown slightly sandy SILT. Sand is fine. Frequent rootlets. Occasional angular to sub-angular, fine to coarse flint gravel. TOPSOIL.					
0.70	D ES			0.65		Yellowish brown to brown with depth, slightly sandy, silty/clayey GRAVEL. Gravel is angular to sub-angular, fine to coarse flint. Occasional rootlets. <i>Becomes clayey towards base of stratum.</i>					
1.00	D ES			0.90							
1.50	D					Firm black speckled, brown, slightly sandy very clayey gravel/very gravelly CLAY. Gravel is angular to sub-angular, fine to coarse flint. Occasional angular flint cobbles. Occasional rootlets and decomposing roots.				1	
1.90	D										
2.50	D										
2.90	D										
3.30	D			3.20 (0.30)		Light brown, slightly sandy, very silty GRAVEL. Gravel is angular to sub-angular, fine to coarse flint. Occasional coarse sand sized chalk.				3	
				3.50		End of Borehole at 3.50m					
										4	

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
									Rootlets observed to 1.7m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	No groundwater encountered.
RUN DISTRICT COUNCIL AL/113/21/OUT									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					



Contract Name: Land at Bayards, Level Mare Lane, Eastergate, Fontwell - Chichester, West Sussex PO20 3RX			Client: Miller Homes			Hole ID: WS4
Contract Number: 19469	Start and End Date: 24/06/21	Logged By: DW	Checked By: RB	Status: DRAFT	Hole Type: WS	
Easting:	Northing:	Ground Level:	Plant Used: Premier 1	Print Date: 07/07/2021	Scale: 1:50	

Weather:			Termination:				Sheet 1 of 1			
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Samples & In Situ Testing				Strata Details					Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/ Installation
0.20	D			(0.40)		Stiff yellowish brown slightly sandy SILT. Sand is fine. Frequent rootlets. Occasional angular to sub-angular, fine to coarse flint gravel. TOPSOIL.				
0.50	D			(0.50)		Stiff brown mottled dark brown, slightly sandy, silty CLAY. Sand is predominantly fine. Occasional rootlets.				
1.00	D			(0.90)		Stiff to firm brown mottled dark brown, slightly sandy, slightly gravelly silty CLAY. Gravel is angular to sub-angular, fine to coarse flint. Sand is predominantly fine. Occasional rootlets.			1	
1.50	D			(1.40)		Soft to firm light brown and dark brown mottled, brown, slightly sandy, slightly gravelly silty CLAY. Gravel is angular to sub-angular, fine to coarse flint and rare chalk. Frequent coarse sand sized chalk within light brown mottling.				
1.90	D			(2.00)		Firm to stiff, yellowish brown mottled light brown, slightly sandy, gravelly silty CLAY. Gravel is angular to rounded, fine to coarse flint. Occasional angular flint cobbles.			2	
2.10	D			(0.40)						
2.50	D			(2.40)		Firm black speckled, yellowish brown to brown with depth, slightly sandy very clayey gravel/very gravelly CLAY. Gravel is angular to sub-rounded, fine to coarse flint. Occasional angular broken flint cobbles.			3	
2.90	D			(0.85)		Light brown, slightly sandy, very silty GRAVEL. Gravel is angular to sub-angular, fine to coarse flint. Occasional coarse sand sized chalk.				
3.30	D			(3.25 3.35)						
						End of Borehole at 3.35m			4	
									5	
									6	
									7	
									8	
									9	
									10	

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Rootlets observed to 1.4m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	No groundwater encountered.
RUN DISTRICT COUNCIL AL/113/21/OUT									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					



Contract Name: Land at Bayards, Level Mare Lane, Eastergate, Fontwell - Chichester, West Sussex PO20 3RX			Client: Miller Homes			Hole ID: WS5
Contract Number: 19469	Start and End Date: 24/06/21	Logged By: DW	Checked By: RB	Status: DRAFT	Hole Type: WS	
Easting:	Northing:	Ground Level:	Plant Used: Premier 1	Print Date: 07/07/2021	Scale: 1:50	

Weather:			Termination:				Sheet 1 of 1			
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Samples & In Situ Testing				Strata Details					Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/ Installation
0.20	D			(0.45)		Stiff yellowish brown slightly sandy SILT. Sand is fine. Frequent rootlets. Occasional angular to sub-angular, fine to coarse flint gravel. Angular fine gravel sized pottery fragment at 0.25m bgl. TOPSOIL.				
0.50	D			0.45		Stiff to firm, brown, slightly sandy, silty CLAY. Sand is predominantly fine. Occasional rootlets. Rare angular to sub-rounded, fine to coarse flint gravel, becoming occasional towards base of stratum.				
0.90	D			(1.40)		No sample in liner from 1.0 - 1.4m bgl.			1	
1.50	D									
1.90	D			1.85		Greyish brown, slightly sandy, very clayey GRAVEL/ very gravelly CLAY. Gravel is angular to sub-angular, fine to coarse flint.			2	
2.10	D			1.95		Light brown, slightly sandy, very silty GRAVEL. Gravel is angular to sub-angular, fine to coarse flint. Frequent coarse sand sized chalk.				
2.60	D			(0.55)		Firm to stiff, light brown, slightly sandy, gravelly SILT. Gravel is angular to sub-angular, fine to coarse flint. Frequent coarse sand sized chalk.				
3.10	D			2.50					3	
3.60	D			(1.30)		End of Borehole at 3.80m			4	
				3.80					5	
									6	
									7	
									8	
									9	
									10	

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Rootlets observed to 1.5m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
					0.00	1.00	PLAIN	24				0	0.00	No groundwater encountered.
					1.00	3.50	SLOTTED	24						
RUN DISTRICT COUNCIL AL/113/21/OUT									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					



Contract Name: Land at Bayards, Level Mare Lane, Eastergate, Fontwell - Chichester, West Sussex PO20 3RX			Client: Miller Homes			Hole ID: WS6
Contract Number: 19469	Start and End Date: 24/06/21	Logged By: DW	Checked By: RB	Status: DRAFT	Hole Type: WS	
Easting:	Northing:	Ground Level:	Plant Used: Premier 1	Print Date: 07/07/2021	Scale: 1:50	

Weather:				Termination:				Sheet 1 of 1			
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Samples & In Situ Testing				Strata Details						Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description				Water Strike	Backfill/ Installation
0.20	D ES			(0.50)		Firm to stiff brown slightly sandy SILT. Sand is fine. Frequent rootlets. Occasional angular to sub-angular, fine to coarse flint gravel. TOPSOIL.					
0.60	D ES			0.50		Firm to stiff brown slightly sandy, silty CLAY. Sand is fine. Occasional angular to sub-angular, fine to coarse flint gravel. Occasional rootlets.					
0.80	D ES			0.70		Firm brown slightly sandy, gravelly CLAY. Gravel is angular to sub-rounded, fine to coarse flint. Occasional rootlets.				1	
1.30	D			(1.00)							
1.80	D			1.70		Firm slightly brown mottled, light brown, slightly sandy, gravelly SILT. Gravel is angular to sub-angular, fine to coarse flint. Frequent coarse sand sized chalk.				2	
2.30	D			(0.50)							
2.80	D			2.20		Brown slightly sandy, very clayey GRAVEL. Gravel is angular to sub-rounded, fine to coarse flint.					
3.30	D			(1.45)						3	
3.80	D			3.65		Firm brown slightly sandy, gravelly CLAY. Gravel is angular to sub-rounded, fine to coarse flint and rare ironstone.					
				(0.35)						4	
				4.00		End of Borehole at 4.00m					
										5	
										6	
										7	
										8	
										9	
										10	

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Rootlets observed to 1.7m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	No groundwater encountered.
RUN DISTRICT COUNCIL AL/113/21/OUT									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					

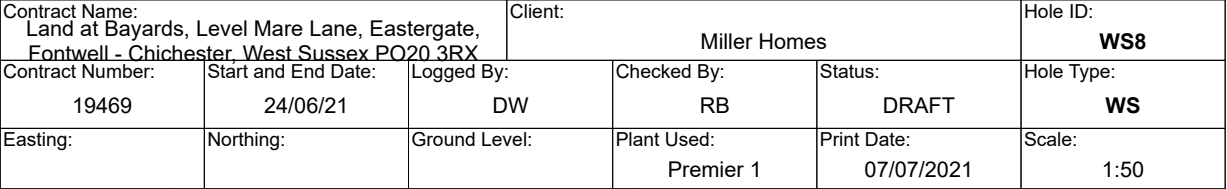


Contract Name: Land at Bayards, Level Mare Lane, Eastergate, Fontwell - Chichester, West Sussex PO20 3RX			Client: Miller Homes			Hole ID: WS7
Contract Number: 19469	Start and End Date: 24/06/21	Logged By: DW	Checked By: RB	Status: DRAFT	Hole Type: WS	
Easting:	Northing:	Ground Level:	Plant Used: Premier 1	Print Date: 07/07/2021	Scale: 1:50	

Weather:	Termination:	Sheet 1 of 1
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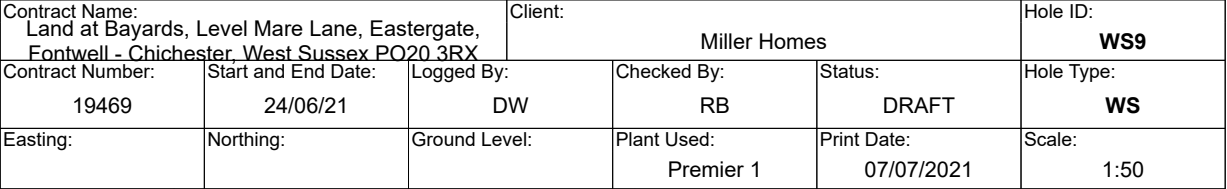
Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.10	D			0.20		Firm to stiff yellowish brown slightly sandy desiccated SILT. Sand is fine. Frequent rootlets. Rare angular to sub-angular, fine to medium flint and brick gravel (<5%). TOPSOIL.		
0.40	D					Firm to stiff brown mottled greyish brown, slightly sandy, silty CLAY. Occasional rootlets. Rare angular to sub-angular, fine to coarse flint gravel.		
					No sample in liner from 1.0 - 1.55m bgl.			
0.90	D			(1.45)		Firm brown slightly sandy, gravelly to very gravelly CLAY. Gravel is angular to sub-rounded, fine to coarse flint. Occasional angular broken flint cobbles. Occasional rootlets.	1	
1.60	D			1.65				
1.80	D			(0.85)		Brown to yellowish brown with depth, slightly sandy, very clayey angular fine to coarse flint GRAVEL.	2	
2.30	D			2.50				
2.60	D					Light brown mottled brown, slightly sandy, very silty angular to sub-angular, fine to coarse flint GRAVEL. Frequent coarse sand sized chalk.	3	
3.10	D			(1.10)				
					Frequent coarse sand sized chalk towards base of stratum grading into stratum below.			
3.70	D			3.60				
				(0.40)				
				4.00		End of Borehole at 4.00m	4	
							5	
							6	
							7	
							8	
							9	
							10	

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	No groundwater encountered.
RUN DISTRICT COUNCIL AL/113/21/OUT									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					



Weather:	Termination:	Sheet 1 of 1
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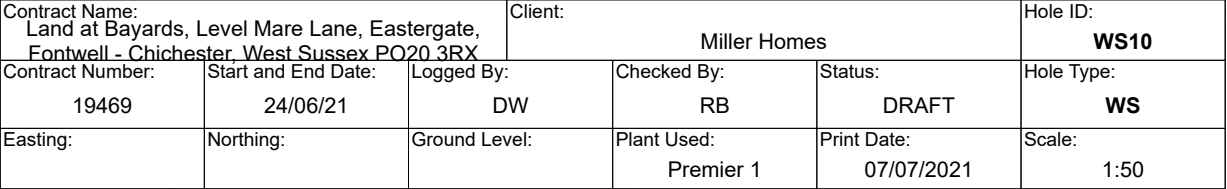
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
					0.00	1.00	PLAIN	24				0	0.00	No groundwater encountered.
					1.00	2.50	SLOTTED	24						
RUN DISTRICT COUNCIL AL/113/21/OUT					Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.									



Weather:	Termination:	Sheet 1 of 1
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Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	No groundwater encountered.
RUN DISTRICT COUNCIL AL/113/21/OUT									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.



Weather:	Termination:		Sheet 1 of 1
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[illegible]

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks: Roots observed to 2.3m bgl.					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
Chiselling					Installation									
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Water Strikes					
									Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	No groundwater encountered.
RUN DISTRICT COUNCIL AL/113/21/OUT										Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.				

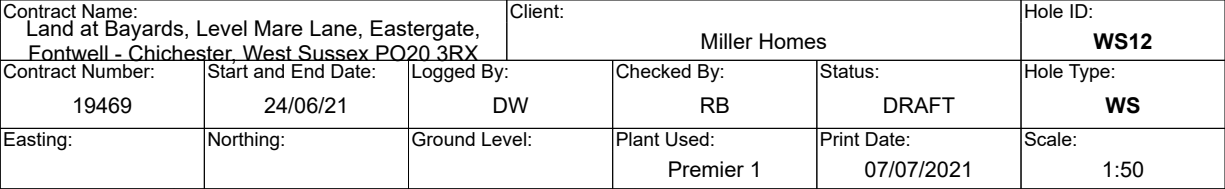


Contract Name: Land at Bayards, Level Mare Lane, Eastergate, Fontwell - Chichester, West Sussex PO20 3RX		Client: Miller Homes			Hole ID: WS11
Contract Number: 19469	Start and End Date: 24/06/21	Logged By: DW	Checked By: RB	Status: DRAFT	Hole Type: WS
Easting:	Northing:	Ground Level:	Plant Used: Premier 1	Print Date: 07/07/2021	Scale: 1:50

Weather:	Termination:	Sheet 1 of 1
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Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/Installation
0.10	D					Firm greyish brown, slightly sandy, slightly gravelly SILT. Gravel is angular to sub-angular, fine to coarse flint. Frequent rootlets.		
0.30	ES			0.25		Firm to stiff, yellowish brown mottled greyish brown, slightly sandy, silty CLAY. Frequent rootlets. Occasional angular medium to coarse flint gravel.		
0.60	D			0.50		Firm brown, slightly sandy, gravelly to very gravelly CLAY. Gravel is angular to sub-rounded, fine to coarse flint. Occasional rootlets and desiccated woody roots.		
	ES			(0.50)				
1.10	D			1.00		Light brown slightly sandy, very silty angular to sub-angular, fine to coarse flint GRAVEL. Frequent coarse sand sized chalk. Occasional roots.	1	
1.40	D			(0.30)				
				1.30		Greyish brown to brown with depth, sandy very clayey angular to sub-angular, fine to coarse flint GRAVEL. Frequent clay pockets. Occasional rootlets and desiccated roots.		
1.90	D			(0.85)			2	
2.20	D			2.15		Stiff brown, slightly sandy, gravelly CLAY. Gravel is angular to sub-angular, fine to coarse flint. <i>Faint hydrocarbon odour near top of stratum.</i>		
	ES			(0.45)				
2.70	D			2.60		Stiff light brown, mottled yellowish brown, slightly sandy, gravelly SILT. Gravel is angular to sub-angular, fine to coarse flint. Frequent coarse sand sized chalk.	3	
				(0.70)				
3.20	D			3.30		End of Borehole at 3.30m	4	
							5	
							6	
							7	
							8	
							9	
							10	

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks: Roots observed to 2.0m bgl.					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	No groundwater encountered.
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

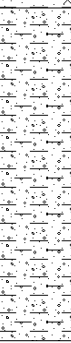


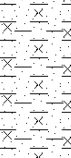
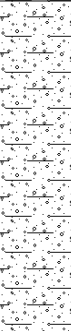
Weather:	Termination:		Sheet 1 of 1
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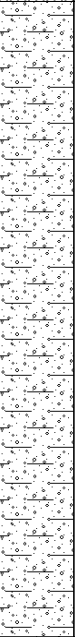
Samples & In Situ Testing			Strata Details					Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		Water Strike	Backfill/ Installation
0.10	D			0.20		Soft to firm greyish brown, slightly sandy, slightly gravelly desiccated SILT. Gravel is angular to sub-angular, fine to coarse flint. Frequent rootlets.	1		
0.40	D			(0.35)		Soft to firm, yellowish brown mottled greyish brown, slightly sandy, gravelly, desiccated SILT. Gravel is angular, fine to coarse flint. Frequent rootlets and roots.			
0.60	D			0.55		Firm to stiff brown, slightly sandy, gravelly to very gravelly CLAY. Gravel is angular to sub-rounded, fine to coarse flint. Occasional rootlets and desiccated roots.			
0.90	ES			(0.65)		Very gravelly and desiccated to 0.8m bgl.			
1.30	D			1.20		Slightly black mottled, dark brown, sandy, very clayey angular to sub-angular, fine to coarse flint GRAVEL. Black mottling is odourless.			
1.60	D			(0.30)	1.50				Firm to stiff, black speckled, brown to yellowish brown with depth, slightly sandy, gravelly CLAY. Gravel is angular to sub-angular, fine to coarse flint. Occasional desiccated roots.
2.20	D			(0.80)	2.30				Stiff light brown, mottled yellowish brown, slightly sandy, slightly gravelly SILT. Gravel is angular to sub-angular, fine to coarse flint. Frequent coarse sand sized chalk. Occasional clay pockets.
2.40	D			(0.70)	3.00				Firm to stiff, yellowish brown mottled light brown and black speckled, slightly sandy, gravelly CLAY. Gravel is angular to rounded, fine to coarse flint. Occasional coarse sand sized chalk. Rare desiccated woody roots.
2.90	D			(0.40)	3.40				Band of light brown slightly sandy gravelly SILT from 3.35m bgl.
3.10	D								End of Borehole at 3.40m
							4		
							5		
							6		
							7		
							8		
							9		
							10		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Roots observed to 3.3m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
					0.00 1.00	1.00 3.20	PLAIN SLOTTED	24 24				0	0.00	No groundwater encountered.
RUN DISTRICT COUNCIL AL/113/21/OUT									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					

APPENDIX F – TRIAL PIT LOGS

		Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk			Trial Pit Log		Trial Pit No. TP1 Sheet 1 of 1			
Project Name: Land at Bayards, Level Mare Lane, Eastergate, Fontwell - Chichester, West Sussex PO20 3RX		Project No.: 19469		Method: Machine Excavated		Hole Type TP				
Location: Land at Bayards, Level Mare Lane, Eastergate, Fontwell - Chichester, West Sussex PO20 3RX				Plant: JCB 3CX		Scale 1:25				
Client: Miller Homes		Trial Pit Length: 2.30m		Trial Pit Width: 0.60m		Logged By JC				
Dates: 24/06/2021		Level:		Co-ords:						
Water Strike	Samples & In Situ Testing			Depth (m)	Level (mAOD)	Legend	Stratum Description			
	Depth	Type	Results							
	0.20	ES+D		0.40			grass over Brown slightly sandy slightly gravelly SILT. Gravel is fine to coarse angular to well rounded flint. Sand is fine to medium. frequent roots and rootlets.			
	0.50	ES+D					0.90		Light brown slightly sandy, slightly gravelly SILT. Gravel is fine to coarse sub-angular to well-rounded flint. Sand is fine to medium, occasional roots and rootlets, occasional medium brown clay lumps	
	1.00	ES+D							1.40	
	1.50	D		2.50		Off white suspected CHALK HEAD MATERIAL AND GRAVEL. Chalk head material is coarse sand grain size. Gravel is fine to cobble angular to well-rounded flint.				
	2.00	D				End of Pit at 2.500m				
	2.50	D								
General Remarks: Roots observed to 0.9m bgl.							Sample Type D: Disturbed B: Bulk J: Jar W: Water			
Groundwater Remarks: No groundwater encountered.										

 Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk				Trial Pit Log		Trial Pit No. TP2 Sheet 1 of 1			
Project Name: Eastergate, Fontwell - Chichester, West Sussex PO20 3RX		Project No.: 19469		Method: Machine Excavated		Hole Type TP			
Location: Land at Bayards, Level Mare Lane, Eastergate, Fontwell - Chichester, West Sussex PO20 3RX				Plant: JCB 3CX		Scale 1:25			
Client: Miller Homes				Trial Pit Length: 2.80m		Trial Pit Width: 0.60m			
Dates: 24/06/2021		Level:		Co-ords:		Logged By JC			
Water Strike	Samples & In Situ Testing			Depth (m)	Level (mAOD)	Legend	Stratum Description		
	Depth	Type	Results						
	0.20	ES+D		0.30			grass over Brown slightly sandy slightly gravelly SILT. Gravel is fine to coarse angular to well rounded flint. Sand is fine to medium. frequent roots and rootlets.		
	0.50	ES+D					0.90		Light brown slightly sandy, slightly gravelly silty CLAY. Gravel is fine to coarse sub-angular to well rounded flint. Sand is fine to medium, occasional roots and rootlets.
	1.00	ES+D							1.40
	1.50	D		2.50		Off white head material, CLAY AND GRAVEL. Chalk head material is coarse sand grain size. Gravel is fine to cobble angular to well-rounded flint.			
	2.00	D				End of Pit at 2.500m			
	2.50	D							
General Remarks: Roots observed to 0.9m bgl.							Sample Type D: Disturbed B: Bulk J: Jar W: Water		
Groundwater Remarks: No groundwater encountered.									

 Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk				Trial Pit Log		Trial Pit No. TP3 Sheet 1 of 1	
Project Name: Land at Bayards, Level Mare Lane, Eastergate, Fontwell - Chichester, West Sussex PO20 3RX		Project No.: 19469		Method: Machine Excavated		Hole Type TP	
Location: Land at Bayards, Level Mare Lane, Eastergate, Fontwell - Chichester, West Sussex PO20 3RX				Plant: JCB 3CX		Scale 1:25	
Client: Miller Homes				Trial Pit Length: 1.90m		Trial Pit Width: 0.60m	
Dates: 24/06/2021		Level:		Co-ords:		Logged By JC	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (mAOD)	Legend	Stratum Description
	Depth	Type	Results				
	0.20	ES+D		0.40			grass over Brown slightly sandy slightly gravelly SILT. Gravel is fine to coarse angular to well rounded flint. Sand is fine to medium. frequent roots and rootlets.
	0.50	ES+D					
	1.00	ES+D		2.50			Brown slightly sandy, clayey GRAVEL. sand is fine. Gravel is fine to cobble sub-angular flint.
	1.50	D					
	2.00	D					
	2.50	D					End of Pit at 2.500m
General Remarks: Roots observed to 1.00m bgl.							Sample Type D: Disturbed B: Bulk J: Jar W: Water
Groundwater Remarks: No groundwater encountered.							

APPENDIX G – PARTICLE SIZE DENSITY TESTS



PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number 54865

Borehole/Pit No. WS7

Site Name Bayards Level Mare Lane, Eastergate, Chichester

Sample No.

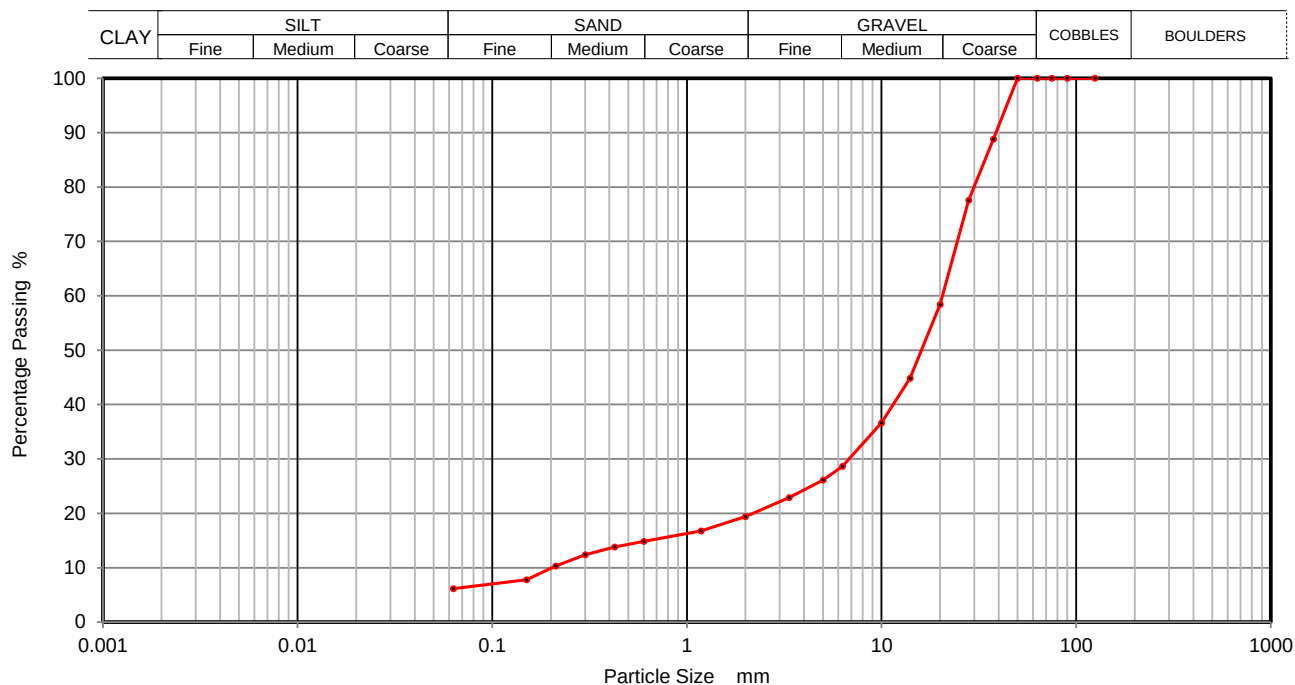
Soil Description Brown slightly silty/ clayey fine to coarse sandy fine to coarse GRAVEL

Depth Top 2.60

Depth Base 3.10

Date Tested 23/07/2021

Sample Type D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	89		
28	78		
20	58		
14	45		
10	37		
6.3	29		
5	26		
3.35	23		
2	19		
1.18	17		
0.6	15		
0.425	14		
0.3	12		
0.212	10		
0.15	8		
0.063	6		

Sample Proportions	% dry mass
Cobbles	0
Gravel	81
Sand	13
Silt and Clay	6

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	22/07/2021	Richard John	
David	Approved	23/07/2021	Paul Evans	

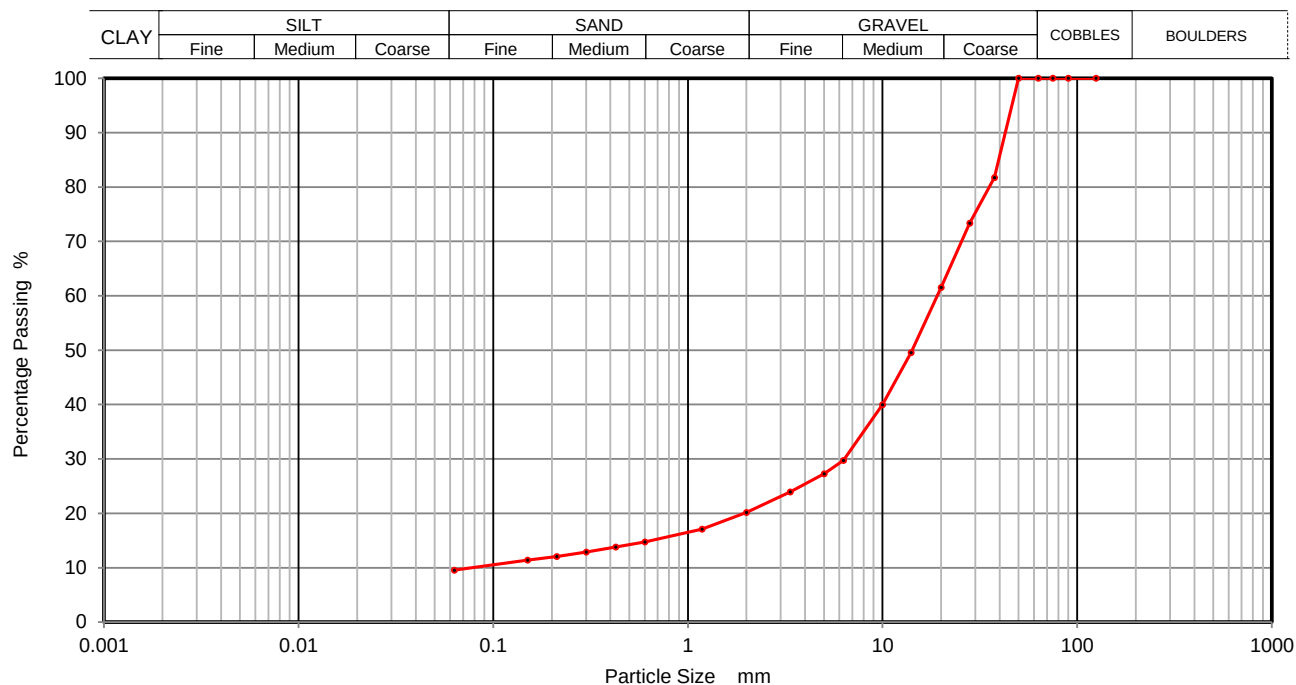


2788



**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

		Contract Number	54865
		Borehole/Pit No.	WS8
Site Name	Bayards Level Mare Lane, Eastergate, Chichester	Sample No.	
Soil Description	Brown silty/ clayey fine to coarse sandy fine to coarse GRAVEL	Depth Top	1.60
		Depth Base	2.10
Date Tested	23/07/2021	Sample Type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	82		
28	73		
20	62		
14	50		
10	40		
6.3	30		
5	27		
3.35	24		
2	20		
1.18	17		
0.6	15		
0.425	14		
0.3	13		
0.212	12		
0.15	11		
0.063	10		

Sample Proportions	% dry mass
Cobbles	0
Gravel	80
Sand	10
Silt and Clay	10

Remarks
Preparation and testing in accordance with BS1377 unless noted below

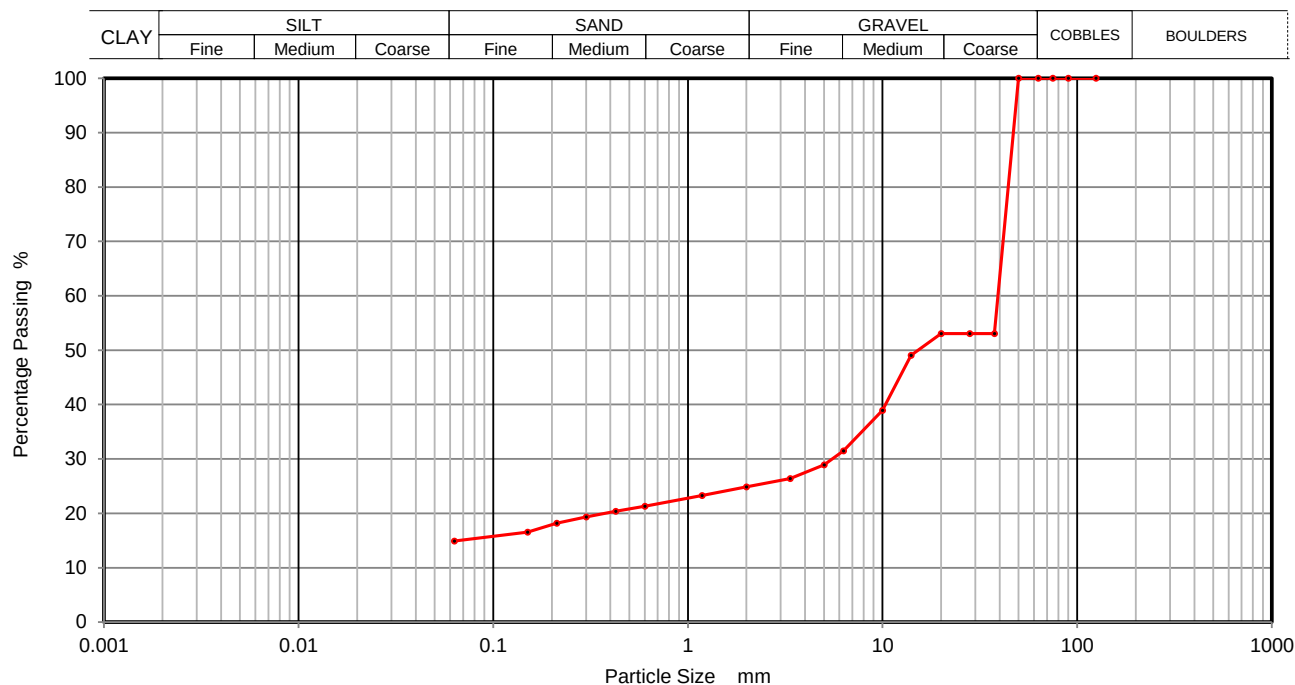
Operator	Checked	22/07/2021	Richard John	
David	Approved	23/07/2021	Paul Evans	





PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number	54865	
	Borehole/Pit No.	
WS9		
Site Name	Bayards Level Mare Lane, Eastergate, Chichester	
Sample No.		
Soil Description	Brown fine to coarse sandy silty/ clayey fine to coarse GRAVEL	
Depth Top	3.00	
Depth Base	3.50	
Date Tested	23/07/2021	
Sample Type	D	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	53		
28	53		
20	53		
14	49		
10	39		
6.3	31		
5	29		
3.35	26		
2	25		
1.18	23		
0.6	21		
0.425	20		
0.3	19		
0.212	18		
0.15	17		
0.063	15		

Sample Proportions	% dry mass
Cobbles	0
Gravel	75
Sand	10
Silt and Clay	15

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	22/07/2021	Richard John	
David	Approved	23/07/2021	Paul Evans	



2788

APPENDIX H – SOAKAWAY TESTS

Soakaway Calculations

Soakaway Test No.	TP1 Test 1
Site Name.	Bayards
Job No.	19469

Field Test

Trial Pit Log (include details of groundwater):
See trial Pit

Depth of Pit	2.35 m bgl
Width of Pit	0.60 m
Length of Pit Top	2.30 m
Length of Pit Base	1.80 m
Depth of First Reading	2.02 m bgl

Calculations for Area of Trapeziod Side

Length at top of soak 1.8702

Length at base 1.80

Area of one trapezoid side 0.9143

Calculations of length of one angled short side

Length of angled short side 0.3374

Depth of Pit Soaked	0.33 m
ap	3.313 m2
Vp	0.548571638 m3
ε100-0	23.0 min
Amount of water used total	0.3703 m3
Flow rate	1.200E-04 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)
2.02	0	100
2.05	3.0	91
2.11	6.0	73
2.23	13.0	36
2.25	17.0	30
2.35	23.0	0

Total drai	0.33	
T100	0.000	2.02 100% effective storage depth
T0	23.000	2.35 0% effective storage depth
T100-0	23.000	Derived from Best Fit

Comments

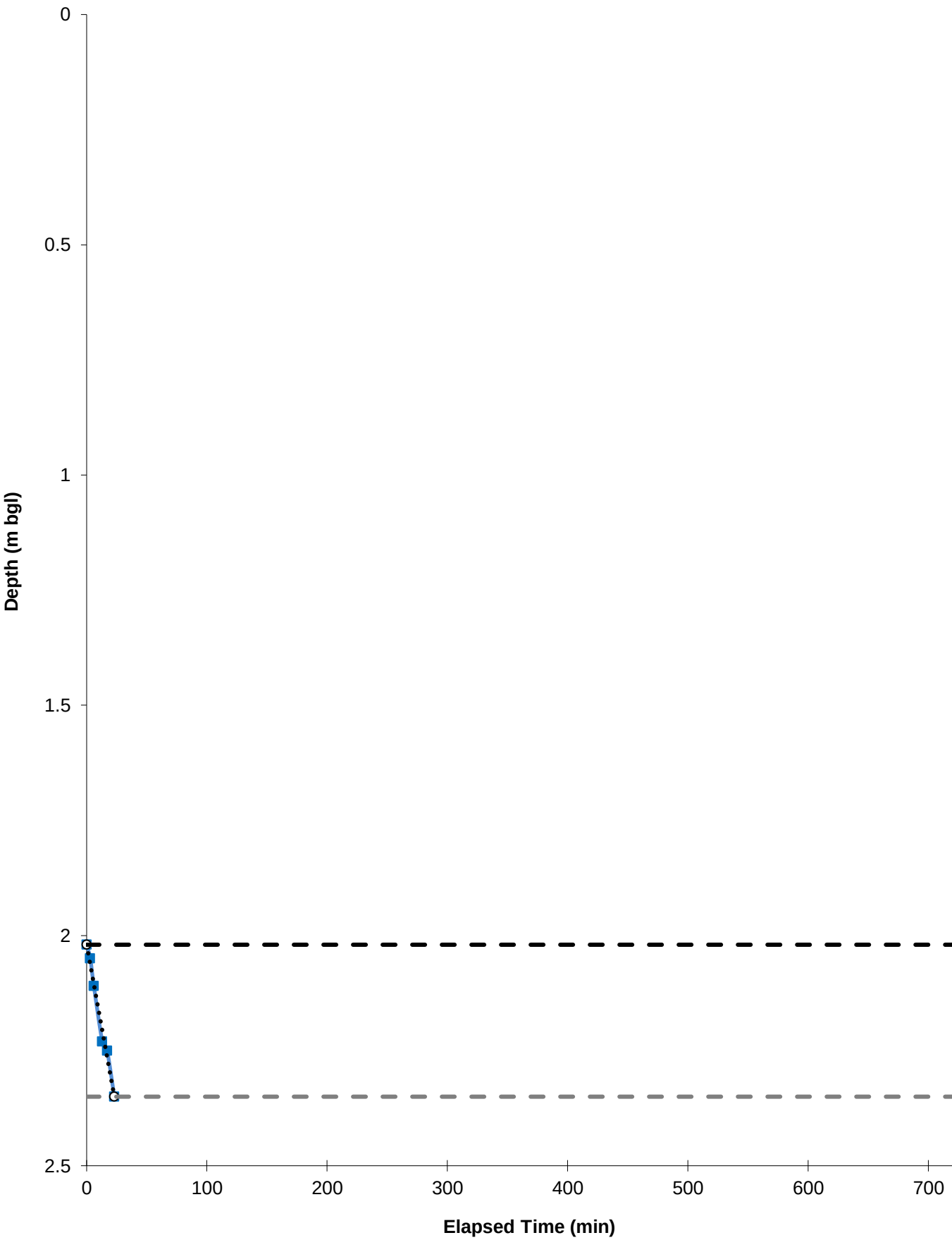
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SOILS LIMITED

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Surrey, KT20 5SR

Telephone: 01737 814 221

Infiltration Rate Plot



Notes: The horizontal dashed black line represents the top of the water i.e. first reading

The light grey dashed represents 0% of the effective storage depth, The dark grey represents 100% of the effective storage depth. The blue line is the depth to water with time. Where a red line is present it is extrapolated data.

Soakaway Calculations

Soakaway Test No.	TP1 Test 2
Site Name.	Bayards
Job No.	19469

Field Test

Trial Pit Log (include details of groundwater):
See trial Pit

Depth of Pit	2.23 m blg
Width of Pit	0.60 m
Length of Pit Top	2.30 m
Length of Pit Base	1.80 m
Depth of First Reading	1.94 m bgl

Calculations for Area of Trapeziod Side

Length at top of soak 1.865

Length at base 1.80

Area of one trapezoid side 0.802

Calculations of length of one angled short side

Length of angled short side 0.2972

Depth of Pit Soaked	0.29 m
ap	3.041 m2
Vp	0.481170471 m3
ε100-0	17.0 min
Amount of water used total	0.3245 m3
Flow rate	1.551E-04 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)
1.94	0	100
1.98	2.0	86
2.15	13.0	28
2.23	17.0	0

Total drai	0.29	
T100	0.000	1.94 100% effective storage depth
T0	17.000	2.23 0% effective storage depth
T100-0	17.000	Derived from Best Fit

Comments

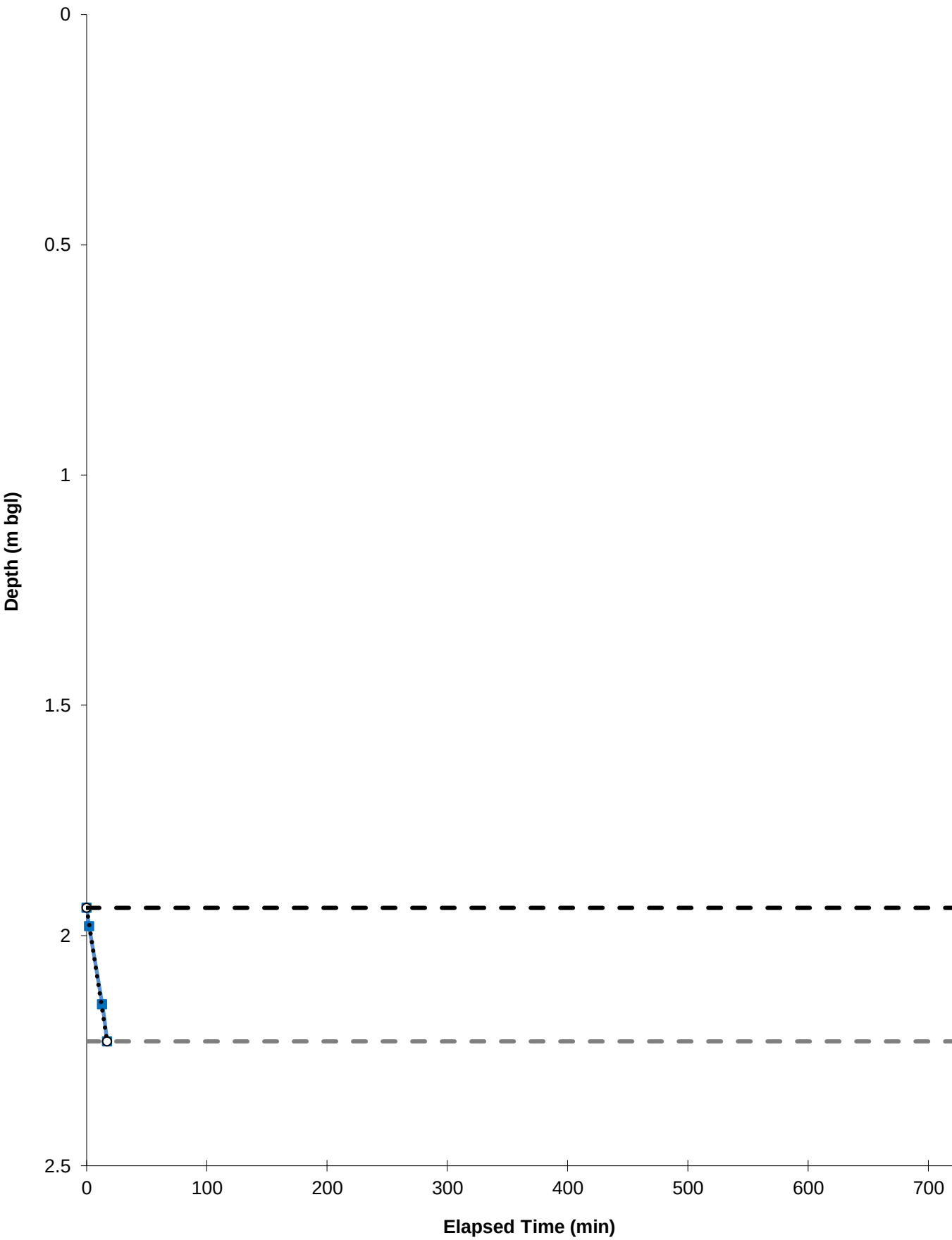
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Infiltration Rate Plot



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Soakaway Calculations

Soakaway Test No.	TP1 Test 3
Site Name.	Bayards
Job No.	19469

Field Test

Trial Pit Log (include details of groundwater):
See trial Pit

Depth of Pit	2.24 m bgl
Width of Pit	0.60 m
Length of Pit Top	2.30 m
Length of Pit Base	1.80 m
Depth of First Reading	1.94 m bgl

Calculations for Area of Trapeziod Side

Length at top of soak1.867

Length at base1.80

Area of one trapezoid side0.8302

Calculations of length of one angled short side

Length of angled short side0.3074

Depth of Pit Soaked	0.30 m
ap	3.109 m2
Vp	0.330087054 m3
ε100-0	17.0 min
Amount of water used total	0.3301 m3
Flow rate	1.041E-04 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)
1.93	0	100
1.98	2.0	84
2.03	5.0	68
2.08	8.0	52
2.11	11.0	42
2.17	14.0	23
2.24	17.0	0

Total drai	0.31	
T100	0.000	1.94 100% effective storage depth
T0	17.000	2.24 0% effective storage depth
T100-0	17.000	Derived from Best Fit

Comments

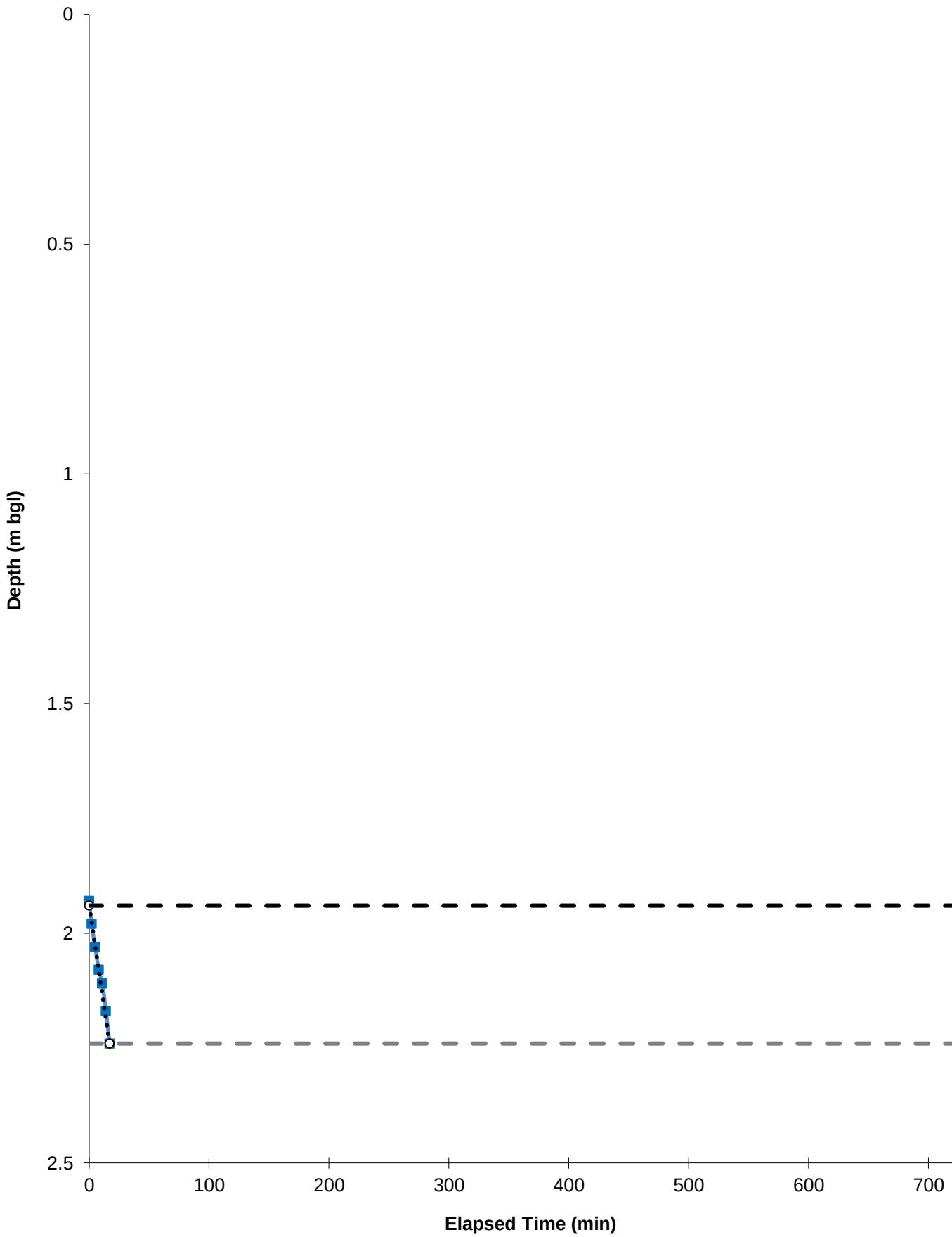
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Infiltration Rate Plot



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Soakaway Calculations

Soakaway Test No.	TP2 Test 2
Site Name.	Bayards
Job No.	19469

Field Test

Trial Pit Log (include details of groundwater):
See trial Pit

Depth of Pit	2.03 m bgl
Width of Pit	0.60 m
Length of Pit Top	2.80 m
Length of Pit Base	2.50 m
Depth of First Reading	1.72 m bgl

Calculations for Area of Trapeziod Side

Length at top of soak 2.5458

Length at base 2.50

Area of one trapezoid side 1.1768

Calculations of length of one angled short side

Length of angled short side 0.3134

Depth of Pit Soaked	0.31 m
ap	4.230 m2
Vp	0.469303197 m3
ε100-0	38.0 min
Amount of water used total	0.4693 m3
Flow rate	4.867E-05 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)
1.72	0	100
1.77	3.0	84
1.80	8.0	74
1.85	14.0	58
1.94	25.0	29
2.03	32.0	0

Total drai	0.31	
T100	0.000	1.72 100% effective storage depth
T0	38.000	2.03 0% effective storage depth
T100-0	38.000	Derived from Best Fit

Comments

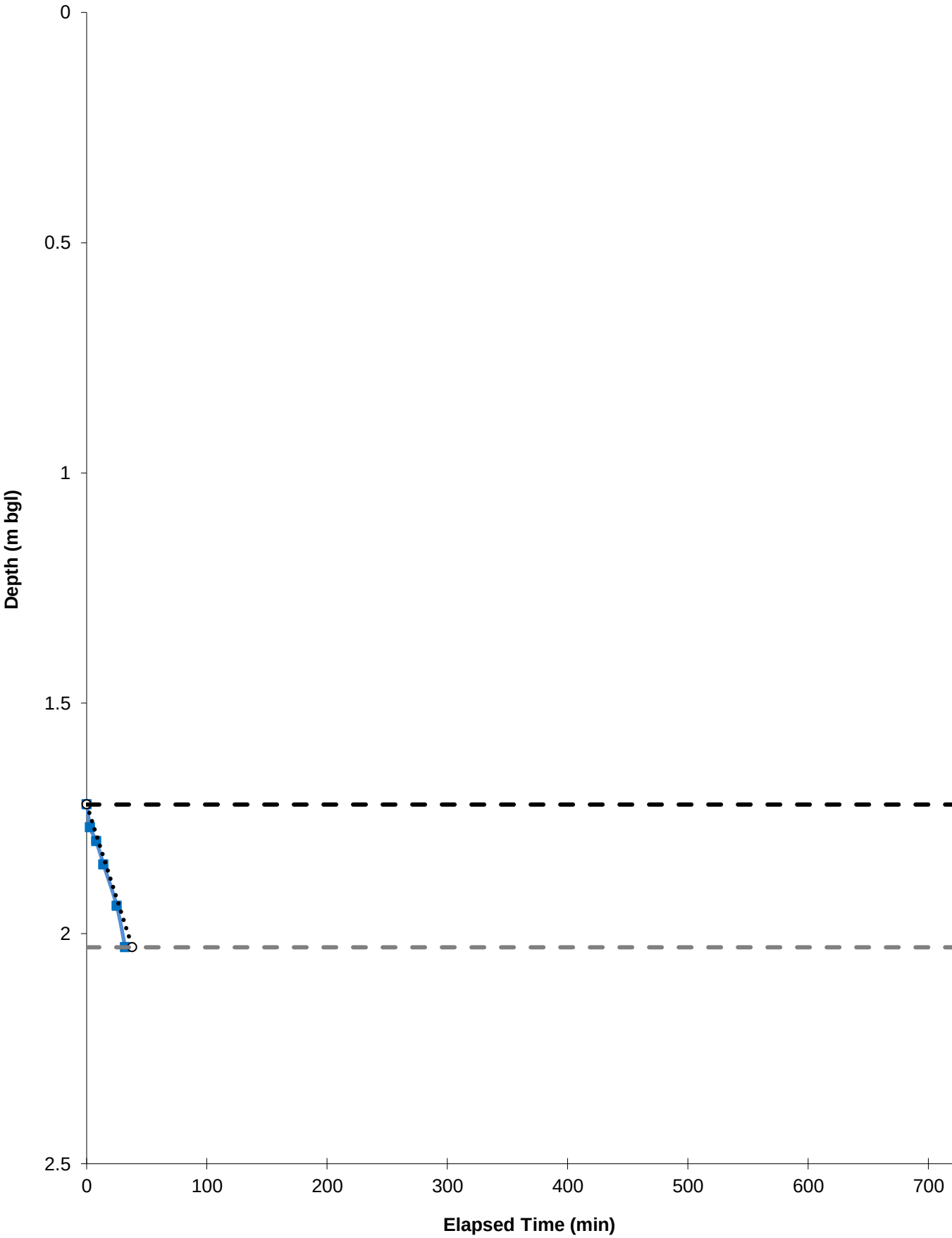
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Infiltration Rate Plot



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Soakaway Calculations

Soakaway Test No.	TP2 Test 3
Site Name.	Bayards
Job No.	19469

Field Test

Trial Pit Log (include details of groundwater):
See trial Pit

Depth of Pit	2.06 m bgl
Width of Pit	0.60 m
Length of Pit Top	2.80 m
Length of Pit Base	2.50 m
Depth of First Reading	1.69 m bgl

Calculations for Area of Trapeziod Side

Length at top of soak 2.5539

Length at base 2.50

Area of one trapezoid side 1.4075

Calculations of length of one angled short side

Length of angled short side 0.3739

Depth of Pit Soaked	0.37 m
ap	4.764 m2
Vp	0.561040879 m3
ε100-0	54.0 min
Amount of water used total	0.5610 m3
Flow rate	3.635E-05 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)
1.69	0	100
1.78	7.0	76
1.83	14.0	62
1.93	27.0	35
2.06	54.0	0

Total drai	0.37	
T100	0.000	1.69 100% effective storage depth
T0	54.000	2.06 0% effective storage depth
T100-0	54.000	Derived from Best Fit

Comments

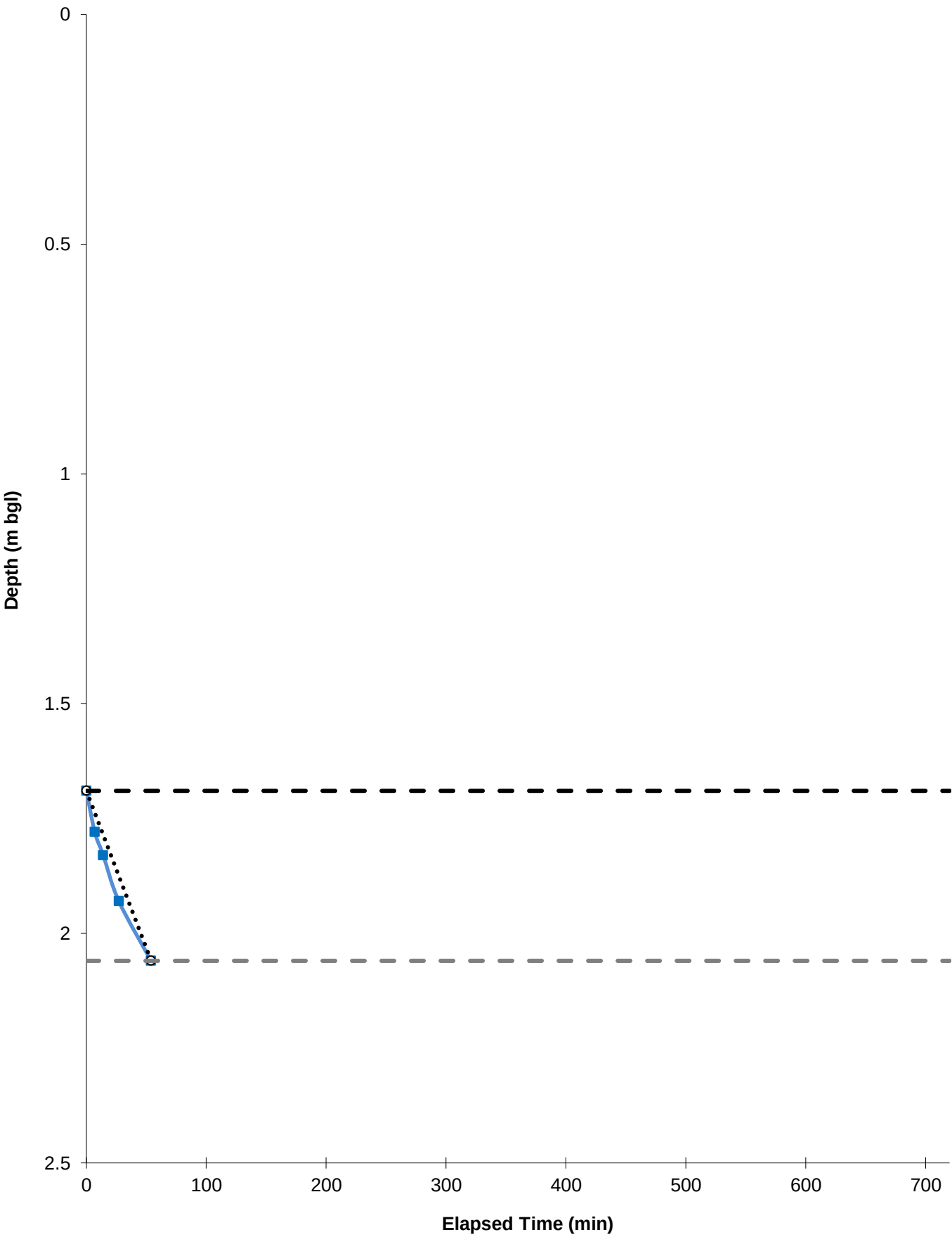
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