Stocking Lane, Shenington Banbury

Flood Risk Assessment & Outline Drainage Strategy Report

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Client

Elan Homes

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1 Introduction

Baynham Meikle Partnership Limited has been commissioned on behalf of Elan Homes to prepare a Flood Risk Assessment and Drainage Strategy for the outline planning application for the development of a 49 no. residential units with associated car parking area development and private roads.

The existing greenfield site is located in Cherwell District Council (CDC) and will be accessed off Rattlecombe Road. The development area is approximately 2.76 hectares in total and the Ordnance Survey Grid reference is E436935, N242770. A Site location plan is included in Appendix A.

It is a requirement for planning applications to consider the potential risk of flooding to the proposed development over its expected lifetime and any possible impacts on flood risk elsewhere in terms of its effects on flood flows and runoff.

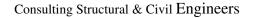
This Flood Risk Assessment has been prepared following guidance set out in the National Planning Policy Framework (NPPF) and is undertaken in consultation with other relevant bodies.

The following aspects of flood risk that have been addressed within this report are:

- The area liable to flooding.
- The probability of flooding occurring now and over time.
- The extent and standard of existing flood defences and their effectiveness over time.
- The rates of flow likely to be involved.
- The likelihood of impacts on other areas, properties, and habitats.
- The effects of climate change which currently requires designs to include 1 in 100-year rainfall events + 40% climate change allowance.
- The nature and current expected lifetime of the development proposed and the extent to which it is designed to deal with flood risk.

Further guidance has been obtained from:

- The SuDs Manual V6 (CIRIA c753).
- "Interim Code of Practice for Sustainable Drainage Systems 2004" (ICOP SUDS).
- "Interim National Procedures" point 3, 10.2 & 10.3.
- The council's in subject Strategic Flood Risk Assessment for this area.



2 Existing Site

2.1 Site Location

The development site is situated between Rattlecombe Road and Stocking Lane, with the nearest postcode being OX15 6NF. The Ordnance Survey National Grid reference to the centre of the site is E436935, N242770. A site location plan can be found in Appendix A. The site is irregularly shaped and occupies an approximate area of 2.76 ha. The neighbouring land use is as follows:

North	The site is bound to the north by Stocking Lane.
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- **East** The site is bound to the east by Rattlecombe Road.
- **South** The site is bound to the south by agricultural land.
- West The site is bound to the west by agricultural land and Shenington Church of England Primary School.

2.2 Topography

The site generally falls from north west to south east, with levels ranging between 179.55 - 180.25mAOD along the north west boundary and levels ranging between 178.08 - 177.81mAOD along with south east boundary.

The existing site is undeveloped and classed as greenfield.

A topographical survey can be found in Appendix A.

2.3 Existing Ground Conditions

The ground conditions at the site where in general accordance with those anticipated from the geological mapping and included grass overlying topsoil which in turn were found to overlie the Marlstone Rock Formation. A summary of the ground conditions encountered in presented in the below table:

Strata & General Description	Depth Encountered (m bgl)	Thickness Range (m)
1 TOPSOIL Grass overlying brown, orange-brown, yellow-orange-brown sandy clayey GRAVEL, and sandy gravelly CLAY with occasional fine rootlets (< 5mm diameter). Gravel is brown sub-rounded fine to medium quartzite and brown becoming dark brown sub-angular fine to medium sandstone with occasional iron staining. (All exploratory hole locations)	Ground Level – 0.75	0.15 – 0.75
2 MARLSTONE ROCK FORMATION Medium dense and dense becoming very dense orange-brown slightly clayey sandy GRAVEL. Gravel is orange-brown occasionally black sub-angular occasionally tabular, fine to medium, becoming medium to coarse sandstone with iron staining and occasional iron deposits. (DS102 to DS107 inclusive)	0.15 – 4.25	1.90 – 6.25+
Loose and very loose orange-brown slightly gravelly clayey SAND. Gravel is orange-brown occasionally black sub-angular, fine to medium, becoming medium to coarse sandstone with iron staining and occasional iron deposits. (DS101 and DS102 only)	3.00 - 6.45+	1.15 – 6.25+
Firm orange-brown very sandy CLAY (DS102 to DS106 inclusive)	0.50 - 1.90	0.30 – 1.15
Orange-brown and dark brown occasionally dark grey thinly laminated SANDSTONE with regular iron staining and iron deposits. Occasional bands of fine to medium orange sand. (TP101 to TP107 inclusive)	1.75 – 3.00	0.50 - 1.05



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Groundwater monitoring wells were installed across the site determine if shallow groundwater exists over the long term at the site. To date no groundwater has been encountered during any of the monitoring visits (4 no. undertaken to date at the issue of this report).

As such, it is deemed that the groundwater table is at greater depth than the depths to which the intrusive works were able to be achieve.

A total of six infiltration tests were undertaken at the site, 3 each within TP102 and TP105. Once excavated, 1m3 of water was added to the excavation and allowed to drain in accordance with BRE 365. All tests undertaken achieved full drainage. Rates were then calculated, with a minimum rate of 1.01 x 10-3 m/s recorded in TP105. As such is can be concluded that discharging surface water flows to ground is viable.

2.4 Aquifer Designation

An extract from the geographic information map (Figure & Figure) provided by Natural England indicates that the site is located on a Superficial Drift classed 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 Bedrock is classed as Secondary A, this means that it has 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 the water-bearing parts of the former non-aquifers.

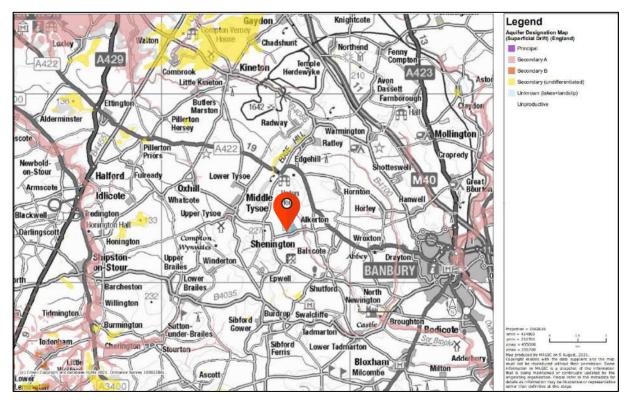


Figure 3. Aquifer Superficial Drift designation map



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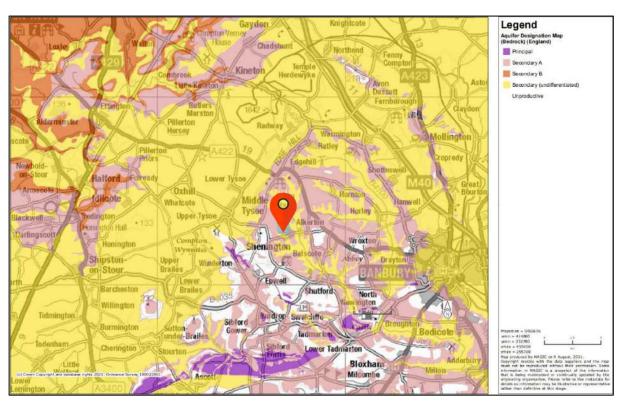
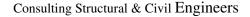


Figure 4. Aquifer Bedrock designation map





2.5 Site Specific Flood Risks

This section reviews the possible sources of flooding relevant for the site and assesses the impacts both on the development itself and on other areas as a result of the proposed development.

The Environment Agency is responsible for the provision of information pertaining to flood risk from tidal and main watercourses throughout England and Wales. The EA provides an online information service through its flood map data. An extract from the flood map is given in Figure which indicates that the site is in Flood Zone 1. The EA identifies the land having a less than 1 in 1,000 annual probability of river or sea flooding.

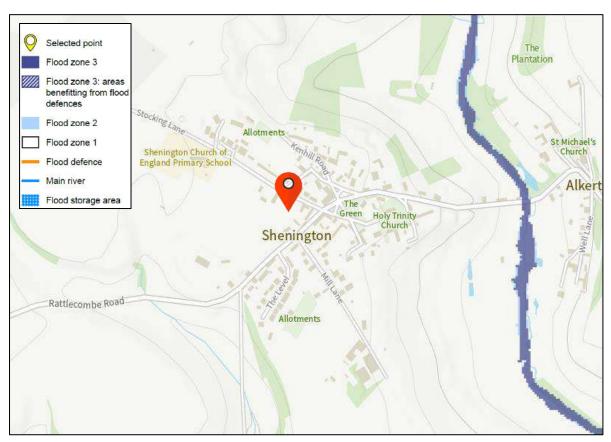


Figure 5. Flood Map for Planning by EA

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2.5.1 Tidal/Fluvial Flooding

Tidal/Fluvial flooding occurs when sea levels rise and flow into a water course causing the water table levels to rise or water levels rise as a result of high or intense rainfall flowing into a watercourse, resulting in water courses overflowing their banks.

Sea (Tidal) Flooding – The site is not located in the vicinity of the coast, and is therefore not at risk of flooding due to tidal flows.

River (Fluvial) Flooding –The site is not located adjacent to any river. Therefore, there is no risk of flooding from fluvial flows.

From Figure 6. Tidal/Fluvial Flood Risk Map, we can see that the proposed site is in a very low risk area. Meaning, each year this area has a chance of flooding less than 1 in 1,000 (0.1%) from tidal and fluvial flows.

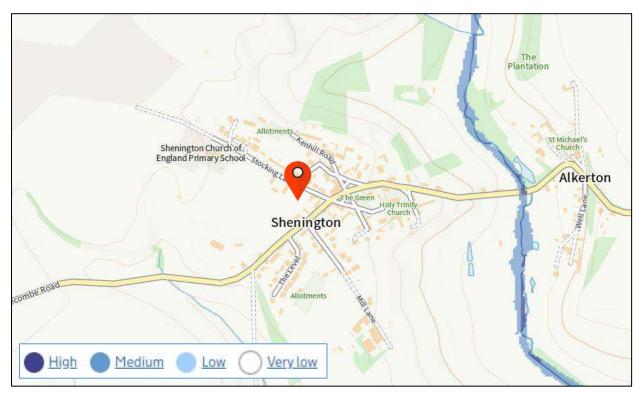


Figure 6. Tidal/Fluvial Flood Risk Map

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2.5.2 Surface Water Flooding (Pluvial Flooding)

Surface water flooding can occur when heavy rainfall overwhelms the local drainage network and also depends on existing ground levels, rainfall and the local drainage network. The EA website contains mapping of areas believed vulnerable to surface water flooding. An extract from the flood map is given in Figure 7. This shows that the site is in a very low flood risk area. Meaning that each year this area has a chance of pluvial flooding of less than 0.1%.

Although the development is in a very low risk area of flooding from surface water flows, it is important to note that the newly developed site will include a drainage system that can cope with large storm events, reducing the risks and/or limit surface water flooding during extreme storm events to areas such as carparks.



Figure 7. Surface Water Flood Risk Map



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2.5.3 Artificial Sources of Flooding

Artificial sources include any water bodies not covered under other categories and typically include canals, lakes and reservoirs.

Cherwell district has two main reservoirs; Clattercote Reservoir and Grimsbury Reservoir, however neither of these are located within the vicinity of the site, therefore there is no risk of flooding due to artificial sources. This can be seen in Figure 8 below.



Figure 8. Artificial Source Flood Risk Map

2.5.4 Historic Flooding

From the CDC SFRA it is clear that there have been multiple historic flooding events within the Cherwell District which has predominantly been cause by the River Cherwell. However, with that said, none of these flooding events occurred within the vicinity of the proposed development site location and has therefore never caused any impact/damage to the site. It is important to note that previous severe flooding event occurred a significant period of time ago (in 1998) before major flood defences were put in place. In addition, according to the CDC SFRA there has been no historic flooding events within the Shenington area.

A copy of the CDC SFRA's historical flooding incidents map is included in Appendix B.

2.5.5 Sewer Flooding

Sewer flooding coincides with heavy rainfall, and may occur if the amount of rainfall exceeds the capacity of the sewer system, the system becomes blocked and/or water surcharges (i.e. rises above the ground) due to high water levels in the receiving watercourse.

As stated in section 2.5.2 of this report, the development plot will include a drainage system that can cope with large storm events, reducing the risks and/or limit surface water flooding during the most extreme storm events.

According to the CDC SFRA there has been 0-5 incidents of sewer flooding within the development area.

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A map of Historical Sewer Flooding Events in Cherwell has been included in Appendix B. This map indicates areas reported to Thames Water that have experienced flooding during the last 20-year period as a result of insufficient hydraulic capacity in the seer network. The dataset identifies that the development site has experienced between 0-5 incident(s).

2.5.6 Groundwater Flooding

Groundwater flooding occurs as a result of water rising up from the underlying aquifers or from water flowing from springs. This tends to occur after long periods of sustained heavy rainfall and can be sporadic in both location and time, often lasting longer than a river or surface water flood.

A copy of the EA's Areas Susceptible to Groundwater Flooding Map is included in Appendix B and indicates that the site is located within an area of less than 25 percent susceptibility to groundwater flooding. Therefore, this area of the Cherwell District can be concluded as a low risk of groundwater flooding.

2.6 Source Protection Zone

The EA have defined Source Protection Zones (SPZs) for 2000 groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk. The maps show three main zones (inner which is buffered around the abstraction point, outer and total catchment) and a fourth zone of special interest.

The zones are used in conjunction with the EA's Groundwater Protection Policy to set up pollution prevention measures in areas which are at a higher risk, and to monitor the activities of potential polluters nearby.

As shown in 9, the proposed development is not near or within any source protection zone.



Figure 9. Source protection zones map





3 Proposed Site

3.1 Description of development

The current site is classed as greenfield. The current proposed application is to develop 49 no. dwellings with associated car parking and access roads. A site layout plan has not been provided at this time.

The proposed development has an impermeable area of 1.01 ha and a permeable area of 1.75 ha. These figures are subject to change as the layout detail progresses.

The proposed site levels will be set such that they try to (where possible) follow the contours of the existing site so as to minimise the requirement for any retaining walls and also adhere to best practice and building regulation design standards.

Proposed development levels will also be set such that they try to minimise any surface water flooding from the new development drainage network and ensure that should any flooding occur it is controlled and kept within the new development boundaries and does not affect neighbouring properties or highway land.

4 Drainage Policy & Consultation

4.1 Drainage Authority

At this stage, the relevant Water Authority (Thames Water) has not been contacted for information regarding the public storm and foul water sewers.

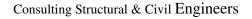
Based on online satellite imagery, there appears to be an existing manhole and gully located along Stocking Lane. This, however is to be confirmed through the purchase of Thames Water's public sewer map to understand the number of public sewers located within the vicinity of the development and an approximate location.

4.2 Lead Local Flood Authority

The Lead Local Flood Authority (LLFA) is Oxfordshire Council; however, Cherwell District Council (CDC) a Strategic Flood Risk Assessment (SFRA) and Local Plan which define flooding and drainage requirements.

Key items within the SFRA are:

- It should be demonstrated through a Surface Water Drainage Strategy or as part of a site-specific Flood Risk Assessment, that the proposed drainage scheme, and site layout and design, will prevent properties from flooding from surface water.
- An allowance for climate change should be taken into account when considering development, in accordance with the EA published updated climate change guidance.
- Use of SuDS (where possible use of strategic SuDS should be made)
- 1 in 100-year attenuation of surface water, taking into account climate change.





4.3 Application of Flood Risk Policy

Based on the EA's flood maps it is possible to undertake an initial site flood risk compatibility assessment to ascertain whether the proposed development site is presently suitable for development by referring to the flood zone compatibility matrix (Table 1).

		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
	Zone 1	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Zones	Zone 2	\checkmark	\checkmark	Exception Test required	\checkmark	\checkmark
Flood Zo	Zone 3a	Exception Test required	\checkmark	х	Exception Test required	\checkmark
	Zone 3b Functional Floodplain	Exception Test required	\checkmark	x	x	x

Table 1.Flood Risk Vulnerability and Flood Zone Compatibility

Key: $\sqrt{-}$ Development is appropriate

x - Development should not be permitted

Notes to table:

This table does not show:

- The application of the Sequential Test which guides development to Flood Zone 1 first, then Zone 2 and then Zone 3.
- Flood Risk Assessment requirements, or
- The Policy aims for each flood zone.

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Table 2. Flood Risk Vulnerability Classification

Essential Infrastructure	 Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations and water treatment works that need to remain operational in times of flood. Wind turbines.
Highly Vulnerable	 Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding. Emergency dispersal points. Basement dwellings. Caravans, mobile homes and park homes intended for permanent residential use. Installations requiring hazardous substances consent (where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations or need to be located in other high flood risk areas, in these instances the facilities should be classified as "essential infrastructure").
More Vulnerable	 Hospitals. Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. Non-residential uses for health services, nurseries and educational establishments. Landfill and sites used for waste management facilities and hazardous waste. Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	 Police, ambulance and fire stations which are not required to be operational during flooding. Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in "more vulnerable" and assembly and leisure. Land and buildings used for agriculture and forestry. Waste treatment (expect landfill and hazardous waste facilities). Minerals working and processing (except for sand and gravel working). Navigations facilities. Ministry of Defence installations. Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. Water-based recreation (excluding sleeping accommodation). Lifeguard and coastguard stations. Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

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Water Compatible Development	 Water treatment works which do not need to remain operational during times of flood. Sewerage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place). Flood control infrastructure. Water transmission infrastructure and pumping stations. Sewerage transmission infrastructure and pumping stations. Sand and gravel working. Docks, marinas and wharves.
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4.3.1 Sequential Test

The Sequential Test is intended to direct new development to an area of lowest probability of flood risk and ensure development is in the most appropriate flood zone.

As the development's extents of the site are within Flood Zone 1, the development can be considered appropriate for the proposed use, and therefore passes the Sequential Test.

4.3.2 Exception Test

The Exception Test is not required as the site is located within Flood Zone 1.

4.3.3 Flood Risk Assessment Summary & Mitigation Measures

Table 1 contains a summary of the flood risks to the proposed site. Mitigation measures to address the identified risks are discussed below.

Flood Risk	Risk Level	Action Required
Tidal/Fluvial	Very Low	None
Surface Water	Very Low	None
Sewers	Low	None
Groundwater	Low	None
Artificial	N/A	None
Run-off	Low	Mitigation Required

Table 3. Summary of Flood Risks

It can be concluded that there is no risk to flooding on the development itself. Mitigation measures are required to ensure that run-off from the proposed development will not adversely impact areas downstream.

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5 Drainage Strategy

5.1 Hierarchy of Disposal

Generally, the aim should be to discharge surface water run-off as high up the following hierarchy of drainage options as reasonably practicable.

- Into the ground (infiltration)
- To a surface water body
- To a surface water sewer, highway drain, or other drainage systems
- To a combined sewer

5.1.1 Infiltration

As mentioned in section 2.3 of this report, geotechnical/geoenvironmental site investigation has been completed and suggested that discharging surface water to ground via infiltration techniques is a viable option for this development. As such the current drainage strategy includes an infiltration basin which has been designed for the 100 year + 40%CC.

5.1.2 Water Body

Current drainage strategy is infiltration.

5.1.3 Surface Water Sewer/Combined Sewer

Current drainage strategy is infiltration.

5.2 Sustainable Drainage

Potential SuDS techniques considered for the proposed site have been outlined below.

5.2.1 Rainwater harvesting

Rainwater harvesting (RWH) is the collection of rainwater runoff for use. Runoff can be collected from roofs and other impermeable areas, stored, treated (where required) and then used as a supply water for domestic, commercial and/or institutional properties.

The rainwater harvesting will be disproportionate in terms of cost and function in regards to the proposed development nature (residential). Therefore, rainwater harvesting has been disregarded.

5.2.2 Green Roofs

Green roofs comprise a multi-layered system that covers the roof of a building or podium structure with vegetation cover, over a drainage layer. They are designed to intercept and retain precipitation, reducing the volume of run-off and attenuating peak flows.

Green roofs have been disregarded due to the pitched roofs.

5.2.3 Soakaways

Soakaways are square or circular excavations either filled with rubble or lined with brickwork, precast concrete or polyethylene rings/perforated storage structures surrounded by granular backfill. They can be grouped and linked together to drain large areas including highways. The supporting structure and backfill can be substituted by modular geo-cellular units. Soakaways provide storm water attenuation, storm water treatment and groundwater recharge.



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An infiltration has been used as a way to discharge surface water flows to ground for this development.

5.2.4 Swales

Swales are linear vegetated drainage features in which surface water can be stored or conveyed. They can be designed to allow infiltration, where appropriate. They should promote low flow velocities to allow much of the suspended particulate load in the storm water runoff to settle out, thus providing effective pollutant removal. Roadside swales can replace conventional gullies and drainage pipes.

Swales have not been incorporated into the design due to the nature of the development.

5.2.5 Pervious Pavements

Pervious pavements provide a pavement suitable for pedestrian and/or vehicular traffic while allowing rainwater to infiltrate through the surface and into the underlying layers. The water is temporarily stored between infiltration to the ground, reuse or discharge to a watercourse or other drainage system. Pavements with aggregate sub-bases can provide good water quality treatment.

When permeable paving for car parking bays is used, the stone sub-base not only stores and slows down the rate of discharge, but also raises the water quality. It should not be used in the loading yard areas, due to the impact of the heavily loaded HGVs on the long-term durability of the pavement finish.

Pervious pavements have been incorporated into the private drives, this will ensure water quality and filtration of hydrocarbons from the run off prior to entering the adoptable system

5.2.6 Geo-cellular/Modular Systems

Modular plastic geo-cellular systems with a high void ratio can be used to create a below ground storage structure. Modular tanks can be used for runoff attenuation but require silt trap protection and a suitable means of access for cleaning and inspection.

A Geo-cellular system has not been used within the drainage strategy and an infiltration basin has been used as an alternative for attenuation.

5.2.7 Ponds/Infiltration Basin

Ponds can provide both storm water attenuation and treatment. They are designed to support emergent and submerged aquatic vegetation along their shoreline. Runoff from each rain event is detained and treated in the pool. The retention time promotes removal of silt through sedimentation and the opportunity for biological uptake mechanisms to reduce nutrient concentrations.

An infiltration basin has been included within the design.



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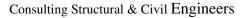
5.3 Sustainable Drainage Maintenance

The various SuDS features will remain privately owned and be maintained by the client. The exact details of this arrangement will be defined when future tenants are confirmed.

The SuDS operation and maintenance strategy will be in accordance with CIRIA C753 best practice, as tabled below:

Monthly	Inspect upstream catchpits for silt and vortex control manhole for debris. Clean out if necessary, using vacuum tanker.
Every Six Months	Remove sediment from the inlet catchpit with a vacuum tanker twice a year as necessary, ideally at the start of Spring when general landscaping tidying up is carried out after winter damage and autumn leaf fall.
Annually	Annually inspect/check all sumps, inlets, outlets, vents to tanks to ensure that they are in good condition and operating as designed. Inspect distribution pipe by CCTV. If necessary clean out.
Remediation Inspection & tasks following significant storm events	Inspect upstream and downstream catchpits for silt and vortex control manhole for debris. Clean out as necessary using vacuum tanker.
Contingency plan details	Exceedance flows as defined in the Drainage Strategy Drawing.

Table 4. SuDS Operation and maintenance requirements





6 Drainage Strategy – Surface Water

6.1 Proposed Surface Water Runoff Rate

As the proposed drainage plan implements the used of soakaway techniques, as a result there will be no positive discharge from the site into the surrounding sewer network.

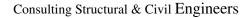
Rate of infiltration following site specific testing within this area was 1.01 x 10-3 m /s or 3.636 m / hr.

6.2 Proposed Surface Water Drainage Strategy

The building roofs are to discharge into the private drainage system which surrounds the dwellings, this will ultimately discharge into the adoptable drainage system within the highway. Surface water flows from external areas are proposed to be collected via traditional methods including gully's drainage channels and slot drains. The infiltration basin has been adequately sized to accommodate the 100 yr + 40% CC flows based on infiltration rates gathered from site specific intrusive testing by Discovery CE.

Levels should be designed at the appropriate detailed design stage such that critical 100 year plus climate change storm events are contained above ground, but safely within the site boundaries without risk to surrounding properties, the building or that restricts access / egress.

For the 1 in 100 years plus climate change event should any flooding occur at the surface level this would be of no more than 100mm in depth and be contained safely on site, in parking areas, without risk to proposed or existing buildings.





7 Drainage Strategy – Foul Sewerage

7.1 Proposed foul drainage strategy

At the time of writing this report a site layout plan was unavailable, therefore it is difficult to determine an exact foul strategy for the development. However, it is clear that foul drainage will be required to serve the development.

The proposed foul network strategy will connect to the nearest foul public sewer. Thames Water's public sewer map has not yet been obtained; therefore, the location of an existing foul network is unknown. The location of an existing foul network will be confirmed once Thames Water's public sewer map has been obtained.

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8 Summary

The development's proposal is to develop multiple dwellings with associated car parking and access roads. The existing site is currently undeveloped and is therefore classed as a greenfield site.

The EA Flood Map for planning depicts the site is located within Flood Zone 1, with very low risk of flooding from tidal & fluvial, surface water and extremely low risk of flooding from artificial sources. The proposed development is classed as less vulnerable usage and it is located in Flood Zone 1 which therefore meets the sequential test. An exception test is not required.

The use of SuDS features has been considered and can be incorporated within the design. Pervious pavements have been incorporated into the private drives, this will ensure water quality and filtration of hydrocarbons from the run off prior to entering the adoptable system

The surface water will be designed to cater for storm events up to 1 in 100 years plus 40% climate change. Surface water flows will be discharged to ground via an infiltration basin with a rate of 1.01×10^{-3} m/s.

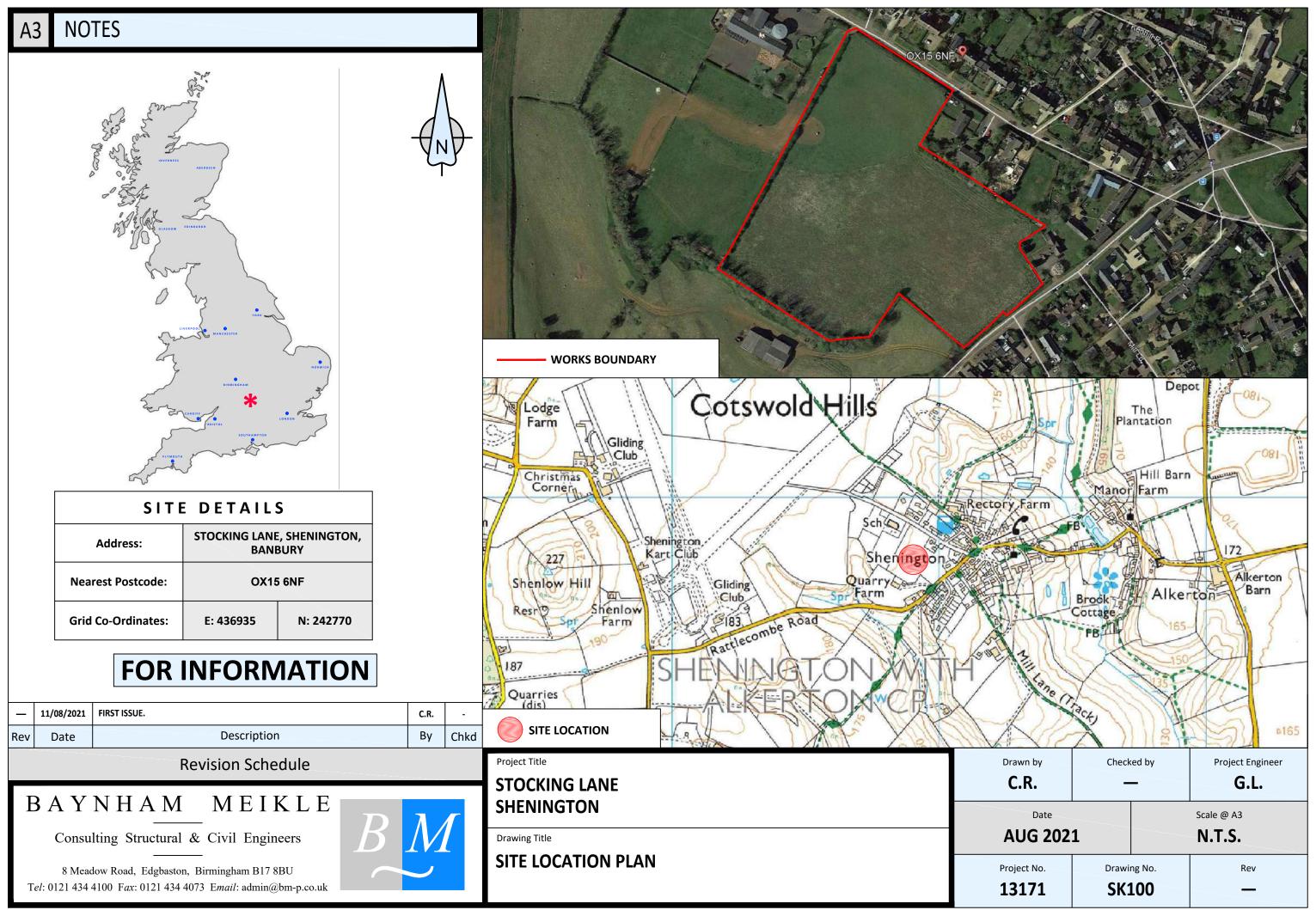
The site does not pose any increased flood risk to the site itself or adjacent developments, and is not susceptible to flooding by other means.

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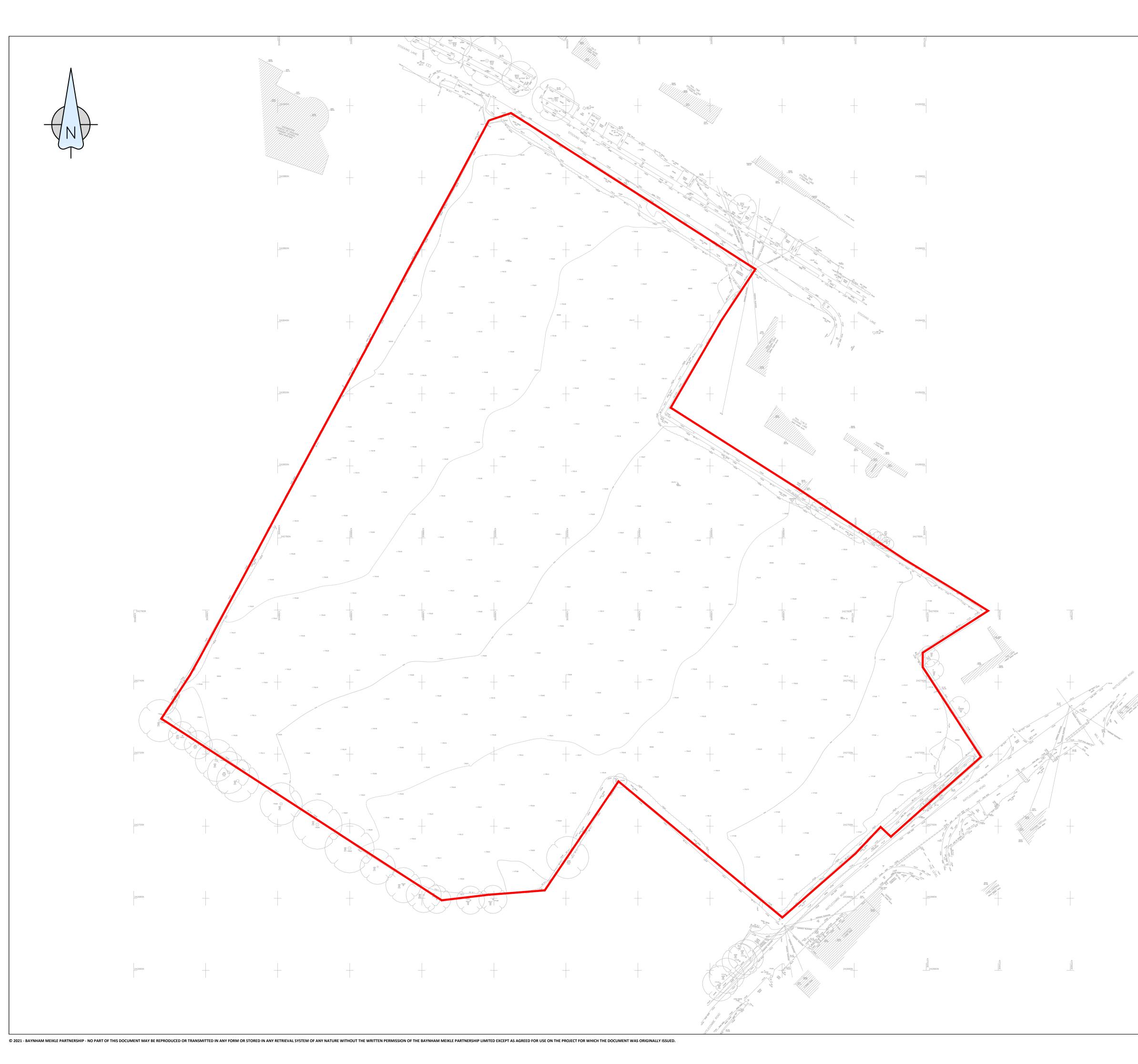


Appendix A – Existing Information

- A.1 Site Location Plan
- A.2 Topographical Survey



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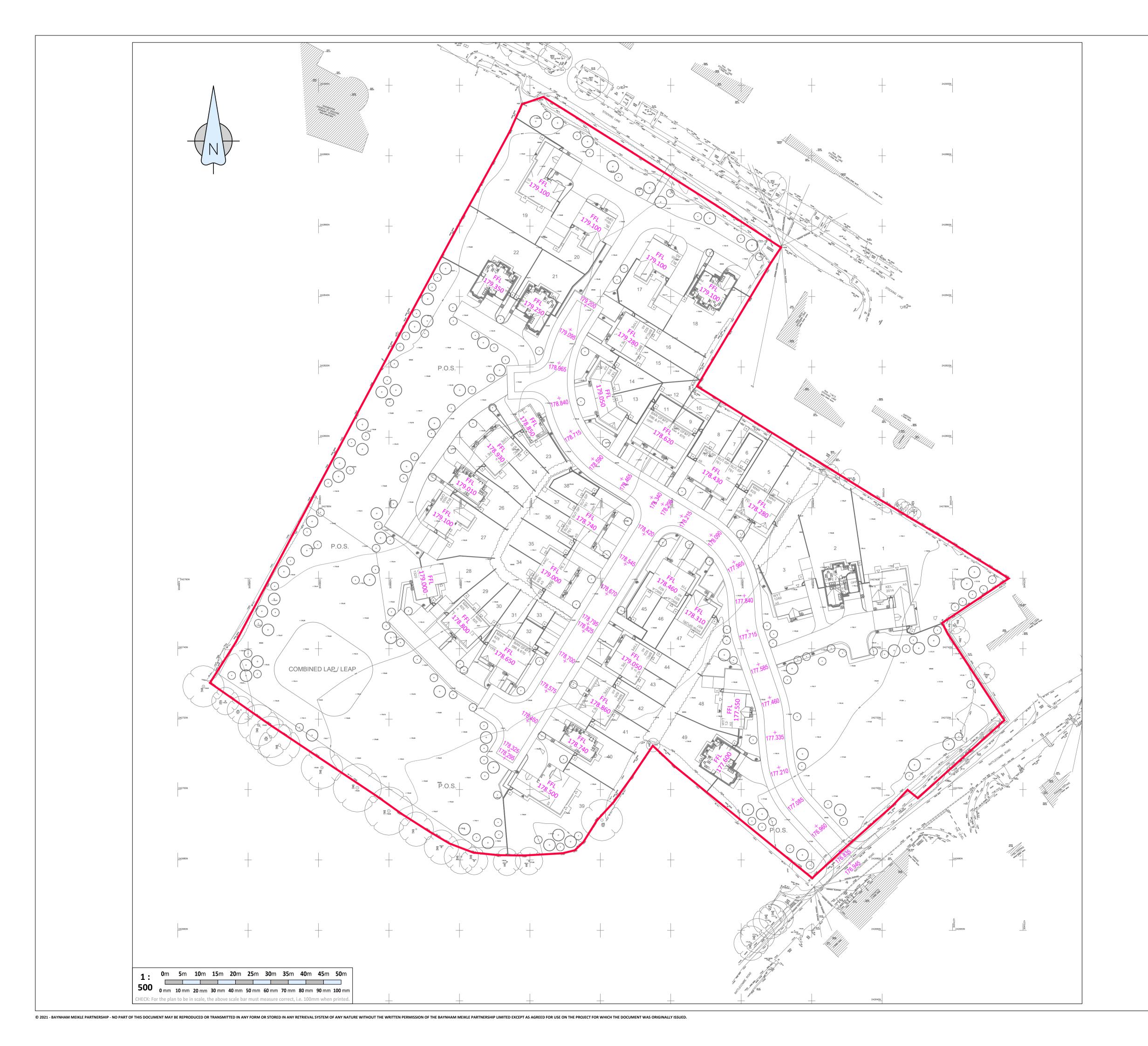
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Appendix B – EA & SFRA Information

- B.1 Proposed Impermeable Areas Plan
- B.2 Proposed Drainage Strategy
- B.3 Proposed Levels Plan



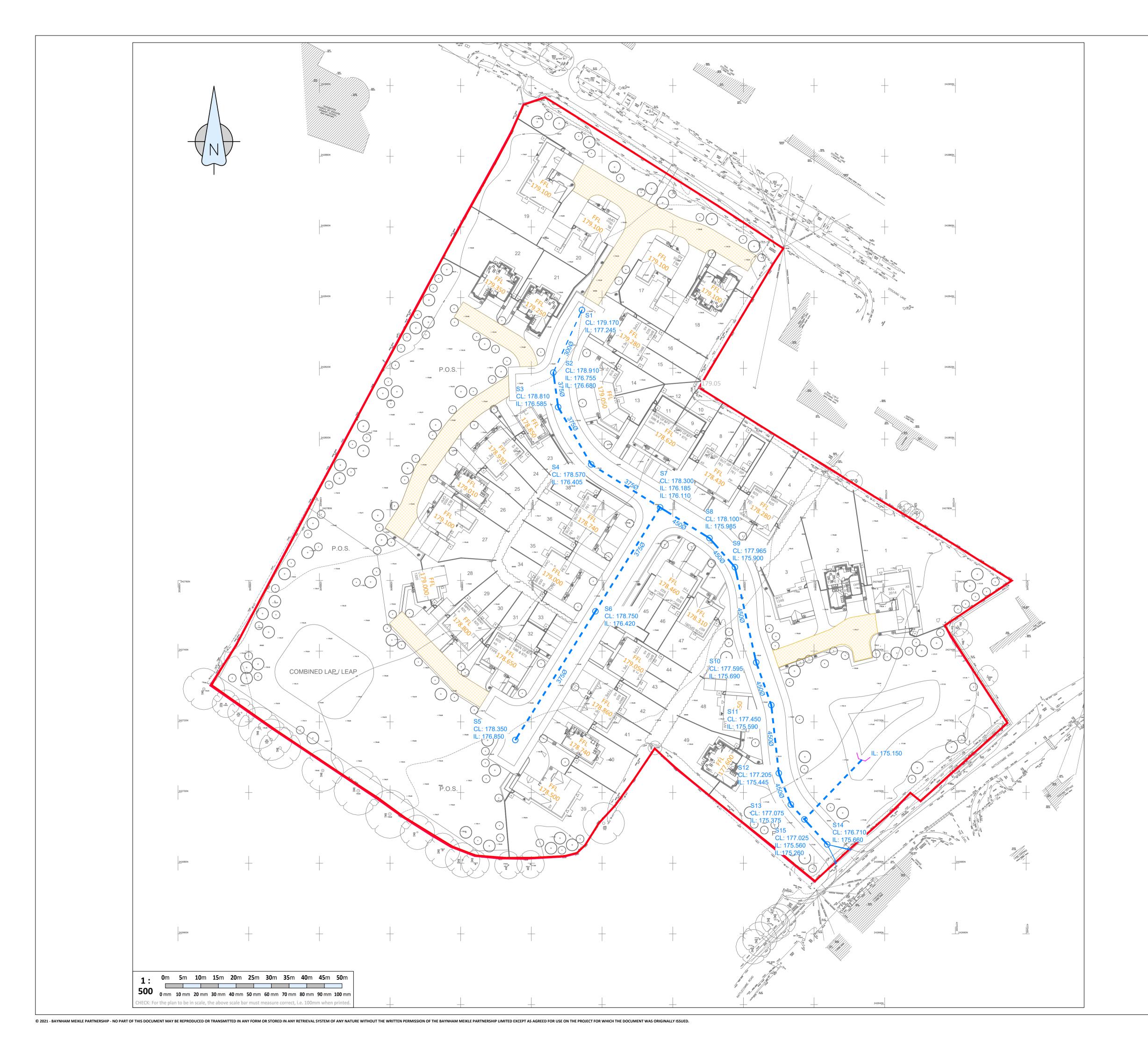
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 5924-21JAN20-01-02-03-2D
- 7. Architectural layout taken from Elan Homes plan reference:
 SHN-Planning REVB(Dated 10.01.2022).

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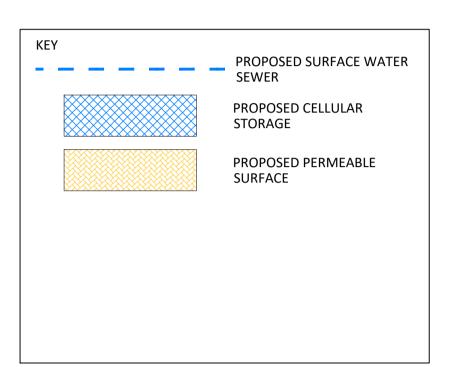
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- 7. Architectural layout taken from Elan Homes plan reference:
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Appendix C – Calculations

C.1 Microdrainage Calculations

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1.000 1.001 1.002 2.000 2.001 1.004 1.005 1.006 PN 1.0	(m) 19.490 9.885 18.702 22.989 42.911 34.611 16.458 10.931 27.603 G Rai (mm/2) 00 44 01 44	(m) 0.490 0.095 0.180 0.220 0.430 0.235 0.125 0.085 0.210 	<pre>(1:x) 39.8 104.1 103.9 104.5 99.8 147.3 131.7 128.6 131.4 .C. ins) 7.13 1 7.22 1</pre>	<pre>« - Ir I.Area (ha) 0.126 0.042 0.126 0.074 0.161 0.067 0.098 0.037 0.083 <u>N</u> US/IL (m) 77.245</pre>	T.E. (mins) 7.00 0.00 0.00 7.00 0.00 0.00 0.00 0.0	pipe capac Base Flow (l/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	<pre>ity < 1 k (mm) 0.600 0.600 0.600 0.600 0.600 0.600 0.600 0.600 0.600 1600 1600 Table Foul (1/s) 0.00 </pre>	flow HYD SECT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(mm) 300 375 375 375 375 450 450 450 Flow /s) 0.0	Pipe// Pipe// Pipe// Pipe// Pipe// Pipe// Pipe// Pipe// Pipe// 2.50 1.78	Conduit Conduit Conduit Conduit Conduit Conduit Conduit Conduit Conduit (1/s) 176.7	Desig:
1.000 1.001 1.002 2.000 2.001 1.004 1.005 1.006 PN 1.0 1.0 1.0	(m) 19.490 9.885 18.702 22.989 42.911 34.611 16.458 10.931 27.603 8 Rai (mm/) 00 44 01 44 02 43	(m) 0.490 0.095 0.180 0.220 0.430 0.235 0.125 0.085 0.210 	<pre>(1:x) 39.8 104.1 103.9 104.5 99.8 147.3 131.7 128.6 131.4 .c. ins) 7.13 1 7.22 1 7.40 1</pre>	<pre>« - Ir • I.Area (ha) • 0.126 0.042 0.126 0.074 • 0.161 0.067 • 0.098 • 0.037 0.083 • 0.037 • 0.083 • 0.037 • 0.083 • 0.77.245 • 76.680</pre>	T.E. (mins) 7.00 0.00 0.00 7.00 0.00 0.00 0.00 0.0	pipe capac Base Flow (l/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	<pre>ity < 1 k (mm) 0.600 0.600 0.600 0.600 0.600 0.600 0.600 0.600 0.600 Table Foul (1/s) 0.0 </pre>	flow HYD SECT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(mm) 300 375 375 375 375 450 450 450 Flow /s) 0.0 0.0	Pipe// Pipe// Pipe// Pipe// Pipe// Pipe// Pipe// Pipe// Pipe// 2.500 1.78 1.78	Conduit Conduit Conduit Conduit Conduit Conduit Conduit Conduit Conduit 176.7 196.2	Desig:
1.000 1.001 1.002 2.000 2.001 1.004 1.005 1.006 PN 1.0 1.0 1.0 1.0	(m) 19.490 9.885 18.702 22.989 42.911 34.611 16.458 10.931 27.603 7 Rai (mm/) 00 44 01 44 02 43 03 43	(m) 0.490 0.095 0.180 0.220 0.430 0.235 0.125 0.085 0.210 	<pre>(1:x) 39.8 104.1 103.9 104.5 99.8 147.3 131.7 128.6 131.4 .C. ins) 7.13 1 7.22 1 7.40 1 7.61 1</pre>	 « - Ir I.Area (ha) 0.126 0.042 0.126 0.074 0.161 0.067 0.098 0.037 0.083 N US/IL (m) 77.245 76.680 76.585 	T.E. (mins) 7.00 0.00 0.00 7.00 0.00 0.00 0.00 0.0	pipe capac Base Flow (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	<pre>ity < 1 k (mm) 0.600 0.600 0.600 0.600 0.600 0.600 0.600 0.600 0.600 1600 1600 1/s) 0.0 0.0 </pre>	flow HYD SECT 0 0 0 0 0 0 0 0 0 0 0 0 0	(mm) 300 375 375 375 375 450 450 450 Flow /s) 0.0 0.0 0.0	Pipe// Pipe// Pipe// Pipe// Pipe// Pipe// Pipe// Pipe// Pipe// 2.50 1.78 1.77	Conduit Conduit Conduit Conduit Conduit Conduit Conduit Conduit Conduit 176.7 196.2 196.3	Desig:

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (1/s)	Flow (1/s)	
1.000	44.51	7.13	177.245	0.126	0.0	0.0	0.0	2.50	176.7	15.2	
1.001	44.22	7.22	176.680	0.168	0.0	0.0	0.0	1.78	196.2	20.1	
1.002	43.69	7.40	176.585	0.294	0.0	0.0	0.0	1.78	196.3	34.8	
1.003	43.05	7.61	176.405	0.368	0.0	0.0	0.0	1.77	195.7	42.9	
2.000	43.70	7.39	176.850	0.161	0.0	0.0	0.0	1.81	200.3	19.1	
2.001	42.57	7.78	176.420	0.228	0.0	0.0	0.0	1.49	164.7	26.3	
1.004	42.14	7.94	176.110	0.694	0.0	0.0	0.0	1.77	281.5	79.2	
1.005	41.86	8.04	175.985	0.731	0.0	0.0	0.0	1.79	284.9	82.9	
1.006	41.16	8.30	175.900	0.814	0.0	0.0	0.0	1.77	281.8	90.7	
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File NETWORK.MDX	Checked by James Harverson	Diamage
Micro Drainage	Network 2020.1	

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	ase (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
	12.804 19.377 9.494 5.700	0.100 0.145 0.070 0.040	133.6 135.6	0.108 0.014 0.046 0.115	0.00 0.00 0.00 0.00	0.0	0.600 0.600 0.600 0.600	0 0 0	450 450	Pipe/Conduit Pipe/Conduit Pipe/Conduit Pipe/Conduit	0 0 0
3.000	9.577	0.100	95.8	0.014	7.00		0.600	0		Pipe/Conduit	•
	33.719 20.000	0.110 -3.000		0.000	0.00		0.600 0.600	0 0		Pipe/Conduit Pipe/Conduit	a

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (1/s)	Vel (m/s)	Cap (1/s)	Flow (1/s)
1.007 1.008 1.009	40.86 40.39 40.16	8.60 8.69	175.690 175.590 175.445	0.922 0.936 0.982	0.0 0.0 0.0	0.0	0.0 0.0 0.0	1.76 1.74	285.5 279.4 277.4	102.4 106.8
1.010 3.000	40.02 44.43		175.375 175.660	1.097 0.014	0.0	0.0	0.0	1.70	270.5 18.1	118.9
1.011 1.012	38.87 32.49		175.260 175.150	1.111 1.111	0.0	0.0	0.0	1.16 0.09	183.8 1.6«	118.9 118.9

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	Coni	MH nection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
~ 1	100.100	1 005			1000	1 0 0 0	122.045	200				
	179.170		-	Manhole		1.000	177.245	300	1 000	126 255	200	
	178.910		1	Manhole		1.001	176.680		1.000		300	
	178.810		1	Manhole		1.002			1.001		375	
	178.570		1	Manhole		1.003	176.405		1.002	176.405	375	
S5	178.350	1.500	Open	Manhole	1350	2.000	176.850	375				
S6	178.750	2.330	Open	Manhole	1350	2.001	176.420	375	2.000	176.420	375	
S7	178.300	2.190	Open	Manhole	1350	1.004	176.110	450	1.003	176.185	375	
									2.001	176.185	375	
S8	178.100	2.115	Open	Manhole	1350	1.005	175.985	450	1.004	175.985	450	
S9	177.965	2.065	Open	Manhole	1350	1.006	175.900	450	1.005	175.900	450	
S10	177.595	1.905	Open	Manhole	1350	1.007	175.690	450	1.006	175.690	450	
S11	177.450	1.860	Open	Manhole	1350	1.008	175.590	450	1.007	175.590	450	
s12	177.205	1.760	Open	Manhole		1.009	175.445	450	1.008	175.445	450	
	177.075		1	Manhole		1.010	175.375		1.009	175.375	450	
	176.710		1	Manhole		3.000	175.660	150	1.000	1/0.0/0	100	
	177.025		1	Manhole		1.011	175.260		1.010	175.335	450	75
513	177.025	1.705	open	Maimore	1330	1.011	175.200	450				/ / /
		1 500							3.000	175.560	150	
POND	176.650		-			1.012	175.150	150	1.011	175.150	450	
	178.900	0.750	Open	Manhole	0		OUTFALL		1.012	178.150	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	436914.329	242836.517	436914.329	242836.517	Required	1
S2	436906.205	242818.801	436906.205	242818.801	Required	1
S3	436907.585	242809.012	436907.585	242809.012	Required	
S4	436916.920	242792.806	436916.920	242792.806	Required	6
S5	436895.457	242714.848	436895.457	242714.848	Required	8

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Micro Drainage	Network 2020.1	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S6	436918.140	242751.274	436918.140	242751.274	Required	1
S7	436936.435	242780.654	436936.435	242780.654	Required	1 al
S8	436950.405	242771.955	436950.405	242771.955	Required	5
S9	436957.613	242763.737	436957.613	242763.737	Required	1
S10	436963.629	242736.797	436963.629	242736.797	Required	1
S11	436967.893	242724.724	436967.893	242724.724	Required	N.
S12	436970.020	242705.464	436970.020	242705.464	Required	4
S13	436973.420	242696.599	436973.420	242696.599	Required	N.
S14	436983.720	242685.317	436983.720	242685.317	Required	5
S15	436977.263	242692.390	436977.263	242692.390	Required	\mathbf{X}
POND	436998.723	242718.398	436998.723	242718.398	Required	-
	437014.289	242730.956			No Entry	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	-	Diam (mm)		C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	0	300	S1	179.170	177.245	1.625	Open Manhole	1200
1.001	0	375	S2	178.910	176.680	1.855	Open Manhole	1350
1.002	0	375	s3	178.810	176.585	1.850	Open Manhole	1350
1.003	0	375	S4	178.570	176.405	1.790	Open Manhole	1350
2.000	0	375	S5	178.350	176.850	1.125	Open Manhole	1350
2.001	0	375	S6	178.750	176.420	1.955	Open Manhole	1350
1.004	0	450	S7	178.300	176.110	1.740	Open Manhole	1350
1.005	0	450	S8	178.100	175.985	1.665	Open Manhole	1350
1.006	0	450	S9	177.965	175.900	1.615	Open Manhole	1350
1.007	0	450	S10	177.595	175.690	1.455	Open Manhole	1350
1.008	0	450	S11	177.450	175.590	1.410	Open Manhole	1350
1.009	0	450	S12	177.205	175.445	1.310	Open Manhole	1350
1.010	0	450	S13	177.075	175.375	1.250	Open Manhole	1350
3.000	0	150	S14	176.710	175.660	0.900	Open Manhole	1200
1.011	0	450	S15	177.025	175.260	1.315	Open Manhole	1350
1.012	0	150	POND	176.650	175.150	1.350	Open Manhole	50

Downstream Manhole

PN	-	Slope (1:X)			I.Level (m)	-	MH Connection	MH DIAM., L*W (mm)
1.000	19.490	39.8	s2	178.910	176.755	1.855	Open Manhole	1350
	9.885			178.810			Open Manhole	
				178.570			Open Manhole	
				178.300			Open Manhole	
2.000	42.911	99.8	S6	178.750	176.420	1.955	Open Manhole	1350
2.001	34.611	147.3	S7	178.300	176.185	1.740	Open Manhole	1350
1.004	16.458	131.7	S8	178.100	175.985		Open Manhole	
1.005	10.931	128.6	S9	177.965	175.900	1.615	Open Manhole	1350
1.006	27.603	131.4	S10	177.595	175.690	1.455	Open Manhole	1350
1.007	12.804	128.0	S11	177.450	175.590	1.410	Open Manhole	1350
1.008	19.377	133.6	S12	177.205	175.445	1.310	Open Manhole	1350
1.009	9.494	135.6	S13	177.075	175.375	1.250	Open Manhole	1350
1.010	5.700	142.5	S15	177.025	175.335	1.240	Open Manhole	1350
3.000	9.577	95.8	S15	177.025	175.560	1.315	Open Manhole	1350
				176.650			Open Manhole	
1.012	20.000	-6.7		178.900	178.150	0.600	Open Manhole	0

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Network Classifications for Storm

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Ріре Туре	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	МН Туре
1.000	S1	300	1.625	1.855	Unclassified	1200	0	1.625	Unclassified
1.001	S2	375	1.850	1.855	Unclassified	1350	0	1.855	Unclassified
1.002	S3	375	1.790	1.850	Unclassified	1350	0	1.850	Unclassified
1.003	S4	375	1.740	1.790	Unclassified	1350	0	1.790	Unclassified
2.000	S5	375	1.125	1.955	Unclassified	1350	0	1.125	Unclassified
2.001	S6	375	1.740	1.955	Unclassified	1350	0	1.955	Unclassified
1.004	S7	450	1.665	1.740	Unclassified	1350	0	1.740	Unclassified
1.005	S8	450	1.615	1.665	Unclassified	1350	0	1.665	Unclassified
1.006	S9	450	1.455	1.615	Unclassified	1350	0	1.615	Unclassified
1.007	S10	450	1.410	1.455	Unclassified	1350	0	1.455	Unclassified
1.008	S11	450	1.310	1.410	Unclassified	1350	0	1.410	Unclassified
1.009	S12	450	1.250	1.310	Unclassified	1350	0	1.310	Unclassified
1.010	S13	450	1.240	1.250	Unclassified	1350	0	1.250	Unclassified
3.000	S14	150	0.900	1.315	Unclassified	1200	0	0.900	Unclassified
1.011	S15	450	1.050	1.315	Unclassified	1350	0	1.315	Unclassified
1.012	POND	150	0.600	1.350	Unclassified	50	0	1.350	Unclassified

Free Flowing Outfall Details for Storm

Outfall	Outfall	c.	Level	I.	Level		Min	D,L	W
Pipe Number	Name		(m)		(m)	Ι.	Level (m)	(mm)	(mm)

1.012 178.900 178.150 0.000 0 0

Simulation Criteria for Storm

Volumetric Runoff Coeff 0.750Additional Flow - % of Total Flow 0.000Areal Reduction Factor 1.000MADD Factor * 10m³/ha Storage 2.000Hot Start (mins)0Inlet Coefficient 0.800Hot Start Level (mm)0 Flow per Person per Day (1/per/day) 0.000Manhole Headloss Coeff (Global)0.500Foul Sewage per hectare (1/s)0.000Output Interval (mins)1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.200	Storm Duration (mins)	30
Ratio R	0.400		

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Micro Drainage	Network 2020.1	

Storage Structures for Storm

Infiltration Basin Manhole: POND, DS/PN: 1.012

Invert Level (m) 175.150 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 3.63600 Porosity 1.00 Infiltration Coefficient Side (m/hr) 3.63600

Depth (m) Area (m²) Depth (m) Area (m²)

0.000	114.0	1.500	466.5

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B 17 8BU						Mirco
Date 07/02/2022			esigned by	James Harvers	son	Micro
File NETWORK.MDX						Drainage
			_	ames Harverso		
Micro Drainage		N	etwork 2020.	.1		
Hot S	tion Facto tart (mins Level (mm ff (Global)	<u>Simu</u> r 1.())) 0.!	for Storm lation Criteri 000 Addition 0 MADD 0 500 Flow per P	<u>a</u> al Flow - % of Factor * 10m³, Inlet Co	Total Flo /ha Storag peffiecien	w 0.000 e 2.000 t 0.800
Number of Number of Number of	Input Hydro f Online Co Offline Co <u>Synt</u> all Model	ograp ontro ontro cheti	hs 0 Number of ls 0 Number of ls 0 Number of <u>c Rainfall Det</u> FSR	Ratio R 0.4	grams 0 trols 0	
M	Region E 5-60 (mm)	Ingla		Cv (Summer) 0.7 Cv (Winter) 0.8		
Duration(Iner rofile(s) s) (mins)	DTS DVD tia	Status Status Status	, 180, 240, 36	ON ON ON r and Wint 0, 480, 60 0, 960, 14	er 0, 40
Return Period(s Climate C					1, 30, 1 0, 0,	
	Return Clin Period Cha			First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000 S1 15 Winter	1		100/15 Summer			
1.001 S2 15 Winter	1		30/15 Summer			
1.002 S3 15 Winter 1.003 S4 15 Winter	1 1		30/15 Summer 30/15 Summer			
1.003 S4 15 Winter 2.000 S5 15 Winter	1			100/15 Summer		
2.000 35 15 Winter 2.001 S6 15 Winter	1		30/15 Summer			
1.004 S7 15 Winter	1			100/15 Winter		
1.005 S8 15 Winter	1	+0%	30/15 Summer	100/15 Winter		
1.006 S9 15 Winter	1		30/15 Summer			
1.007 S10 15 Winter	1			100/15 Winter		
1.008 S11 15 Winter	1		30/15 Summer			
1.009 S12 15 Winter	1		30/15 Summer			
1.010 S13 15 Winter 3.000 S14 15 Winter	1 1		30/15 Summer 30/15 Summer			
1.011 S15 15 Winter	1		30/15 Summer 30/15 Summer			
1.012 POND 15 Winter	1		30/15 Summer			
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Micro Drainage	Network 2020.1			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)			Overflow		Flow	Status	Level Exceeded
1.000	S1	177.307	-0.238	0.000	0.09			14.4	OK	
1.001	S2	176.779	-0.276	0.000	0.16			19.0	OK	
1.002	S3	176.700	-0.260	0.000	0.20			33.0	OK	
1.003	S4	176.531	-0.249	0.000	0.25			41.2	OK	
2.000	S5	176.929	-0.296	0.000	0.10			18.2	OK	3
2.001	S6	176.525	-0.270	0.000	0.17			25.3	OK	
1.004	s7	176.304	-0.256	0.000	0.38			76.6	OK	1
1.005	S8	176.205	-0.230	0.000	0.48			80.8	OK	1
1.006	S9	176.091	-0.259	0.000	0.37			89.4	OK	
1.007	S10	175.931	-0.209	0.000	0.56			100.0	OK	1
1.008	S11	175.808	-0.232	0.000	0.47			100.9	OK	
1.009	S12	175.704	-0.191	0.000	0.63			105.8	OK	
1.010	S13	175.662	-0.163	0.000	0.73			116.4	OK	
3.000	S14	175.692	-0.118	0.000	0.10			1.6	OK	
1.011	S15	175.547	-0.163	0.000	0.73			116.4	OK	
1.012	POND	175.280	-0.020	0.000	0.00		6	0.0	OK	

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Edgbaston, Birmingham		Shenington			
B 17 8BU		-			Micco
Date 07/02/2022		Designed by J	James Harver		Micro
File NETWORK.MDX		Checked by Ja			Drainage
Micro Drainage		Network 2020			
		NCCWOIR 2020	• -		
30 year Return Perioc	l Summary of	Critical Res for Storm	ults by Maxi	.mum Leve	l (Rank 1)
Hot S Hot Start Manhole Headloss Coe Foul Sewage per he Number of Number o	Stion Factor 1 Start (mins) E Level (mm) Eff (Global) 0 Ectare (l/s) 0 Input Hydrogra f Online Contr	.000 phs 0 Number of ols 0 Number of	al Flow - % of Factor * 10m ³ Inlet C erson per Day Storage Struc Time/Area Dia	/ha Storage oeffiecient (l/per/day) ctures 1 ugrams 0	e 2.000 = 0.800
Number of	Offline Contr	ols 0 Number of	E Real Time Cor	trols 0	
	all Model	and and Wales (Ratio R 0.4	750	
E	DTS DVD Inertia Profile(s) s) (mins)	ng (mm) Pimestep 2.5 Sec Status Status Status 15, 30, 60, 120	Summe), 180, 240, 36	ON ON ON	er 0, 40
Climate C	hange (%)			0, 0,	40
US/MH PN Name Storm	Return Climato Period Change		First (Y) Flood	First (Z) Overflow	
1.000 S1 15 Winter 1.001 S2 15 Winter 1.002 S3 15 Winter 1.003 S4 15 Winter 2.000 S5 15 Winter 2.001 S6 15 Winter 1.005 S8 15 Winter 1.006 S9 15 Winter 1.007 S10 15 Winter 1.008 S11 15 Winter 1.009 S12 15 Summer 3.000 S14 15 Winter 1.011 S15 15 Summer 1.012 POND 30 Winter	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	 30/15 Summer 30/15 Summer 100/15 Summer 30/15 Summer 	100/15 Summer 100/15 Winter 100/15 Winter 100/15 Winter		
	©1982	2-2020 Innovy	7Ze		

Baynham Meikle Partnership				
8 Meadow Road	Stocking Lane			
Edgbaston, Birmingham	Shenington			
B 17 8BU		Micro		
Date 07/02/2022	Designed by James Harverson	Dcainago		
File NETWORK.MDX	Checked by James Harverson	Diamage		
Micro Drainage	Network 2020.1			

 $\frac{30 \text{ year Return Period Summary of Critical Results by Maximum Level (Rank 1)}{\text{for Storm}}$

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)		Flow / Cap.	Overflow (1/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	S1	177.342	-0.203	0.000	0.23			35.3	OK
1.001	S2	177.208	0.153	0.000	0.40			47.8	SURCHARGED
1.002	s3	177.096	0.136	0.000	0.55			90.3	SURCHARGED
1.003	S4	176.930	0.150	0.000	0.62			103.7	SURCHARGED
2.000	S5	176.977	-0.248	0.000	0.24			44.6	OK
2.001	S6	176.899	0.104	0.000	0.39			57.5	SURCHARGED
1.004	S7	176.791	0.231	0.000	0.81			161.9	SURCHARGED
1.005	S8	176.666	0.231	0.000	0.96			163.1	SURCHARGED
1.006	S9	176.559	0.209	0.000	0.73			175.2	SURCHARGED
1.007	S10	176.411	0.271	0.000	1.08			192.7	SURCHARGED
1.008	S11	176.293	0.253	0.000	0.91			195.5	SURCHARGED
1.009	S12	176.163	0.268	0.000	1.23			208.0	SURCHARGED
1.010	S13	176.028	0.203	0.000	1.47			233.9	SURCHARGED
3.000	S14	175.853	0.043	0.000	0.27			4.4	SURCHARGED
1.011	S15	175.839	0.129	0.000	1.48			236.9	SURCHARGED
1.012	POND	175.556	0.256	0.000	0.00		11	0.0	SURCHARGED

PN	US/MH Name	Level Exceeded
1.000	S1	
1.001	S2	
1.002	S3	
1.003	S4	
2.000	S5	3
2.001	S6	
1.004	S7	1
1.005	S8	1
1.006	S9	
1.007	S10	1
1.008	S11	
1.009	S12	
1.010	S13	
3.000	S14	
1.011	S15	
1.012	POND	

Baynham Meikl	le Partne	rship					I	Page 12
8 Meadow Road		1	S	tocking	Lane		r	
Edgbaston, Bi		1		heningto				
B 17 8BU	LTINITIGUAN	L.	Ũ	nentingeo				
Date 07/02/20	122			adanad	hrr T	ames Harvers	~ ~ ~	Micro
				-	-			Drainage
File NETWORK.	-					mes Harverso	n	
Micro Drainac	ge		N	etwork 2	020.	1		
			<u>1)</u> Simu:	for Sto lation Cri	orm teria			
Manhole He Foul Sev	Hot Start Hot Start eadloss Coe wage per he	Start (m t Level eff (Glo ectare (ins) (mm) bal) 0.5 1/s) 0.0	0 0 500 Flow p 000	MADD er Pe	ll Flow - % of Factor * 10m ³ / Inlet Co erson per Day (Storage Struc	ha Storage peffiecient l/per/day)	e 2.000 c 0.800
	Number o	f Online	e Contro	ls 0 Numbe	er of	Storage Struc Time/Area Dia Real Time Con	grams O	
		all Mode	el on Engla	nd and Wal	TSR Les Cr	ails Ratio R 0.4 v (Summer) 0.7 v (Winter) 0.8	50	
		Ana Profile((s) (min	lysis Ti DTS DVD Inertia s) s) 1	mestep 2.5 Status Status Status		, 180, 240, 36	ON ON ON	er D, 40
	Climate (-					0, 0,	40
US/MH PN Name	Storm		Climate Change		-	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000 S1	15 Winter	100	+40%	100/15 Su	mmer			
	15 Winter	100	+40%	30/15 Su				
	15 Winter	100	+40%					
	15 Winter 15 Winter	100 100	+40% +40%	30/15 Su		100/15 Summer		
	15 Winter	100	+40% +40%			100/10 Summer		
	15 Winter	100				100/15 Winter		
1.005 S8	15 Winter	100	+40%	30/15 Su	mmer	100/15 Winter		
	15 Winter	100	+40%					
	15 Winter	100	+40%			100/15 Winter		
	15 Winter 15 Winter	100 100	+40% +40%	30/15 Su 30/15 Su				
	15 Winter 15 Winter	100		30/15 Su 30/15 Su				
	30 Winter	100		30/15 Su				
	30 Winter	100	+40%	30/15 Su	mmer			
1.012 POND	30 Winter	100	+40%	30/15 Su	mmer			
			©1982·	-2020 In:	novyz	ze		

Baynham Meikle Partnership		Page 13
8 Meadow Road	Stocking Lane	
Edgbaston, Birmingham	Shenington	
B 17 8BU		Micro
Date 07/02/2022	Designed by James Harverson	Drainage
File NETWORK.MDX	Checked by James Harverson	Diamaye
Micro Drainage	Network 2020.1	

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)		Flow / Cap.	Overflow (1/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	S1	178.970	1.425	0.000	0.42			65.0	FLOOD RISK
1.001	S2	178.715	1.660	0.000	0.68			82.4	FLOOD RISK
1.002	s3	178.623	1.663	0.000	0.77			126.0	FLOOD RISK
1.003	S4	178.483	1.703	0.000	0.92			153.6	FLOOD RISK
2.000	S5	178.360	1.135	10.117	0.53			97.4	FLOOD
2.001	S6	178.392	1.597	0.000	0.74			109.8	SURCHARGED
1.004	S7	178.300	1.740	0.064	1.17			233.5	FLOOD
1.005	S8	178.100	1.665	0.240	1.49			252.0	FLOOD
1.006	S9	177.908	1.558	0.000	1.19			284.7	FLOOD RISK
1.007	S10	177.597	1.457	2.127	1.77			314.9	FLOOD
1.008	S11	177.331	1.291	0.000	1.48			317.7	FLOOD RISK
1.009	S12	177.038	1.143	0.000	1.96			330.7	FLOOD RISK
1.010	S13	176.686	0.861	0.000	2.37			378.5	SURCHARGED
3.000	S14	176.275	0.465	0.000	0.29			4.7	SURCHARGED
1.011	S15	176.260	0.550	0.000	2.23			357.6	SURCHARGED
1.012	POND	175.882	0.582	0.000	0.00		13	0.0	SURCHARGED

PN		Level Exceeded
1.000	S1	
1.001	S2	
1.002	S3	
1.003	S4	
2.000	S5	3
2.001	S6	
1.004	S7	1
1.005	S8	1
1.006	S9	
1.007	S10	1
1.008	S11	
1.009	S12	
1.010	S13	
3.000	S14	
1.011	S15	
1.012	POND	

BAYNHAM MEIKLE

Consulting Structural & Civil Engineers



Appendix D – SI Extracts

D.1 Site Investigation Extracts.

Project: Stocking Lane, Shenington



Project														BOREH	OLE	No
Ste	ocking	Lane,	Sher	ning	gton									DS	101	
Job No			Date	- 2	9-09-21		Ground L		·	Co-Ordinates	0			03	101	
	076J			2	9-09-21		1	79.98		E 436,9	11.0	N 242,8	85.0			
Contracto														Sheet		
Di	scovery	y CE												1 0	f 1	
SAMPI	LES &	TEST	S	ST.					SI	RATA					y	lent/
Depth	Type No	Tes Resi		Water	Reduced Level	Legend	Depth (Thick- ness)				SCRIPT				Geology	Instrument/ Backfill
0.20	ES				179.38		(0.60) 0.60	CLA sub-a	Y. Gravel is angular fine	firm light orai brown sub-ro to medium sa than 5 mm d	ounded fundstone	fine to me with iron	dium qua	rtzite and		
0.75	ES					- · ·		TOP	SOIL					/		
-1.00	D						1 7	Medi	ium dense b	ecoming very D. Gravel is o	dense o	range-bro	wn slight	ly gravelly		
1.00		N4						sub-a	ingular fine	to medium sa	indstone	with iron	staining.	DIACK		
- 1.50	В	12,13,					. <u>-</u> 	MAR	RLSTONE F	OCK FORM	IATION					
- 1.50	В					. : <u> </u>	(2.40)									
2.00		N4				· • · · ·	· _ ·F									
-		7,1				. <u> </u>	,[目
-			ĺ			- 										
-					176.98	⊢· · —-	3.00									
3.00		N4			170.90			Loos	e and very l	ose becomin	ig very d	ense oran	ge-brown	slightly		1:目:
Ę		10,4 1,1,1				a	,- -	grave sub-a	angular med	AND. Grave	l is orang ied sand	ge-brown stone.	occasion	ally black		
						- <u>°</u>		MAR	- RESTONE F	ROCK FORM	IATION					
Ę							1									
4.00		N4					 - -									
Ę		1,1 1,1,1	/ l,1				- - -									
Ē						. .	(3.45)									
F							[(3. - 3)									目
5.00	D	N				. : <u></u> a '	 -									
5.00		1,0)/			- <u> </u>	1 1									
[-		0,0,0),1													
5.80	D															
6.00		N5 3,2	0				- - -									
<u>}</u>		3,15,1	7,15		173.53		6.45									
							-									
Ē							-									
							-									
5 - 5 -							-									
-							-									
E							-									
														GENE REMA		
All dimen														No groundwate encountered. SI 6.45 m. Installe	PT refu	
														groundwater an gas standpipe to	d grou 5.0 n	ınd n.
All dimen	nsions in cale 1:50		C	lient	Elan	Homes	Limited		Method/ Plant Used	Compe	titor D	ART		Logged By ET		



Project												BOREH	OLE	No
Sto	ocking	Lane, S	Shenir	ngton								פח	102	
Job No				29-09-21		Ground L	evel (m)		ordinates ()			03	102	
	076J			29-09-21		1	79.17		E 436,943.0) N 242,8	20.0			
Contractor												Sheet		
	scover	·										1 c	of 1	1.
SAMPI	LES &	TEST	S	5 5	1	1	1	STRA	ATA				2	nent/ l
Depth	Type No	Test Resu		Reduced Level	Legend	Depth (Thick- ness)			DESCRI				Geology	Instrument/ Backfill
0.30	ES			178.42		(0.75) 0.75	Gravel is bro fine to media (less than 5 r	wn sub-i im sands	tone with iror	o medium qu	artzite and	d sub-angular		
1.00		N24 4,5/ 5,5,7	/	177 (7		(0.75)	dark brown s	sub-roun	ightly gravell ded and sub-a	y sandy CLA ngular fine to	Y. Gravel medium	is brown and sandstone		
1.50	D	5,5,7	,/	177.67		1.50 (0.40) 1.90	A LADI OTO		K FORMATI			/		
2.00	В	N14 8,5/ 3,3,3	/			(1.10)	MARLSTOM Medium den	se orange	K FORMATI e-brown sligh n angular and taining.	tly clayey gra	welly SAN fine to me	ND. Gravel is edium		
3.00		N1 10,2	2/	176.17		3.00	NO RECOV	ERY	K FORMATI					
		1,0,0		175.37		(0.80) 3.80	SAND. Grav					layey gravelly one with iron		
- 3.80		N50/240 20,5 3,20,2	5/	174.92		-(0.45) 4.25	MARLSTON NO RECOV		K FORMATI	ON		/		
- - - -						- - - -	and sub-ang	ılar medi	own clayey g ium snadstone	e with iron sta	D. Gravel aining.	is angular		
							MARLSTO	<u>NE ROC</u>	<u>K FORMATI</u>	<u>UN</u>]		
All dimen														
												GENE REMA		
												No groundwate encountered. To early due to SP 4.25 m. Backfi clean gravel.	ermina T refus	sal at
All dimen	sions in ale 1:50		Clier	nt Elan	Homes	Limited	Metho Plant U		Competitor	r DART		Logged By ET		



Proj	ject													BOREH	OLE	No
	Stoc	Stocking Lane, Shenington o Date 29-09-21 Ground Level (m) Co-Ordinates () 21076J 29-09-21 177.93 E 436,974.0 N 242,690												DS'	102	
Job		1076J 29-09-21 177.93 E 436,974.0 N 242,690												03	103	
)76J			29	9-09-21		1	77.93		E 436,974.0	N 242,690.	.0			
Cor	ntractor													Sheet		
														1 0	f 1	
SA	AMPL	ES &	TEST	`S	er		1	1	1	STR	ATA				Ŋ	l l
D	Depth	Type No	Tes Resu	t ılt	Water	Reduced Level	Legend	Depth (Thick- ness)			DESCRIP				Geology	Instrument/ Backfill
0.1	5	ES					⊢ — -	(0.60)	Gravel is t fine to me	orown sul dium san	ht orange-brown s b-rounded fine to dstone with iron s	medium quartz	zite and	sub-angular		
0.50		D				177.33 177.03	<u> </u>	0.60	TOPSOIL							
-0.90 - 1.00 - 1.00	0	ES D	N50/20			176.48		£ (0 55)	dark brow	n sub-rou	slightly gravelly unded and sub-an	sandy CLAY. gular fine to me	Gravel i edium s	is brown and andstone		
Ē			6,8 13,20	,17		170.40	000	- 1.43	11		CK FORMATIO	N.				incoi
				-				- - - -	Very dens brown and	e orange- l orange a	brown-yellow same angular and sub-a	ndy GRAVEL.	Gravel to coar	is dark rse		
		sandstone with iron staining. MARLSTONE ROCK FORMATION									N					
-		MARLSTONE ROCK FORMATION														
								-								
								- - -								
								- -								
								- - -								
								- - -								
-								-								
<u>11/21</u>								- - -								
.GDT 22																
AGS 3 1								- - -								
								- - -								
								-								
								-								
s - USE T														GENE REMA		
													e e 1 g	No groundwate ncountered. Te arly due to SP' .45 m. Installe roundwater an as standpipe to	r ermina Γ refus d with d grou	ted sal at ind
									I							
IA AGS31	All dimensions in metres Scale 1:50 Client Elan Homes Limited Method/ Plant Used Competitor DART										L	ogged By ET				



Project								BOREH	OLE	No
Stockii	ng Lane,	Shenin			104					
Job No		Date ,	29-09-21		DS ²	104				
21076	J	2	29-09-21	1	78.78	E 436,922.0 N 242,7	747.0			
Contractor								Sheet		
Discov	very CE							1 0	f 1	
SAMPLES	& TEST	۲S ا	[]		1	STRATA			Ŋ	nent/
Depth Ty	vpe Tes No Rest		Reduced Level Le	egend (Thick- ness)		DESCRIPTION			Geology	Instrument/ Backfill
All dimension Scale 1	S N60/22 6,1 15,16	0/	177.78	$\begin{array}{c} & & & \\ \hline & & \\ \hline & & & \\ \hline \\ \hline$	Gravel is bro fine to mediu (less than 5 r TOPSOIL Medium den and dark bro sandstone wi MARLSTON Very dense y medium to ca	ng light orange-brown slightly gra wn sub-rounded fine to medium q m sandstone with iron staining. O nm diameter). se orange-brown clayey sandy GR wn sub-rounded and sub-angular f th iron staining. <u>IE ROCK FORMATION.</u> ellow-brown-orange sandy GRAV varse sandstone with iron staining. <u>IE ROCK FORMATION</u>	uartzite and ccasional fir AVEL. Grav ine to mediu /EL. Gravel	sub-angular ne rootlets vel is brown im		
	1	I	<u> </u>	<u>L</u>	1			GENE REMA	RKS	<u> </u>
							en ea 1.	o groundwate acountered. Te rrly due to SP' 45 m. Backfil ean gravel.	rmina Γrefus	al at
All dimension Scale 1			ogged By ET	,						



Project													BOREH	OLE	No
	g Lane,		-	ton									– DS [,]	105	
Job No	Stocking Lane, SheningtonNoDate29-09-2121076J29-09-2129-09-21ractorDiscovery CE $\underbrace{MPLES \& TESTS}_{pth}$ $\underbrace{MPLES \& TESTS}_{No}$ ReducedpthTypeTest $\underbrace{MPLES}_{Result}$ $\underbrace{177.19}_{176.84}$ ES $\underbrace{N20}_{4,3/}_{5,5,5,5}$ 176.84DN50/35mm176.34					Ground L		·	Co-Ordii	0				105	
			29	9-09-21		1	77.84		E 4	37,020.0) N 242,	727.0			
Contractor													Sheet		
	·												1 0	t I	1
SAMPLES	& TES	ΓS	er					S	TRAT	A				Ś	nent/ II
Depth Typ No	e Te Res	st sult	Wat	Reduced Level	Legend	Depth (Thick- ness)				DESCRI				Geology	Instrun Backfi
0.50 ES	N: 4, 5,5, N50/2	20 3/ 5,5 35mm 10/	Wa	Level		(Thick- ness) (0.65) (0.65) (0.65) (0.50) (0.50) (0.50) (0.50) (0.50) (0.50)	Gras Grav fine (less TOP Oran dark with MAI Stiff brow MAI Dens Grav with	to medium than 5 mm SOIL ge-brown sub- brown sub- iron stainir RLSTONE brown-orange a RLSTONE se becoming	sub-rour sandstond diameter lightly gr rounded g. <u>ROCK F</u> nge slight ngular fur <u>ROCK F</u> g very de -brown a g.	nge-brown nded fine t e with iron ravelly san and sub-a ORMATIO tly gravelly ne and med ORMATIO nse brown angular and	a slightly gr o medium o o staining. C dy CLAY. ngular fine ON. y very sand lium sands ON slightly cla d sub-angu	quartzite an Occasional Gravel is to to medium y CLAY. (tone grave	nd sub-angular fine rootlets prown and n sandstone	Geolo	
		I		<u> </u>		<u> </u>	<u>.</u>						GENE REMA		<u> </u>
													No groudwater encountered. Te early due to SP 2.45 m. Backfil clean gravel.	Γ refus	sal at
All dimensions Scale 1:		s Cli	ient	Elan H	Homes	Limited		Method/ Plant Used	l Co	ompetitor	DART]	Logged By ET		



Project												BOREH	OLE	No
Sto	cking	Lane,	She	ning	ton								100	
Job No	21076J 29-09-21 179.34 E 436,827.0 N 242,740.0										פט	106		
				2	9-09-21		1	79.34		E 436,827.0 N 24	2,740.0			
Contractor												Sheet		
	covery											1 c	f 1	
SAMPL	ES &	TEST	S	er				[STF	RATA			Ś	nent/ II
Depth	Type No	Tes Resi		Water	Reduced Level	Legend	Depth (Thick- ness)			DESCRIPTION			Geology	Instrument/ Backfill
0.10	ES				178.69		(0.65)	Gravel is but fine to med (less than 5	rown su ium san	ht orange-brown slightly b-rounded fine to medius adstone with iron staining ameter).	n quartzite and	d sub-angular		
- 0.80 - 1.00	ES	N3 10,1	0/		178.39	0 <u>~</u> 0 0 <u>~0</u> 0 <u>~0</u> 0	2 0.95 (0.50)	Medium de and dark bi	own su	nge-brown clayey sandy b-rounded and sub-angul	GRAVEL. Gra ar fine to med	avel is brown ium		
1.40	D	12,12	,6,3		177.89		<u> </u>	MARLSTO Dense oran	ONE RC	OCK FORMATION.	sandy GRAV	EL. Gravel is		
2.00	N20 13,5/ 11,3,3,3 N20 13,5/ 11,3,3,3 N20 13,5/ 11,3,3,3 N20 13,5/ 11,3,3,3 N20 13,5/ 11,3,3,3 N20 13,5/ 11,3,3,3 N20 13,5/ 10,00 N20 10,00 N20 10,00 N20 10,00 N20 N20 N20 N20 N20 N20 N20 N									iron staining a	and rare iron			
2.80	80 D 00 N50/160mm								e-brown-yellov own angular fi	v slightly ne to medium				
3.00														
All dimen												GENE	RAL	
												GENE REMA No groundwate encountered. To early due to SP 3.45 m. Installe groundwater ar gas standpipe to	RKS r ermina T refus d with d grou	al at nd
All dimen	All dimensions in metres Scale 1:50 Client Elan Homes Limited Method/ Plant Used Competitor DART Logge									Logged By E1	7			

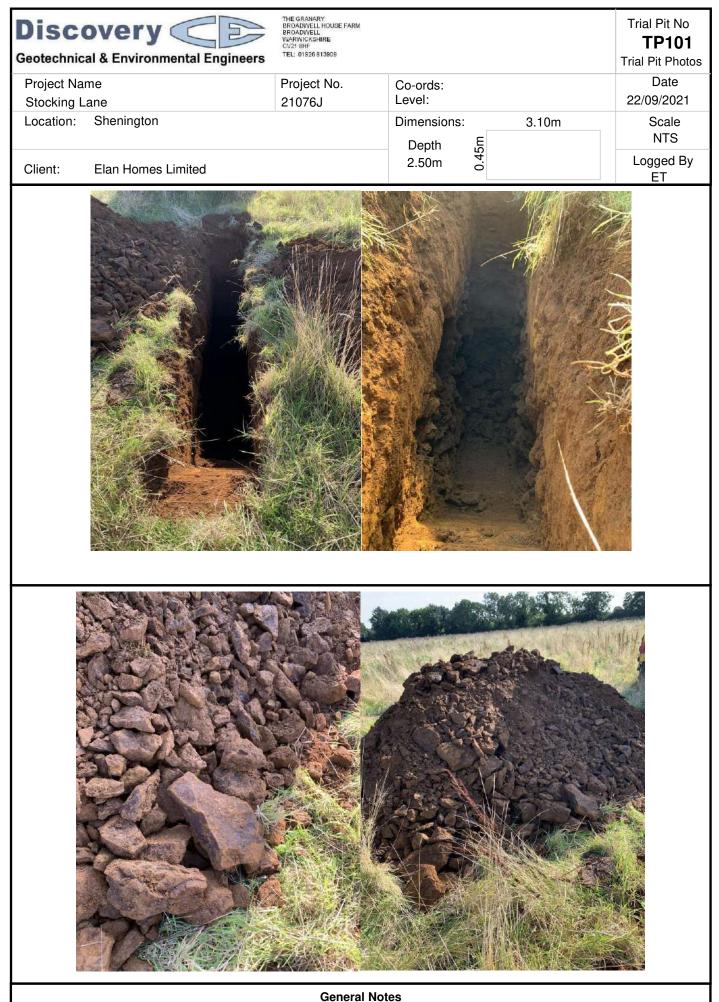


Project										BOREH	OLE	No
	cking	Lane, S		ngton		<u> </u>	1			- DS	107	,
Job No	0761		Date	29-09-21		Ground L		Co-Ordinates ()	0 N 242 712 0			
Contractor	076J			29-09-21		1	78.47	E 430,922	.0 N 242,712.0	Sheet		
	scover	v CE								1 0	f 1	
SAMPI		-						STRATA				f.
			191	Reduced	4	Depth					Geology	Instrument/ Backfill
Depth	Type No	Result	t B	Reduced Level		(Thick- ness)			RIPTION		Geol	Instr Back
0.20	EC			178.17		0.30	Grass overlyin	ng orange-brown-ye	ellow gravelly SAND. C I sub-angular fine to me	Gravel is		
0.20	ES				0000	1	sandstone wit	h iron staining.	a bud ungunu mite to m			
					0000		TOPSOIL	1				
1.00		N50/295	mm		0.00	(1.15)	is orange-darl	k brown angular and	onally yellow sandy GR I sub-angular fine to me	edium		
		5,6/ 6,14,15,		177.02	000	1.45		h iron staining.				
		0,14,13,	,15	177.02		-	MARLSTON	E ROCK FORMA	TION	/		- pure
						-						
-						-						
						-						
						-						
_						-						
						-						
						-						
						-						
						-						
						-						
						-						
						-						
-						-						
						-						
						-						
						-						
						-						
						-						
						-						
-						-						
						- -						
						-						
						-						
		·								GENE	RAL	
										REMA	RKS	,
All dimen										No groundwate encountered. To early due to SP 1.45 m. Backfil clean gravel.	ermina Γrefus	sal at
All dimen Sc	sions in ale 1:50		Clier	nt Elan	Homes	Limited	Method Plant U		or DART	Logged By ET		

TRIAL PIT LOG



Project							TF	RIAL PIT No
	king Lane,	Shenington					_	TP101
Job No		Date 22-09-21	Ground Level (n	·	dinates ()			
210	76J	22-09-21	179.86	E	436,855.0 N 242,7	94.0		
Contractor							Sheet	
Disc	covery CE							1 of 1
			STRATA			SA	MPLE	S & TESTS
						Depth	No	Remarks/Tests
Depth 0.00-0.25 0.25-0.70	<u>1/ 1/1</u> su st <u> 0</u> <u> 0</u> <u> 0</u> <u> 0</u> <u> 0</u> <u>- 0</u> <u>- 0</u> <u>- 0</u> <u>- 0</u> <u>- 0</u> <u>- 0</u> <u>- 0</u>	rass overlying light orange b-rounded fine to mediun aining. Occasional fine ro OPSOIL range-brown gravelly very id sub-angular fine to med IARLSTONE ROCK FOF	e-brown slightly gravn quartzite and sub-a otlets (less than 5 mm y sandy CLAY. Grav lium sandstone with	ngular fine to mee m diameter). /el is brown and d	dium sandstone with iron			
0.70-0.80	° C C Am	rm orange-brown slightly gular medium sandstone (ARLSTONE ROCK FOF range-brown sandy cobbly edium to coarse sandstone (ARLSTONE ROCK FOF	with occasional iron RMATION. y GRAVEL. Gravel e with iron staining.	staining.	/	0.70	ES	
1.50-1.60 1.60-2.00	Fi G G G G G G G G G G G G G	rm orange-brown-yellow ib-angular fine to medium ARLSTONE ROCK FOF range-brown sandy cobbly edium to coarse sandstone	sandstone with iron RMATION y GRAVEL. Gravel	staining.	-	1.60	ES	
2.00-2.50 2.00-2.50 Shoring/S Stability: D All dimens Sca	M O ar	ARLSTONE ROCK FOF range-brown and dark bro id iron deposits. Occasion ARLSTONE ROCK FOF	RMATION wwn thinly laminated al bands of fine orar	SANDSTONE w	/ ith regular iron staining			ENERAL
Shoring/S Stability:	upport: No Stable — 3.10 — <u>A</u> <u>C</u>	B 0.45				e 2 d g p z	R No groun ncounte .50 m b igging. roundw ipe insta one 0.00	EMARKS
All dimens	ions in metres le 1:25	S Client Elan Hom	es Limited	Method/ Plant Used	JCB 3CX		ogged I	^{Зу} ЕТ



No groundwater encountered. Terminated at 2.50 m due to hard digging. Gas and groundwater monitoring pipe installed, response zone 0.0 - 2.50 m. backfilled with arisings

TRIAL PIT LOG



Geotechnical & Environmental Engineers

Project	ject								TRIAL PIT No	
Sto	ocking L		Shenington							TP102
Job No			Date 22-09-21	Ground Level (n	·	o-Ordinates (0			17102
21	076J		22-09-21	178.88	3	E 436,9	18.0 N 242,7	74.0		
Contractor									Shee	
Dis	scovery	CE								1 of 1
			S	TRATA				SA	MPLE	ES & TESTS
								Deptl	h No	Remarks/Tests
Depth 0.00-0.25	No $\frac{\sqrt{1/2}}{1/2}$	/ sub-	ss overlying orange-brow rounded fine to medium ing. Occasional fine root	n slightly gravelly quartzite and sub-a	ingular fine to	. Gravel is bi p medium sar	rown ndstone with iron			
0.25-0.60	25-0.60 TOPSOIL 0.30							0.30	ES	
0.60-1.60	60-1.60 Orange-brown sandy GRAVEL Gravel is brown and dark brown angular occasionally									
	00	Occ	asional cobbles.	dstone with occasi	onal iron stai	ning and iror	i deposits.	0.90	ES	
	$ \begin{array}{c} \circ & \circ \\ \circ & \circ \\ \circ & \circ \end{array} $ MARLSTONE ROCK FORMATION.							1.00	ES	
		e								
1.60-2.00	00000000000000000000000000000000000000	Ora	nge-brown sandy cobbly ium to coarse sandstone	GRAVEL. Gravel with iron staining.	is dark brow	n angular occ	asionally tabular	1.50	D	
200.200	000000000000000000000000000000000000000		RLSTONE ROCK FORM			JTF	1	1.80	В	
2.00-2.60		and	nge-brown and dark brow iron deposits. Occasional RLSTONE ROCK FORM	l bands of fine to n	nedium orang	e sand.	lar iron staining			
								2.40	В	
Shoring/Stability:		Non	e							GENERAL REMARKS
⊨									2.60 m b digging. infiltrati	ered. Terminated at ogl due to hard Used for on testing.
D	C		B 0.45						DaCKIIII	ed with arisings.
	sions in n ale 1:25	netres	Client Elan Home	s Limited	Method/ Plant Used	JC	B 3CX		Logged	By ET

AGS3 UK TP 21076J SHENINGTON LOGS - USE THIS ONE.GPJ GINT STD AGS 3 1.GDT 15/11/21

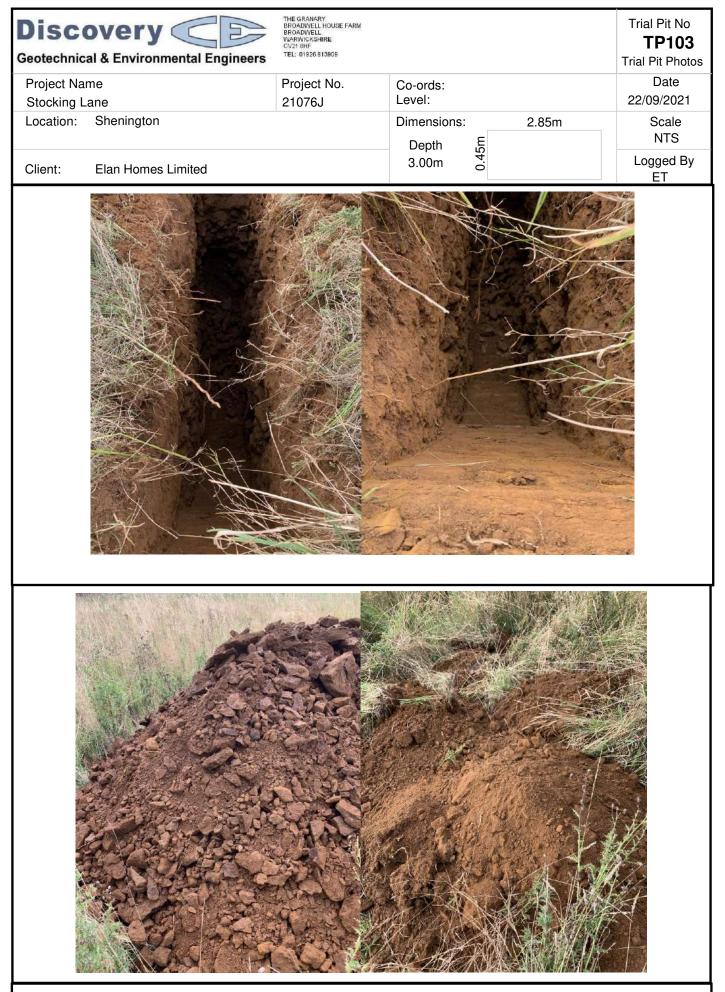


No groundwater encountered. Terminated at 2.40 m due to hard digging. Used for infiltration testing. Backfilled with arisings.

TRIAL PIT LOG



Project	roject						TF	RIAL PIT No
Sto	ocking Lar	ie, Shenington						TP103
Job No		Date 22-09-21	Ground Level (n	n) C	o-Ordinates ()			17103
21	076J	22-09-21	178.49)	E 436,984.0 N 242,7	80.0		
Contractor							Sheet	
Dis	scovery C	E						1 of 1
			STRATA			SA	MPLE	S & TESTS
						Depth	No	Remarks/Tests
Depth 0.00-0.35	No	sub-rounded fine to me diameter).	DESC ange-brown slightly gra dium quartzite and sands	RIPTION velly sandy C stone. Fine ro	LAY. Gravel is brown otlets (less than 5 mm			
0.35-1.40		TOPSOIL Orange-brown sandy G tabular medium to coar Occasional cobbles. MARLSTONE ROCK	se angular sandstone wit	n and dark bi h iron stainin	rown angular occasionally g and rare iron deposits.	0.80	ES	
1.40-1.90								
1.90-3.00		Orange-brown and dark SANDSTONE with reg medium orange sand. MARLSTONE ROCK	_	ry dark grey t on deposits. C	ninly laminated Occasional bands of fine to	2.10	В	
E. 641 611 1001 - 1007 - 1001 101 1121						_		
Shoring/	Shoring/Support: None Stability: Stable $ \begin{array}{c c} \hline \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ $							
All dimer	Il dimensions in metres Scale 1:25 Client Elan Homes Limited Method/ Plant Used L							^{Зу} ЕТ

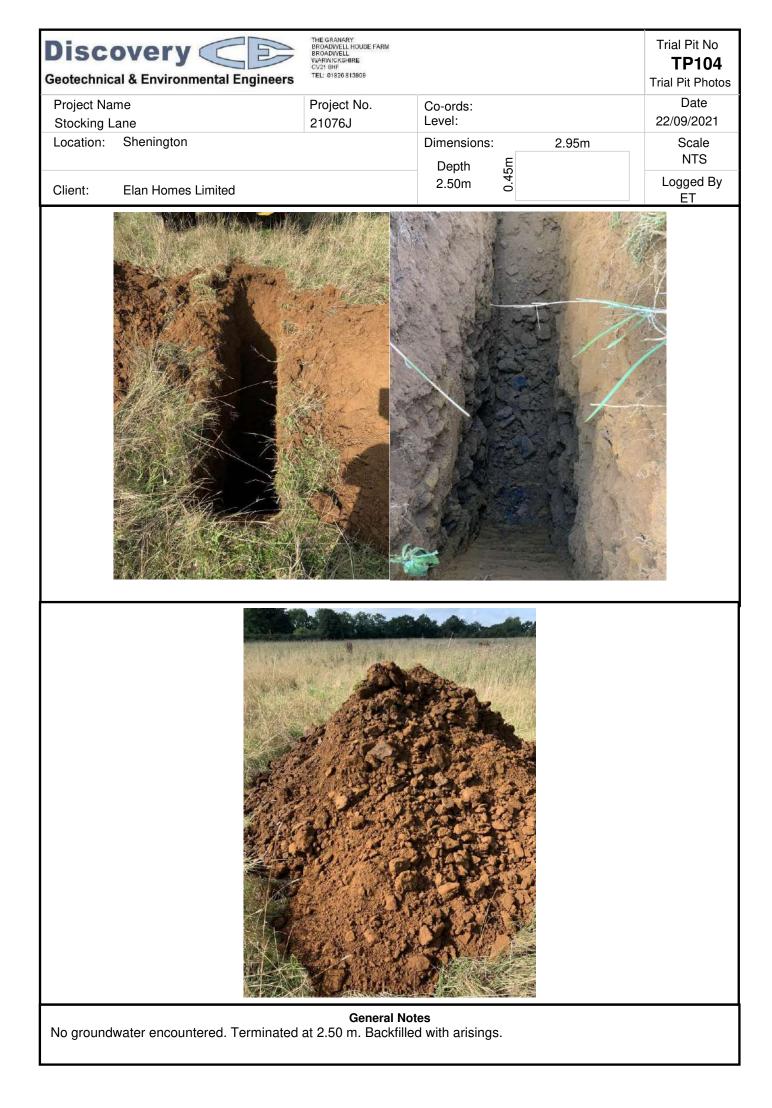


General Notes No groundwater encountered. Terminated at 3.00 m. Backfilled with arisings.

TRIAL PIT LOG



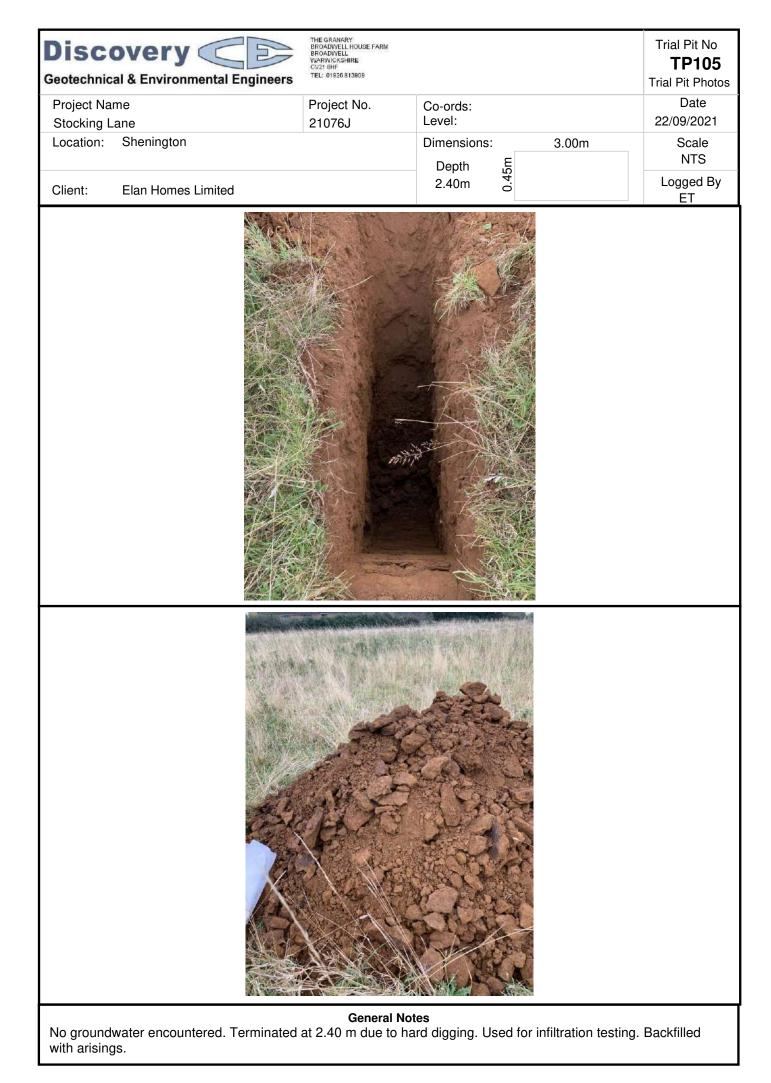
Job No	cking Lane,	Shenington						
								TP104
		Date 22-09-21	Ground Level (n	n) Co-Or	dinates ()			IF 104
21	076J	22-09-21	178.02	H	E 437,004.0 N 242,7	35.0		
Contractor							Sheet	
Dis	covery CE							1 of 1
			STRATA			SA	MPLE	S & TESTS
						Depth	No	Remarks/Tests
Depth 0.00-0.35		ass overlying light orang b-rounded fine to mediur ccasional fine rootlets (le: DPSOIL	e-brown slightly grav n quartzite and sub-a	RIPTION velly very sandy (ngular fine to me er).	CLAY. Gravel is brown dium sandstone.			
0.35-1.50		ange-brown sandy GRA casionally tabular mediu ccasional cobbles.	m to coarse sandston	n becoming dark e with iron stainin	brown angular ng and rare iron deposits.	0.60	ES	
	°0 - M °0 - °0 - O	ARLSTONE ROCK FOI	RMATION.			1.00	ES	
						1.00	ES	
1.50-2.20		ange-brown and dark bro ndstone. Cobbles are ang casional fine to medium ARLSTONE ROCK FOI	ular and tabular if sa orange sand.	ES. Gravel is an ndstone. Occasio	gular and tabular coarse mal iron staining and	1.50	В	
2.20-2.40	an	ange-brown and dark bro d iron deposits. Occasior ARLSTONE ROCK FOI	hal bands of fine orar	SANDSTONE was sand.	vith regular iron staining	2.30	D	
Stability:	Support: No Stable 	me → B 0.45				e 2 d	R lo grour ncounte .50 m b	ENERAL EMARKS ndwater red. Terminated at gl due to hard Backfilled with
	C sions in metres ale 1:25	<u>↓</u>	nes Limited	Method/ Plant Used	JCB 3CX		.ogged I	^{3y} ET



TRIAL PIT LOG



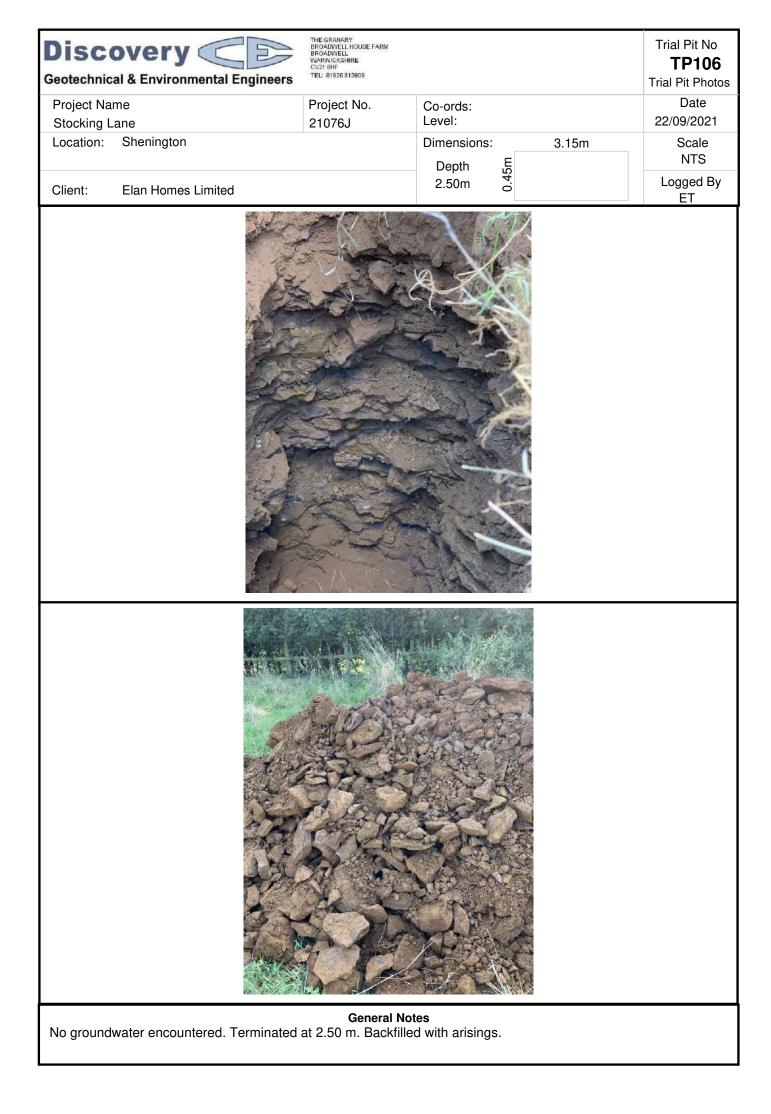
Project	-								
	cking La	ne, Shenington					_ .	TP105	
Job No	0.7.4	Date 22-09-21	Ground Level (m)		linates ()	20.0			
	076J	22-09-21	178.30	E	436,973.0 N 242,7	39.0	C1		
Contractor							Sheet	1 6 1	
Dis	covery C							1 of 1	
			STRATA					S & TESTS	
Depth 0.00-0.20 0.20-1.60	No 0 0 0 0 0 0 0 0 0 0 0 0 0	Grass overlying light oran, sub-rounded fine to mediu Occasional fine rootlets (la TOPSOIL Orange-brown sandy GRA sandstone. Occasional cob MARLSTONE ROCK FC	DESCF ge-brown slightly grave im quartzite and sub-ar ess than 5 mm diamete AVEL. Gravel is angula obles. DRMATION.	ngular fine to mee r). ar occasionally tal	ium sandstone. / pular medium to coarse e sandstone GRAVEL	0.50	ES	Remarks/Tests	
1.75-2.00		MARLSTONE ROCK FC Orange-brown and dark bi sandstone. Cobbles are any occasional fine to medium MARLSTONE ROCK FC	DRMATION. rown gravelly COBBL gular and tabular if san orange sand.	ES. Gravel is ang	/ ular and tabular coarse	1.80	D B D		
Shoring/S Stability: D All dimen	Support: Stable 					e 2 d	RI No ground ncounter .50 m bg igging. U nfiltration	ed. Terminated at due to hard	
All dimen	sions in me ale 1:25	etres Client Elan Hor		Method/ Plant Used	JCB 3CX		ogged B	y ET	



TRIAL PIT LOG



Project							TR	RIAL PIT No
Sto	cking Lan	e, Shenington						TP106
Job No		Date 22-09-21	Ground Level (n	n) Co-Orc	linates ()			IFIUO
21	076J	22-09-21	178.10) E	436,898.0 N 242,69	90.0		
Contractor							Sheet	
Dis	covery Cl	E						1 of 1
			STRATA			SA	MPLE	S & TESTS
						Depth	No	Remarks/Tests
Depth 0.00-0.15 0.15-0.50	No	Grass overlying light orang fine to medium quartzite ar Occasional fine rootlets (le	e-brown slightly grav d sub-angular fine to	o medium sandston	el is brown sub-rounded e with iron staining.	/		
0.50-1.65		TOPSOIL Orange-brown slightly grav sub-rounded and sub-angu MARLSTONE ROCK FO Orange-brown sandy GRA occasionally tabular mediu Occasional cobbles.	velly very sandy CLA lar fine to medium sa RMATION. VEL. Gravel is brow	Y. Gravel is browndstone with irons	staining.	0.70	ES	
	000000	MARLSTONE ROCK FO	RMATION.			1.00	D	
1.65-2.10 2.10-2.50		Orange-brown and dark br sandstone. Cobbles are ang occasional fine to medium MARLSTONE ROCK FO Orange-brown and dark br	ular and tabular if sa orange sand. RMATION.	ndstone. Occasion	nal iron staining and	1.50	D	
		and iron deposits. Occasion MARLSTONE ROCK FO	nal bands of fine orar	ige sand.		2.30	D	
Shoring/S Stability:	Support: 1 Stable 					e 2 d g	R No grounte counte .50 m b ligging. groundwa	ENERAL EMARKS adwater red. Terminated at gl due to hard Gas and ater monitoring illed, response) - 2.50 m.
	dimensions in metres Scale 1:25 Client Elan Homes Limited Method/ Plant Used JCB 3CX L							



TRIAL PIT LOG



Project	pet							IAL PIT No
Sto	cking Lane,	Shenington						TP107
Job No		Date 22-09-21	Ground Level (m)	Co-Ordinates ()				
21	076J	22-09-21	178.90	E 436,880	.0 N 242,730.0			
Contractor							Sheet	
Dis	scovery CE							1 of 1
			STRATA			SAM	PLES	S & TESTS
					Γ	Depth	No	Remarks/Tests
Depth 0.00-0.30	- su	rass overlying light orang ib-rounded fine to mediun ccasional fine rootlets (les	n quartzite and sub-angul	v sandv CLAY. Gravel i	s brown	-		
0.30-0.80		OPSOIL. range-brown and dark bro cooming dark brown sub-r on staining. IARLSTONE ROCK FOF	ounded and sub-angular	/ sandy CLAY. Gravel is fine to medium sandstor	brown he with rare 0.4	0	ES	
0.80-1.75	o m	range-brown sandy GRAV edium to coarse sandstone IARLSTONE ROCK FOF	e. Occasional cobbles.	vn angular occasionally t	abular			
					1.4	0	ES	
1.75-2.00	2 A 52	range-brown and dark bro indstone. Cobbles are ang ccasional fine to medium o	ular and tabular if sandst	Gravel is angular and ta one. Occasional iron sta	bular coarse ining and 1.8	0	В	
2.00-2.70	i i i O	IARLSTONE ROCK FOF range-brown and dark bro nd iron deposits. Occasion IARLSTONE ROCK FOF	own thinly laminated SAl al bands of fine orange s	NDSTONE with regular and.	2.1	0	В	
Shoring/S Stability: D All dimen								
Shoring/S Stability:	Support: No Minor coll 3.05 — A	apse on eastern face				enc 2.7 dig	ground counter 0 m bg	ENERAL EMARKS dwater red. Terminated at gl due to hard Backfilled with
All dimen	C sions in metre			thod/	202		gged B	y FT
Sca	ale 1:25		Pla	nt Used JCB	эсл			ET



TRIAL PIT LOG



Project			TI	RIAL PIT No				
Sto	cking Lane,	Shenington						HP101
Job No		Date 13-10-21 13-10-21	Ground Level (n	·	Ordinates ()			
	076J	13-10-21	179.98	3	E 436,910.0 N 242,8	85.0		
Contractor							Sheet	
Dis	scovery CE							1 of 1
			STRATA			SA	MPLE	S & TESTS
						Depth	n No	Remarks/Tests
Depth 0.00-0.60	sta	rass overlying firm light b-rounded fine to mediu aining. Occasional fine r OPSOIL	orange-brown slightly m quartzite and sub-a	RIPTION y gravelly sandy ngular fine to r m diameter).	/ CLAY. Gravel is brown nedium sandstone with iron			
						0.50	В	
0.60-0.75	da	edium dense orange-bro ırk brown sub-rounded a ARLSTONE ROCK FO		rery clayey SAN o medium sands	ID. Gravel is brown and stone with iron staining.	0.75	D	
All dimen Sc								
Shoring/S Stability:	—— 0.45 —— A	■ B 0.45					R No groun encounte pit. Tern bgl due t	ENERAL EMARKS indwater red. Hand dug trial ininated at 0.75 m o hard digging. ed with arisings.
All dimen	C sions in metres ale 1:25	S Client Elan Hor	nes Limited	Method/ Plant Used			Logged 1	^{3y} ET

TRIAL PIT LOG



Project	oject							RIAL PIT No
Sto	cking Lane,	Shenington						
Job No		Date 13-10-21	Ground Level (n	n) Co-C	Ordinates ()			HP102
)76J	13-10-21	179.17	·]	E 436,942.0 N 242,8	20.0		
Contractor							Sheet	
Dis	covery CE							1 of 1
			STRATA			SAI	MPLE	S & TESTS
						Depth	No	Remarks/Tests
Depth 0.00-0.75	sta	rass overlying firm light ib-rounded fine to mediu aining. Occasional fine r OPSOIL	orange-brown slightly	RIPTION / gravelly sandy ngular fine to m n diameter).	CLAY. Gravel is brown edium sandstone with iron			
0.75-1.00		rm orange-brown slightl ib-rounded and sub-angu	y gravelly sandy CLA ılar fine to medium sa	Y. Gravel is bro ndstone with iro	wn and dark brown n staining.	0.40	В	
	M	ARLSTONE ROCK FC	ORMATION.		/	1.00	D	
All dimension Logs - USE THIS ONE GPU GINT STD AGS 3_1.GPT 22/1/21 Concerned and the set of the set	Support:							ENERAL
Shoring/S Stability:								
All dimens	sions in metres ale 1:25	s Client Elan Hor	mes Limited	Method/ Plant Used		L	ogged l	By ET

TRIAL PIT LOG



Project								TF	RIAL PIT No
	ocking		henington		<u> </u>			_	HP103
Job No	0761		Date 13-10-21	Ground Level (n	·	Co-Ordinates () $E 426.072.0 $ N 242.60	0.0		
Contractor	.076J		13-10-21	177.93		E 436,973.0 N 242,69	90.0	Sheet	
		ry CE						Sheet	1 of 1
		.,		STRATA			S A	MPI F	S & TESTS
				5110111			Depth		Remarks/Tests
Depth 0.00-0.60	No	stain	s overlying firm light o rounded fine to mediuu ing. Occasional fine ro SOIL	orange-brown slightly m quartzite and sub-a	RIPTION y gravelly sa ingular fine m diameter)	andy CLAY. Gravel is brown to medium sandstone with iron	0.30	В	
0.60-0.90		 Firm sub-	orange-brown slightly rounded and sub-angul	y gravelly sandy CLA lar fine to medium sa	Y. Gravel i ndstone wit	s brown and dark brown h iron staining.	_		
		sub-: MAI	RLSTONE ROCK FO	RMATION.			0.80	D	
Shoring/	Suppo	ort:							ENERAL
Stability:	:).45 A C					1	R No groun encounte oit. Term	EMARKS ndwater red. Hand dug trial inated at 0.90 m o hard digging. ed with arisings.
All dimer	nsions i ale 1:2		Client Elan Hon	nes Limited	Method/ Plant Used	1		Logged I	^{Зу} ЕТ

TRIAL PIT LOG



Project	t					
_	ne, Shenington					HP104
Job No	Date 13-10-21	Ground Level (m)	Co-Ordinates ()			
21076J	13-10-21	178.78	E 436,921.0 N 242,7	47.0		
Contractor	_				Sheet	
Discovery C	E					1 of 1
	S	STRATA		SAN	MPLE	S & TESTS
				Depth	No	Remarks/Tests
Depth 0.00-0.50	Grass overlying firm light or sub-rounded fine to medium staining. Occasional fine roo TOPSOIL	DESCRIPT ange-brown slightly grav quartzite and sub-angula otlets (less than 5 mm diar	elly sandy CLAY. Gravel is brown r fine to medium sandstone with iron			
	Medium dense orange-brow sub-rounded and sub-angula MARLSTONE ROCK FOR	r fine to medium sandstor	. Gravel is brown and dark brown ne with iron staining.	0.60	B D	
Shoring/Support: Stability: All dimensions in me Scale 1:25	B 0.45			ei pi	R o grour counte it. Term	ENERAL EMARKS Idwater red. Hand dug trial inated at 1.00 m o hard digging. d with arisings.
All dimensions in me Scale 1:25	tres Client Elan Home	es Limited Meth Plan	hod/ t Used		ogged H	³ y ET

TRIAL PIT LOG



Project						TR	IAL PIT No
Sto Job No	cking La	ane, Shenington	Ground Level (m)	Co-Ordinates ()		-	HP105
	076J	Date 13-10-21 13-10-21	177.84	E 437,019.0 N 242,72	27.0		
Contractor		15-10-21	1//.04	E 457,019.0 N 242,72	27.0	Sheet	
	covery (СF.				Sheet	1 of 1
			STRATA		SAI		S & TESTS
			SIRAIA		Depth	No	Remarks/Tests
Depth 0.00-0.65	No	staining. Occasional fine r TOPSOIL	ootlets (less than 5 mm diar	elly sandy CLAY. Gravel is brown r fine to medium sandstone with iron meter).	0.50	D	
0.65-1.00		Firm orange-brown gravel and sub-angular fine to me MARLSTONE ROCK FC	edium sandstone with iron s	prown and dark brown sub-rounded taining.	0.75	В	
Shoring/S							ENERAL
D	— 0.45 	B 0.45			ei p	RI lo groun ncounter it. Termi	EMARKS
A 11 -1"	C	etres Client Elan Hor	nes Limited Metl	hod/		ogged B	147
All dimen	sions in m ale 1:25		Plan	t Used		oggeu D	ET

TRIAL PIT LOG



Project								TRIAL PIT No		
	cking		henington					_	HP106	
Job No			Date 13-10-21 Ground Level (m) Co-Ordinates ()		40.0					
Contractor					E 436,826.0 N 242,7	6.0 N 242,740.0		+		
Discovery CE								Sheet	1 of 1	
STRATA							SA Depth		CS & TESTS Remarks/Tests	
Depth 0.00-0.65		stair	DESCRIPTION Grass overlying firm light orange-brown slightly gravelly sandy CLAY. Gravel is brown sub-rounded fine to medium quartzite and sub-angular fine to medium sandstone with iror staining. Occasional fine rootlets (less than 5 mm diameter). TOPSOIL							
0.65-0.95	0. _(0.	Oran	nge-brown clayey sand angular fine to mediun	ly GRAVEL. Gravel i n sandstone with iron	is brown and c staining.	lark brown sub-rounded and	0.40	D		
		2 o MA	RLSTONE ROCK FO	RMATION.				В		
Shoring/3 Stability:	Shoring/Support: Stability:							GENERAL REMARKS No groundwater encountered. Hand dug tria pit. Terminated at 0.95 m		
D		AC	B 0.45					ogl due t Backfille	o hard digging. ed with arisings.	
All dimensions in metres Scale 1:25 Client Elan Homes Limited Method/ Plant Used								Logged By ET		