The Thomas Family & Bloor Homes Ltd

LE22724
Newlands Farm

Flood Risk Assessment

LE22724–XX-LE-GEN-XX-RP-CE-FRA01-Flood Risk Assessment

First Issue
December 2023

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CONTENTS

1 INTRODUCTION

1.1 Background

1.1.1 Link was commissioned by The Thomas Family & Bloor Homes Ltd to prepare a Flood Risk Assessment and Drainage Strategy Statement for a new site along Newlands Farm. The report has been prepared in conjunction with the local policy guidance provided by Wokingham Borough Council.

1.1.2 The proposed site is a Suitable Alternative Natural Green Space (SANG) site which is outlined on drawing 10930-FPCR-ZZ-ZZ-DR-L-0002 - P03 - SANG Car Park in Appendix A.

1.2 Site Location

1.2.1 The site area totals to 16.38 ha and is within Flood Zone 3 based on data provided by the Environment Agency. The main access road to the site is Old Wokingham Road.

1.2.2 The main features of the current site include existing public access and natural landscapes. The proposed features include proposed footpaths, enhanced landscapes for ecological benefit, car parking and an access road.

1.2.3 Tertiary tributaries run through the site from the Emm Brook river, where one of the tributaries will be utilised as the outfall point.

1.2.4 The nearest postcode is RG40 3BU.

1.3 Topography

1.3.1 The site general falls to the south-east from the north-west approximately 57m AOD to 68m AOD.

1.3.2 A topographical survey has been appended within this report in Appendix B.

Figure 1. Site Location

1.4 Ground Conditions

1.4.1 Ground investigation survey desk study was conducted using British Geological Survey borehole records to review ground conditions on site. Publicly available borehole SU86NW65 situated at E 483140, N 166350, approximately 0.07km from the site was used to identify ground conditions. This record shows gravel and sand at 3.0m and sand at 12.8m.

1.4.2 Records from the British Geological Survey shows the site sits on pale yellow-brown to pale grey or white, locally orange or crimson, fine- to coarse-grained sand. This can be seen in Figure 2.

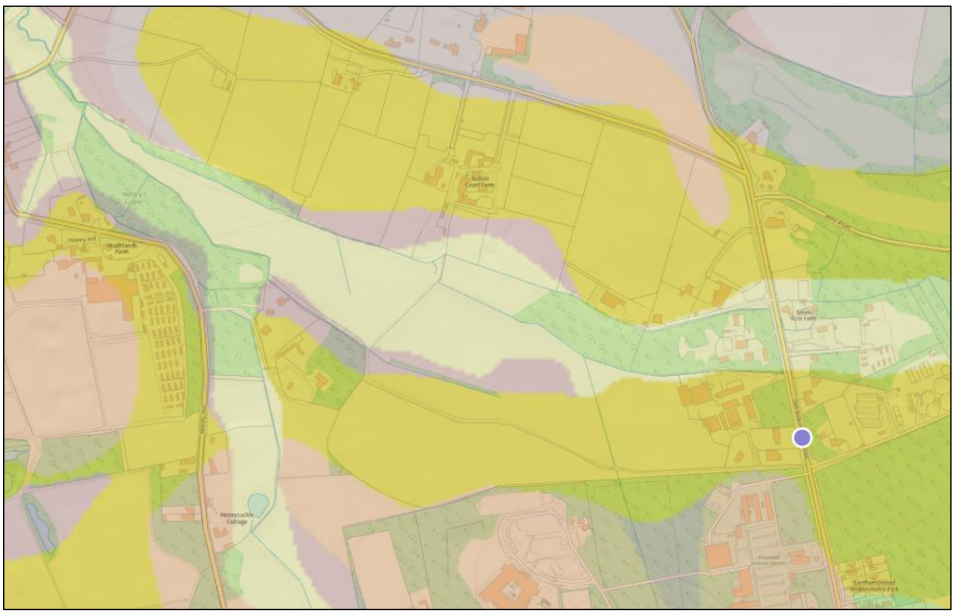

Figure 2. Ground geology from British Geological Survey records.

1.4.3 The ground is greenfield which allows for ground infiltration. Pervious surfaces are proposed at the entrance of the site for vehicle access and car parking, with tarmac at the first 10m of the site entrance.

1.4.4 Due to the high permeability of the soil present at the proposed site, it is suspected that ground water levels will be high.

1.5 Watercourses

1.5.1 The nearest watercourse is a nearby water ditch which runs along the site. this ditch connects to River Emm Brook. This river is classed as a 'moderate' ecological status due to current activity including sewage

discharge and urbanization. A ditch present north of the site will be utilised as an outfall connection for the drainage network at the carparking area.

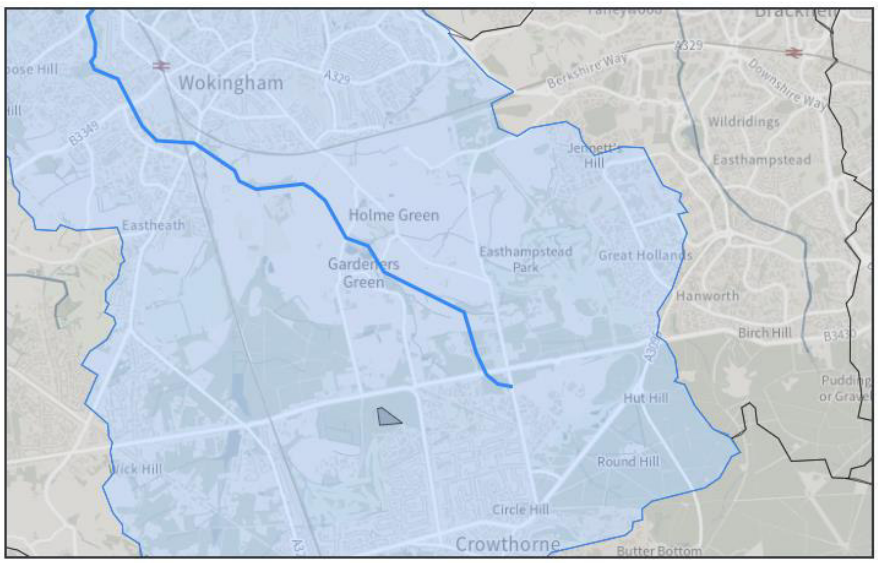

Figure 3: Extent of Emm Brook across the site (Credits: Environment Agency)

1.6 Existing Drainage

1.6.1 There are a few private properties situated in the site which suggest the presence of foul water drainage. Drainage is managed by Thames Water.

1.6.2 Sewage records at the highway of Old Wokingham Road was requested. Records show an existing chamber approx. 98m from the Section 278. This will be utilised to drain the Section 278 of the access road.

1.6.3 No further connections to existing drainage system will be required.

1.7 National Planning Flood Risk Policies Relevant to this Development

1.7.1 The National Planning Policy Framework (NPPF), last revised by the Department of Communities and Local Government (DCLG) on 5th September 2023, took immediate effect on that date. The document Technical Guidance on the National Policy Framework (TGNPPF) also published by the Department of Communities and Local Government, has now been withdrawn and superseded by the Planning Practice Guidance (PPG), published on 29 November 2016. Within the PPG Documentation, there is a guidance document: Flood risk and Coastal Change which was published 6 March 2014 (last updated 25 August 2022), which 'advises how to take account of and address the risks associated with flooding and coastal change in the planning process' for new developments.

1.7.2 The requirement for conducting a FRA as part of a planning application is set out in Footnote 55 on page 48 of the NPPF, which states:

"A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use."

1.7.3 Essential content of a site specific FRA is explained in the PPG, paragraph 020 as follows:

"A site-specific flood risk assessment is carried out by (or on behalf of) a developer to assess the flood risk to and from a development site. Where necessary (see footnote 5 in the National Planning Policy Framework), the assessment should accompany a planning application submitted to the local planning authority. The assessment should demonstrate to the decision-maker how flood risk will be managed now and over the development's lifetime, taking climate change into account, and with regard to the vulnerability of its users."

1.7.4 The objectives of a "site-specific flood risk assessment" are to establish:

- Whether a proposed development is likely to be affected by current or future flooding from any source;
- Whether it will increase flood risk elsewhere;
- Whether the measures proposed to deal with these effects and risks are appropriate;
- The evidence for the local planning authority to apply (if necessary) the Sequential Test, and;
- Whether the development will be safe and pass the Exception Test, if applicable."

1.7.5 According to the latest relevant Planning Practice Guidance, present day rainfall rates should be confirmed from the Climate Change Allowances map demonstrating climate change allowances for peak rainfall in England.

1.7.6 "Non-Statutory Technical Standards for Sustainable Drainage Systems" published by Department for Environment, Food and Rural Affairs in March 2015 sets out Government expectations for surface water drainage systems serving major developments to restrict discharges to greenfield rates. The standards do not address the quality of surface water discharges and state circumstances when the discharge rate can be higher than greenfield, up to the existing flow in the case of redevelopment of brown field sites.

1.7.7 Flood Zone 3a is defined as those areas of the Borough that are situated within the 1% AEP fluvial flood extent. The flood outlines for Flood Zone 3a as used in the SFRA are reflected in the current Environment Agency Flood Maps for Planning.

1.7.8 Flood zone 3b (functional floodplain) comprises land where water has to flow or be stored in times of flood. LPAs should identify in their SFRAs areas of functional floodplain in agreement with the Environment Agency. The NPPF PPG3 states the following: "*The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. However, land which would naturally flood with an annual probability of 1 in 20 (5%) or greater in any year, or is designed to flood (such as a flood*

attenuation scheme) in an extreme (0.1% annual probability) flood, should provide a starting point for consideration and discussions to identify the functional floodplain."

1.7.9 This is defined as:

- Land subject to flooding in the 5% AEP fluvial flood event, excluding building footprints; and,
- Land which provides a function of flood conveyance (i.e. free flow) or flood storage, either through natural processes, or by design (e.g. washlands and flood storage areas).

1.7.10 It should be noted that typically Flood Zones 2 and 3a do not take account of the presence of flood defences. In terms of planning policy this is a conservative assumption, meaning that new development placed in accordance with the Sequential Test would not rely on the presence of flood defences, as there remains a risk that these defences can fail through overtopping or structural failure.

1.7.11 Definition of Flood Zone 3b is more flexible and dependent on local agreement between each council and the Environment Agency. In some cases, it may be appropriate to take defences into account since these will affect where water is able to flow or be stored in times of flood and thus, which land is vulnerable to flooding in reality.

1.8 Local Policy Guidance

1.8.1 Wokingham Borough Council released a document 'Woking Borough Managing Development Delivery Document (Local Plan)' adopted in 2014, outlining a number of policies for development.

1.8.2 The relevant policies are summarised below:

1.8.3 **CP1 – Sustainable development**

Planning permission will be granted for development proposals that:

1. Maintain or enhance the high quality of the environment;
2. Minimise the emission of pollutants into the wider environment;
3. Limit any adverse effects on water quality (including ground water);
4. Ensure the provision of adequate drainage;
5. Minimise the consumption and use of resources and provide for recycling;
6. Incorporate facilities for recycling of water and waste to help reduce per capita water consumption;
7. Avoid areas of best and most versatile agricultural land;
8. Avoid areas where pollution (including noise) may impact upon the amenity of future occupiers;
9. Avoid increasing (and where possible reduce) risks of or from all forms of flooding (including from groundwater);
10. Provide attractive, functional, accessible, safe, secure and adaptable schemes;

11. Demonstrate how they support opportunities for reducing the need to travel, particularly by private car in line with CP6; and
12. Contribute towards the goal of reaching zero-carbon developments41 as soon as possible by:
    a. Including appropriate on-site renewable energy features; and
    b. Minimising energy and water consumption by measures including the use of appropriate layout and orientation, building form, design and construction, and design to take account of microclimate so as to minimise carbon dioxide emissions through giving careful consideration to how all aspects of development form.

CP4 - Infrastructure Requirements

Planning permission will not be granted unless appropriate arrangements for the improvement or provision of infrastructure, services, community and other facilities required for the development taking account of the cumulative impact of schemes are agreed. Arrangements for provision or improvement to the required standard will be secured by planning obligations or condition if appropriate.

CP7 - Biodiversity

Sites designated as of importance for nature conservation at an international or national level will be conserved and enhanced and inappropriate development will be resisted. The degree of protection given will be appropriate to the status of the site in terms of its international or national importance. Development:

1. Which may harm county designated sites (Local Wildlife Sites in Berkshire), whether directly or indirectly, or
2. Which may harm habitats or, species of principle importance in England for nature conservation, veteran trees or features of the landscape that are of major importance for wild flora and fauna (including wildlife and river corridors), whether directly or indirectly, or
3. That compromises the implementation of the national, regional, county and local biodiversity action plans will be only permitted if it has been clearly demonstrated that the need for the proposal outweighs the need to safeguard the nature conservation importance, that no alternative site that would result in less or no harm is available which will meet the need, and:

    i) Mitigation measures can be put in place to prevent damaging impacts; or

    ii) Appropriate compensation measures to offset the scale and kind of losses are provided.

CP8 - Thames Basin Heaths Special Protection Area

Development which alone or in combination is likely to have a significant effects on the Thames Basin Heaths Special Protection Area will be required to demonstrate that adequate measures to avoid and mitigate any potential adverse effects are delivered.

CP11 - Proposals outside Development Limits (including countryside)

In order to protect the separate identity of settlements and maintain the quality of the environment, proposals outside of development limits will not normally be permitted except where:

1. It contributes to diverse and sustainable rural enterprises within the borough, or in the case of other countryside based enterprises and activities, it contributes and/or promotes recreation in, and enjoyment of, the countryside; and
2. It does not lead to excessive encroachment or expansion of development away from the original buildings; and
3. It is contained within suitably located buildings which are appropriate for conversion, or in the case of replacement buildings would bring about environmental improvement; or
4. In the case of residential extensions, does not result in inappropriate increases in the scale, form or footprint of the original building;
5. In the case of replacement dwellings the proposal must:
    a. Bring about environmental improvements; or
    b. Not result in inappropriate increases in the scale, form or footprint of the original building. Essential community facilities cannot be accommodated within development limits or through the re-use/replacement of an existing building;
6. Affordable housing on rural exception sites in line with CP9.

CP20 – North Wokingham Strategic Development Location

Within the area identified at North Wokingham, a sustainable, well designed mixed use development will be delivered by 2026 including:

1. Phased delivery of around 1,500 dwellings including affordable homes in accordance with policy CP5;
2. Appropriate retail facilities;
3. Appropriate employment located west of Twyford Road, north of Matthewsgreen Farm and east of Toutley Industrial Estate;
4. Social and physical infrastructure (including provision for one new primary school if required);
5. Measures to maintain separation from Binfield/Bracknell and Winnersh;
6. Necessary measures to avoid and mitigate the impact of development upon the Thames Basin Heaths Special Protection Area in line with Policy CP8 to meet the requirements of the Habitats Regulations and in accordance with Natural England's latest standards. This will include sufficient Suitable Alternative Natural Greenspace (subject to monitoring of the quality and quantity standards).;

7. Improvements to transport capacity along the A321 and A329 including the provision of a new route from the A329 (near the M4 over-bridge) to the vicinity of the Coppid Beech roundabout;
8. Measures to improve accessibility by non-car transport modes along the A321 and A329 corridors; and 9) Measures to improve access by non-car modes to Wokingham town centre (including the station interchange).

Policy CC03: Green Infrastructure, Trees and Landscaping

1. Green Routes and Green Route Enhancement Areas are defined on the Policies Map.
2. Development proposals should demonstrate how they have considered and achieved the following criteria within scheme proposals:
    a. Provide new or protect and enhance the Borough's Green Infrastructure networks, including the need to mitigate potential impacts of new development.
    b. Promote accessibility, linkages and permeability between and within existing green corridors including public rights of way such as footpaths, cycleways and bridleways.
    c. Promote the integration of the scheme with any adjoining public open space or countryside
    d. Protect and retain existing trees, hedges and other landscape features
    e. Incorporate high quality, ideally, native planting and landscaping as an integral part of the scheme.
3. Development proposals which would result in the loss, fragmentation or isolation of areas of green infrastructure will not be acceptable.
4. Development proposals within the River Valley areas shall improve or contribute toward:
    a. The establishment of a Loddon/ Blackwater riverside footpath and bridleway, as defined on the Policies Map, to accommodate dual use
    b. The establishment of a riverside footpath and cycleway to accommodate dual use along the Emm Brook
    c. Opportunities for improvements to green infrastructure to help minimise flood risk

Policy CC09: Development and Flood Risk (from all sources)

1. All sources of flood risk, including historic flooding, must be taken into account at all stages and to the appropriate degree at all levels in the planning application process to avoid inappropriate development in areas at risk of flooding. Proposals must be consistent with the guidance in paragraphs 99-104 of the National Planning Policy Framework (NPPF); the Technical Guidance to the NPPF and demonstrate how they have used the Strategic Flood Risk Assessment (SFRA) to determine the suitability of the proposal.

2. Development proposals in Flood Zones 2 or 3 must take into account the vulnerability of proposed development.
3. Development must be guided to areas of lowest flood risk by applying the sequential approach taking into account flooding from all sources and shall ensure flood risk is not worsened for the application site and elsewhere, and ideally that betterment of existing conditions is achieved. The sequential test will not be required if at least one of the following applies:
    a. Replacement of an existing single residential property. However, the replacement property should, where possible, be located on the part of the site at lowest risk
    b. Conversions and change of use unless it involves a change to a more vulnerable class
    c. Minor development, as defined in footnote 10 of the Technical Guidance Note to the NPPF.
4. In exceptional circumstances, new development in areas of flood risk will be supported where it can be demonstrated that:
    a. The development provides wider sustainability benefits to the community that outweigh flood risk
    b. The development will: i. Be safe for its lifetime, taking account of the vulnerability of its users ii. Not increase flood risk in any form elsewhere and, where possible, will reduce flood risk overall iii. Incorporate flood resilient and resistant measures into the design
    c. Appropriate evacuation and flood response procedures are in place to manage the residual risk associated with an extreme flood event.
5. Where required, suitable and appropriately detailed flood risk information will need to accompany a planning application. A Flood Risk Assessment (FRA) is required for:
        a) All proposals in areas of known historic flooding from all sources
        b) Where there is evidence of a risk from all sources of flooding identified in the Strategic Flood Risk Assessment
        c) Those proposals set out in footnote 20 to paragraph 103 of the NPPF.

Policy CC10: Sustainable Drainage

1. All development proposals must ensure surface water arising from the proposed development including taking into account climate change is managed in a sustainable manner. This must be demonstrated through
    a. A Flood Risk Assessment, or
    b. Through a Surface Water Drainage Strategy.
2. All development proposals must

a. Reproduce greenfield runoff characteristics and return run-off rates and volumes back to the original greenfield levels, for greenfield sites and for brownfield sites both run-off rates and volumes be reduced to as near greenfield as practicably possible.

b. Incorporate Sustainable Drainage Systems (SuDS), where practicable, which must be of an appropriate design to meet the long term needs of the development and which achieve wider social and environmental benefits

c. Provide clear details of proposed SuDS including the adoption arrangements and how they will be maintained to the satisfaction of the Council [as the Lead Local Flood Authority (LLFA)] d) Not cause adverse impacts to the public sewerage network serving the development where discharging surface water to a public sewer.

1.8.4 The **Wokingham Borough Local Development Framework** published in 2010 specifies the following requirements for drainage:

- Risk of flooding to be managed by landowners and developers by management of own drainage of land so that they do not adversely impact adjoining properties or exasperate existing flooding problems.
- It is essential that the developer consider the possible change in flood risk over the lifetime of the development because of climate change.
- The use of SuDS should be implemented to minimise the risk of flooding.

1.8.5 Sustainable drainage systems use techniques to control surface water run-off as close to its origin as possible, before it enters a watercourse. This involves moving away from traditional piped drainage systems towards engineering solutions, which mimic natural drainage processes.

1.8.6 The Strategic Flood Risk Assessment of the local council makes reference to climate change and the increase risk in flooding.

1.8.7 Whilst present day flood extents should be used to establish flood zones at a development site, the NPPF requires that developers should also consider the possible change in flood risk over the lifetime of the development resulting from climate change. The likely increase in flow and rainfall intensity over the lifetime of the development should be assessed proportionally to the guidance provided by the Environment Agency.

2 FLOOD RISK

2.1 Flood Zones and Vulnerability Classification

2.1.1 The formal flood zone mapping approved by the government and prepared for use in the planning process, identifies areas potentially at risk of flooding from fluvial or tidal sources without taking into account the presence of flood defences or structures such as culverts or minor watercourses. An extract from the mapping is included in Figure 4 below; the red line denotes the site boundary.

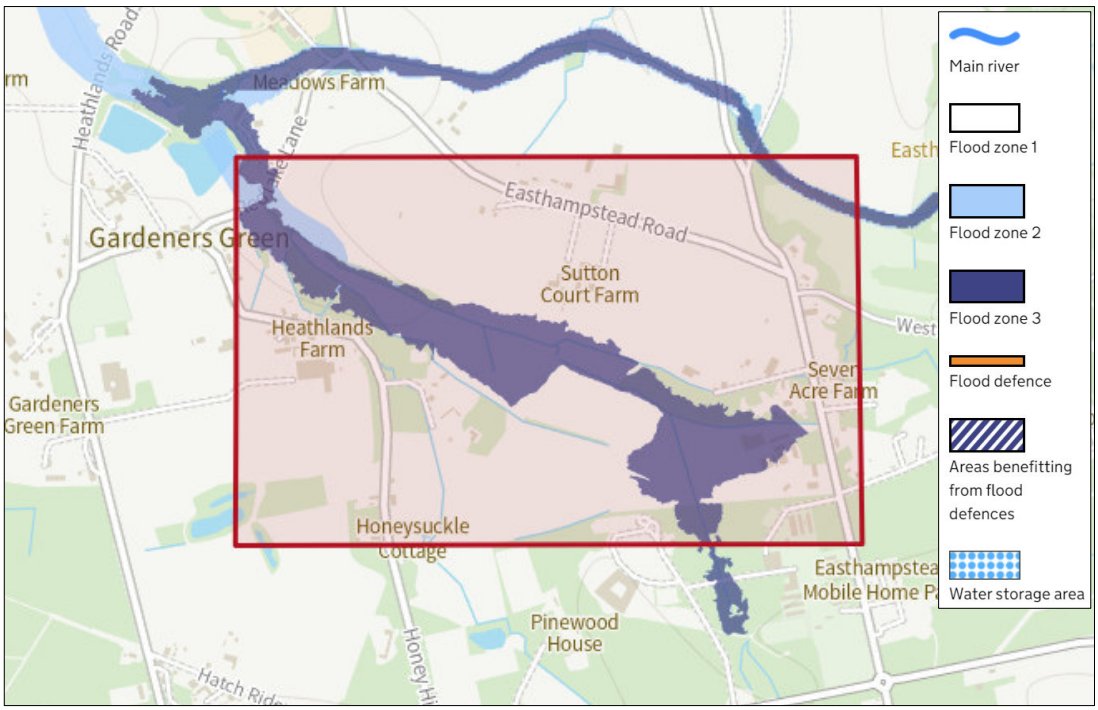

Figure 4. Flood Zone Map

2.1.2 The formal flood zone mapping shows the site to be located within Flood Zone 3.

2.1.3 Table 1 overleaf indicates what uses of land are appropriate for each flood zone, as set out within Table 3 – Flood risk vulnerability and flood zone 'compatibility' in the NPPF. The proposed use would be defined as **water compatible** due to the large area of greenfield.

Table 1. Flood risk vulnerability and flood zone 'compatibility'

	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test	✓	✓	✓
Zone 3a	Exception Test	✗	Exception Test	✓	✓
Zone 3b	Exception Test	✗	✗	✗	✓

2.2 Flood Risk from Rivers and Watercourses

2.2.1 The site is shown on the available flood maps, see Figure 5, to be at a high risk of flooding from rivers and watercourses. However, the development site is greenfield so ground infiltration is expected to reduce flood risk. The area of development at the car park is placed outside of the Flood zone 3 areas to avoid increase of risk of flooding.

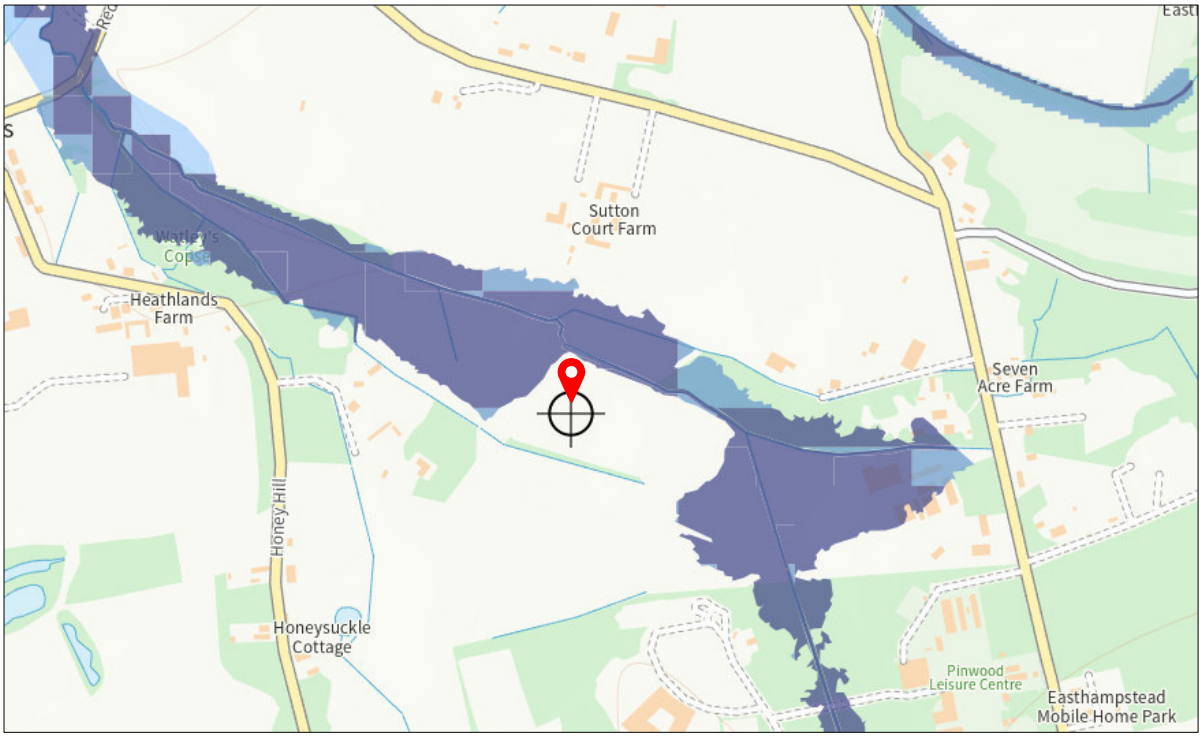

Figure 5. Flooding from Rivers and Watercourses

2.3 Flooding from Surface Water

2.3.1 A source of flood risk to the site is from surface water flooding created by the site itself or adjacent areas. Based on the Surface Water Maps available, see Figure 6, the site is located within a low and high risk of flooding from surface water area.

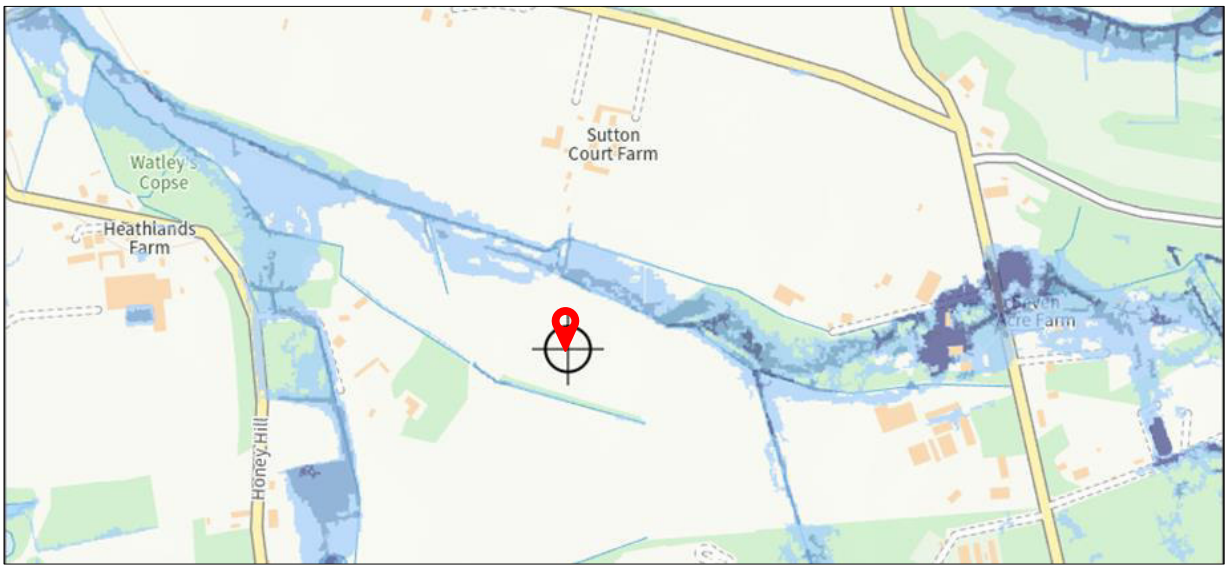

Figure 6. Flooding from Surface Water

2.4 Flooding from Reservoirs, Canals and Other Artificial Sources

2.4.1 The reservoir flood map shown in Figure 7 shows the extent of flooding should a canal, reservoir, or other artificial source breach upstream of the development. This shows that the site would not be at risk of flooding from this source and as such this source of flooding is not considered a risk.

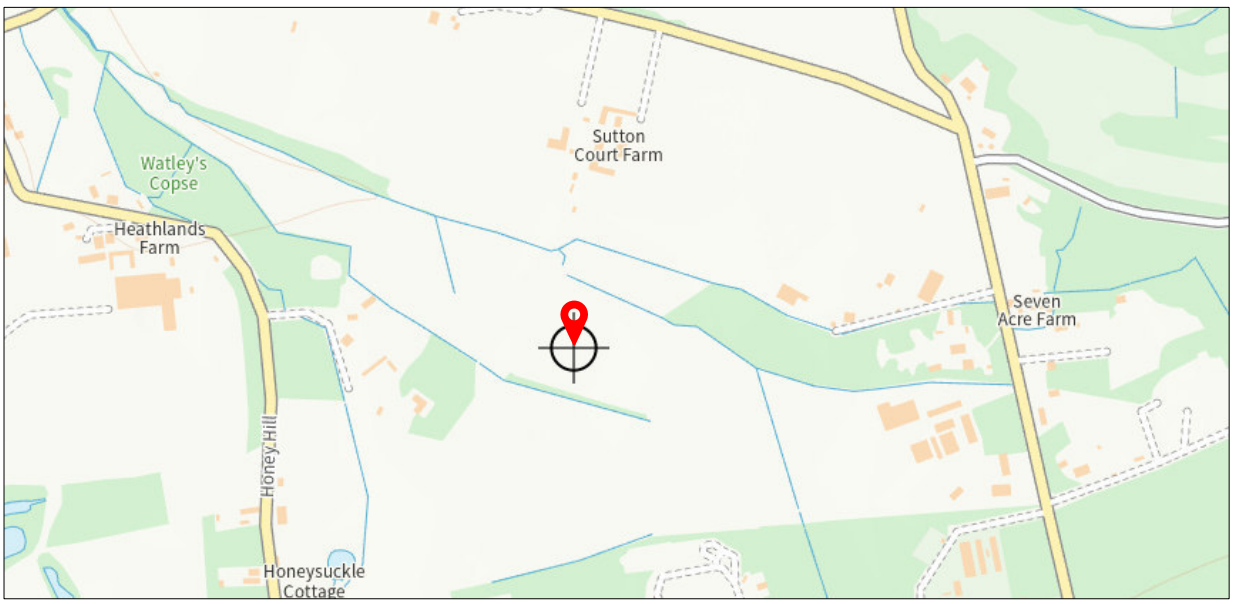

Figure 7: Flooding from Reservoirs

3 Mitigation

3.1 Flood Risk Management

3.1.1 It is suggested that the following flood risk management measures are considered to mitigate the risks identified above:

- It is recommended that flood zone areas are not to be filled or increased to avoid exasperation of flooding elsewhere outside the site.
- The groundwater levels are anticipated to be high due to the permeability of the soil type. Therefore increasing soil depths to accommodate the planting of mature trees is not recommended.
- Any newly created ponds/wetlands will cause increased levels of surface water draining. This can be controlled by installing liners.
- The proposed development requires a carpark which will incorporate surface water drainage system, described further in Section 5, which will include pervious surface to allow water to infiltrate into the ground and an outfall connection to a ditch is proposed.

3.2 Residual Risks

3.2.1 Residual risks are the risks that remain once the flood risk management measures described above have been implemented. These are typically associated with extreme events that overwhelm drainage systems exceeding the flood levels used to design any mitigation measures. The primary residual risks that will affect this development are:

- An extreme rainfall event which exceeds the capacity of the proposed surface water drainage system to both intercept and convey the flows. During such an event, water that is unable to enter the formal drainage system will flow over the ground through the development. The risk can be reduced by ensuring that the ground remains to follow the natural contours to the watercourses present in the site.

4 Pre-application to the Environment Agency

4.1.1 A pre-application for a preliminary opinion from the Environment Agency in regards to the development proposal was submitted to the Environment Agency.

4.1.2 The Environmental Agency's basic constraint check has identified the following site characteristics:

- The site is within Flood Zone 3
- The site is located upon a Secondary A superficial aquifer.
- The site is located upon a Secondary A bedrock aquifer.
- There is deciduous woodland on site.

4.1.3 This Flood Risk Assessment has addressed solutions to the above constraints:

- Flood Zone 3 – the site is naturally draining to the Emm Brook river. There is minimal development on the site which consists of footpaths and footbridges. A car parking area and access road is proposed which is situated outside of the flood zone.
- Aquifers type – groundwater is suspected to be fluctuate be high during higher storm periods. These do not pose an issue as there is minimal development on site. Minimal digging solutions are proposed for the footbridges.
- Woodland on site – the proposed plan includes the addition of marshes and increased area of woodlands to enhance biodiversity of the site, therefore this does not pose a constraint.

5 PROPOSED DRAINAGE STRATEGY

5.1 Outfall Assessment

5.1.1 As required by Part H of the Building Regulations and the paragraph 7-080 in Planning Policy Guidance of the NPPF, the required Drainage Hierarchy has been considered in the development of this strategy as summarised below.

Table 2. Outfall Assessment

Outfall Option	Available Option	Comment
Infiltration Drainage	✓	The use of infiltration outfall has been proposed due the ground infiltration rates shown from records by BGS.
Watercourse	✓	It is proposed that the surface drainage is to be discharge into the Emm Brook Watercourse with a limited discharge rate of 2 l/s as to not increase risk of flooding.
Surface Water Sewer	N/A	Not considered
Combined Sewer	N/A	Not considered

5.1.2 Note that a suitable discharge consent will need to be agreed with the approving body by the contractor prior to completing the connection to the watercourse.

5.1.3 All footways will be unbound material.

5.2 SuDS Assessment

5.2.1 As part of the surface water drainage strategy for the site a number of Sustainable Drainage Systems (SuDS) were considered. Table 3 below provides a list of the options considered and a justification for their inclusion or omission.

Table 3. SuDS Assessment

SuDS System	Used	Justification
Rainwater Harvesting System	No	The use of rainwater harvesting is not considered economically viable on this site considering installation and operational costs.
Green Roofs	No	Green roof has been proposed
Infiltration Systems	Yes	Systems such in the form of a filter drain are suitable on this site due the anticipated geology.

Proprietary Treatment Systems	No	The use of proprietary treatment systems is not considered as it is not required on this site.
Filter Strips	No	Filter strips have not been considered for this site.
Swales	No	Swales are not suitable for this scheme due to available space and proposed land use.
Bioretention Systems	No	Bioretention Systems have not been considered the most effective proposal for this site due to the lack of available landscape areas.
Porous Pavements	Yes	Porous paving has been assessed as the most effective method to drain the site without increasing flood risk. All surface works from the parking areas shall drain via the voided sub-base.
Attenuation Storage Tanks (oversized pipes)	Yes	The attenuation tank will be required alongside a flow control to control the outfall discharge to the watercourse as to not overwhelm the existing watercourse.
Detention Basins	No	There is insufficient space for a detention basin on this site.
Ponds and Wetlands	Yes	Ponds have been designed within the site.

5.3 Proposed Surface Water Drainage Strategy

5.3.1 Due to the inclusion of a car parking are and access road, a drainage system is designed to accommodate surface water drainage at these locations. The new drainage system will comprise of porous paving consisting of graded gravel, perforated pipes, an attenuation tank and a flow control (Hydrobrake), with the outfall connection to an existing watercourse on site.

5.3.2 In accordance with Wokingham Borough Local Development Framework on sustainable drainage systems and the Strategic Flood Risk Assessment for the area, it is proposed that the maximum discharge rate up to a 100-year storm plus 40% allowance for climate change is restricted to 2 l/s to the watercourse. In order to restrict the flow, it is proposed to use flow control device and an attenuation tank for storage.

5.3.3 To support this assessment a Drainage Strategy Drawing No. **NL-LE-GEN-XX-DR-CE-400-S1-Proposed Drainage Strategy** has been prepared and this is included at **Appendix C** along with the supporting InfoDrainage model results demonstrating the system's performance. The proposed system has been assessed for a number of return periods and a series of rainfall events and the discharge rates for the critical storms are provided in Table 4 below.

Table 4. Surface water discharge rates

Return Period	Allowable Discharge Rate (l/s)
1 in 1 year	2.0
1 in 30 year	2.0
1 in 100 year	2.0

6 CONCLUSION

6.1.1 This site-specific Flood Risk Assessment has been prepared in accordance with NPPF guidance and local policy on Flood Risk. The government approved flood mapping shows the site to be located within Flood Zone 3 flood risk from both fluvial and pluvial sources on the site. However, the site is classed as a water-compatible site therefore ground infiltration and natural watercourses on the site provide natural drainage solutions. The site includes minimal development which means flooding is not exasperated.

6.1.2 The SANG site requires an access road and pedestrian car parking. This requires a drainage system which is demonstrated and appended to this report. The drainage system includes SUDs features such as porous paving and an attenuation tank. This is designed to limit surface water run-off by allowing for ground percolation. The surface water is then discharged to an existing watercourse at greenfield rates. The system is modelled to be compatible to extreme storm events of 1 in 100 year plus climate change of +40%.

APPENDICES

APPENDIX A – Proposed Sang Framework Plan

0 50 100 150 200m

N

FP WOKW8

KEY

- Site Boundary (16.37 ha)
- Main site vehicular access point
- Existing trees
- Existing Wet woodland within site
- Wet woodland planting
- Dry woodland scrub planting
- Flower rich grassland - dry seed mix
- Flower rich grassland - wet seed mix
- Dry Woodland tree planting
- Wet Woodland tree planting
- Ponds with wetland planting (see typical detail for excavation)
- Scrapes with wet grass seed (see typical detail for excavation)
- Carpark (see detailed proposal)
- View corridor
- Floodzone
- Spoil area
- Bund removal
- Boardwalk path route - 2m wide
- Self-binding gravel / hoggin 2m wide with 1m wide mown edges
- Mown grass paths 1.5m wide
- Existing track
- Existing footbridges replaced
- Proposed new footbridges
- Public Right Of Way (PROW)
- Existing Contours
- Close Board Fence
- Post and wire with stock proof fence
- Car Park Fence Gates
- Pedestrian path East
- Paving across track
- Agriculture access
- Mown Grass path
- Areas of Existing vegetation to be removed (refer to Arboricultural Survey)

10930

Land at Newlands Farm, Old Wokingham Road, Wokingham

The Thomas Family & Bloor Homes Limited

SANG General Arrangement Plan

FINAL 1:2000 @ A1

20 December 2023 JP LP

10930-FPCR-XX-XX-DR-L-0005 issue P05

Project Code - Originator - Zone - Level - Type - Role - Drawing Number

masterplanning
environmental assessment
landscape design
urban design
ecology
architecture
arboriculture

FPCR Environment and Design Ltd
Lockington Hall
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w: www.fpcr.co.uk

File: L:\10900\10930\LANDS\Drawings\10930-FPCR-ZZ-ZZ-DR-L-0001 [SANG] v2023 JP 2.vwx

NOTES

Ordnance Survey base mapping - supplied by client.

0 5 10 15m

N

KEY

- Site Boundary
- 27 Car Parking Spaces, including one disabled bays
- Proposed Footpath
- Height Restriction Barrier (Location TBC)
- Proposed Turning Head (Option 1, Swept Path, Indicative Vehicle Turning Head Options - mode transport planning)
- Proposed deciduous woodland planting
- Existing trees to be retained

rev	date	description	drn	chk
P03	20/12/2023	Updated carpark design and road allignment	JP	LP
P02	18/10/2023	Car Park repositioned outside of FZ2&3.	MPS	LP
P01	01.09.2023	First Issue	MPS	KMN

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client
The Thomas Family & Bloor Homes Limited

project
Land at Newlands Farm, Old Wokingham Road, Wokingham

drawing title
SANG Car Park
General Arrangement

project number	status	issue
10930	FINAL	P03
scale	drn chk	date created
1:250 @ A3	MPS KMN	September 2023

document number
10930-FPCR-ZZ-ZZ-DR-L-0002
Project Code - Originator - Zone - Level - Type - Role - Drawing Number

File: L:\10900\10930\LANDS\Drawings\10930-FPCR-ZZ-ZZ-DR-L-0001 [SANG] v2023 JP 2.vwx

APPENDIX B – Topographical Survey

TREES

A	Ash
AL	Alder
AP	Apple
B	Beech
C	Cedar
CB	Copper Beech
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PWF	Post & Wire Fence
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WMF	Wire Mesh Fence
WPF	Wood Panel Fence

SURVEY STATION INFORMATION

Name	Easting	Northing	Height	Type
W1	483969.893	166237.027	67.088	Peg
W2	483956.069	166297.943	66.175	Nail
W3	483956.551	166338.593	65.791	Nail
W4	483973.411	166263.416	66.719	Nail
W5	483996.715	166161.470	68.326	Nail
W6	483989.812	166152.768	68.558	Nail
W7	483977.214	166209.215	67.652	Nail
W8	483945.201	166385.124	65.574	Nail
W9	484017.831	166028.643	70.033	Nail
W10	483921.601	166223.675	66.791	Nail
W11	483945.091	166241.923	66.745	Peg
W12	483895.312	166217.573	66.614	Nail
W13	483850.964	166198.247	66.718	Nail
W14	483816.428	166172.774	66.724	Peg
W15	483875.304	166198.483	68.072	Nail in fence post
W16	483800.390	166213.821	66.972	Nail in fence post
W17	483788.860	166143.099	68.845	Nail in fence post
W18	483859.807	166147.349	67.916	Nail
W19	483709.474	166142.318	66.287	Peg
W20	483940.624	166153.252	68.236	Peg
W21	483910.361	166148.497	68.180	Peg
W22	483816.689	166141.259	67.930	Peg
W23	483730.755	166135.763	66.381	Peg
W24	483669.521	166145.295	65.921	Peg
W25	483684.060	166146.049	65.647	Peg
W26	483667.723	166201.867	64.506	Peg
W27	483658.477	166234.772	64.063	Peg
W28	483634.064	166317.402	63.333	Peg
W29	483664.009	166244.208	65.144	Nail in fence post
W30	483617.709	166332.037	63.194	Peg
W31	483636.856	166330.387	63.504	Peg
W32	483671.301	166304.818	63.424	Peg
W33	483588.840	166358.884	63.298	Peg
W34	483707.939	166293.214	63.785	Peg
W35	483772.871	166284.185	64.556	Peg
W36	483774.484	166287.864	65.779	Nail in fence post
W38	483588.868	166358.874	63.286	Peg
W39	483568.843	166380.600	62.871	Peg
W40	483526.036	166389.049	62.727	Peg
W41	483478.417	166423.581	61.521	Peg
W42	483421.564	166465.668	60.970	Peg
W43	483397.329	166438.374	60.847	Peg
W44	483400.423	166429.923	62.833	Nail in fence post
W45	483322.459	166462.457	60.255	Peg
W46	483323.024	166476.507	60.204	Peg
W47	483248.368	166487.591	59.909	Peg
W48	483270.559	166456.934	59.882	Peg
W49	483213.169	166504.834	59.608	Peg
W50	483260.430	166507.383	59.820	Peg
W51	483180.689	166509.452	59.573	Peg
W52	483138.806	166524.113	59.138	Peg
W53	483183.732	166519.668	60.527	Nail in fence post
W54	483089.213	166552.421	58.653	Peg
W55	483119.507	166548.387	60.317	Nail in fence post
W56	483053.347	166568.744	58.542	Peg
W57	482985.272	166601.848	58.140	Peg
W58	482932.519	166619.405	57.878	Peg
W59	482893.127	166648.684	57.401	Peg
W60	482848.754	166690.012	57.293	Peg
H1	483528.704	166209.546	64.961	Peg
H2	483465.726	166216.771	64.706	Peg
H3	483507.263	166211.398	66.032	Nail in fence post
H4	483396.388	166236.484	64.436	Peg
H5	483293.914	166277.501	64.163	Peg
H6	483297.638	166310.252	63.059	Peg
H7	483286.237	166276.180	65.955	Nail in fence post
H8	483296.992	166357.844	61.580	Peg
H9	483332.829	166298.945	62.787	Peg
H10	483383.107	166285.321	62.870	Peg
H11	483437.122	166268.753	63.272	Peg
H12	483405.319	166293.258	63.647	Peg
H13	483343.648	166311.977	63.243	Peg
H14	483199.194	166431.546	60.224	Peg
H15	483112.314	166497.053	59.259	Peg
H16	483017.950	166560.638	58.425	Peg

483925mE 483950mE 483975mE 484000mE
166425mN 166400mN 166375mN 166350mN 166325mN 166300mN 166275mN

Sheet 1 of 10

REVISION B - AUGUST 2023
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REVISION A - May 2023
Update site survey as instructed by client.

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w: siteline.co.uk

BLOOR HOMES SOUTHERN	Client
LAND AT NEWLANDS FARM PINEWOOD WOKINGHAM BERKSHIRE	Contract
SITE SURVEY	Title
01PW01B (Sheet 1 of 10	Drawing Number
APRIL 2022	Date
1:250 (at A1)	Scale
AB	Surveyor(s)

TREES

A	Ash
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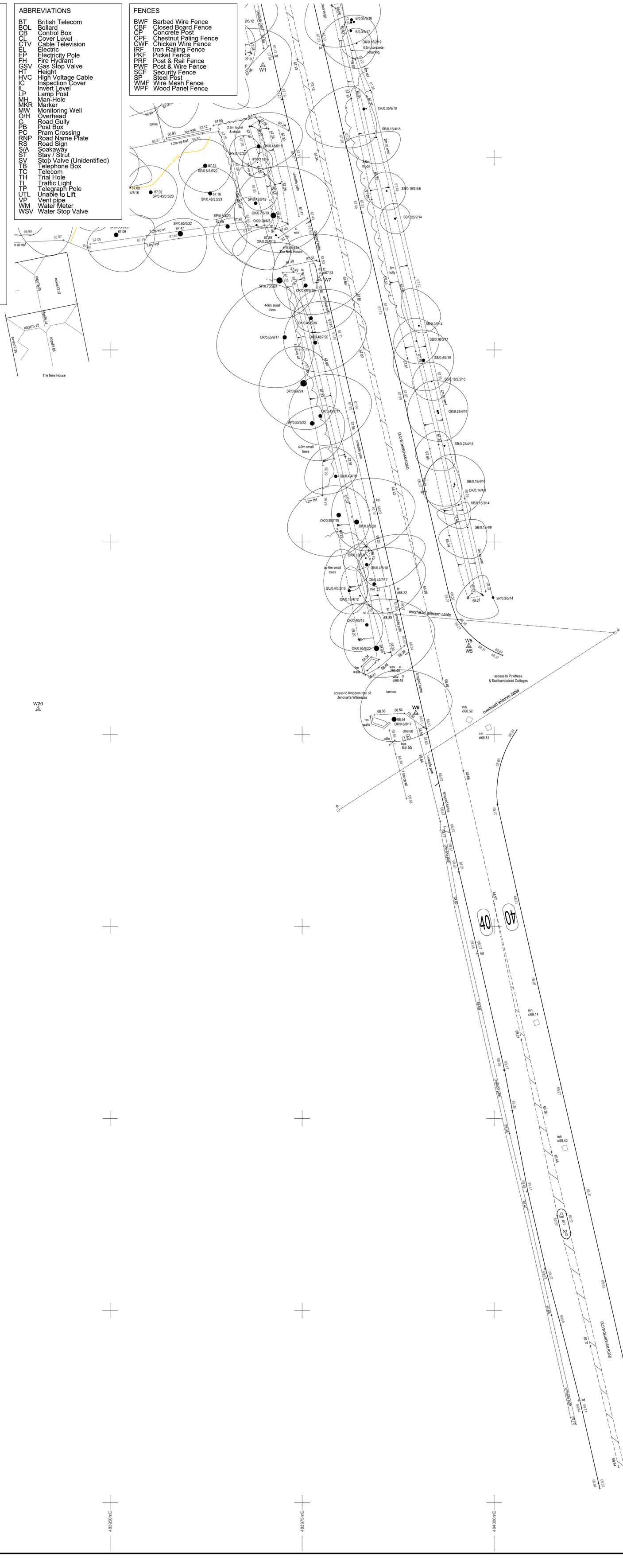

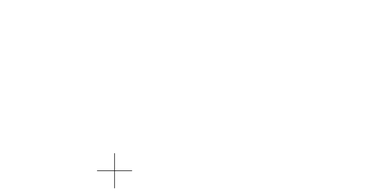

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REVISION A - May 2023
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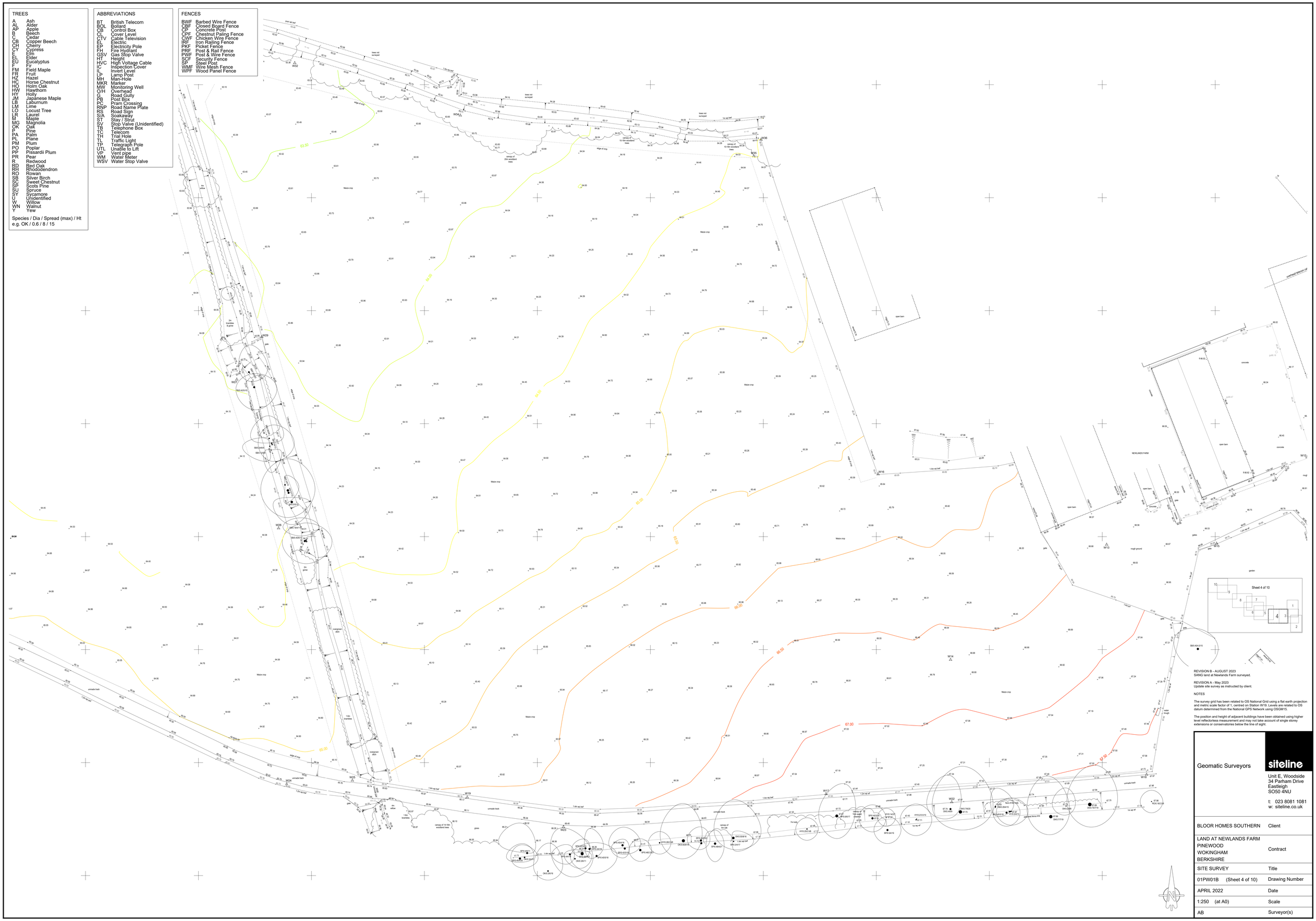

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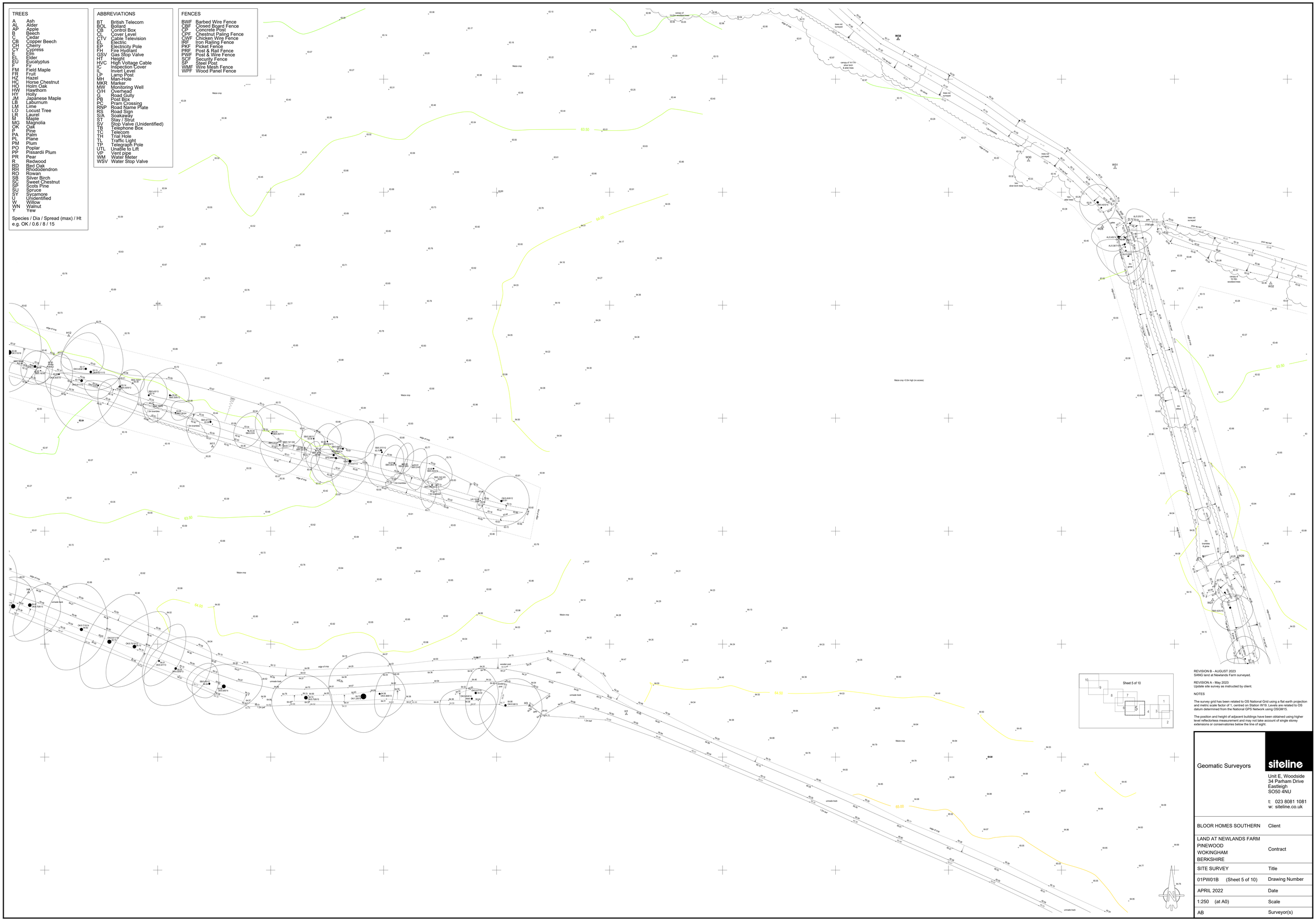

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FR	Fruit
HZ	Hazel
HC	Horse Chestnut
HO	Holm Oak
HW	Hawthorn
HY	Holly
JM	Japanese Maple
LB	Laburnum
LM	Lime
LO	Locust Tree
LR	Laurel
M	Maple
MG	Magnolia
OK	Oak
P	Pine
PA	Palm
PL	Plane
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W	Willow
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Species / Dia / Spread (max) / Ht
e.g. OK / 0.6 / 8 / 15

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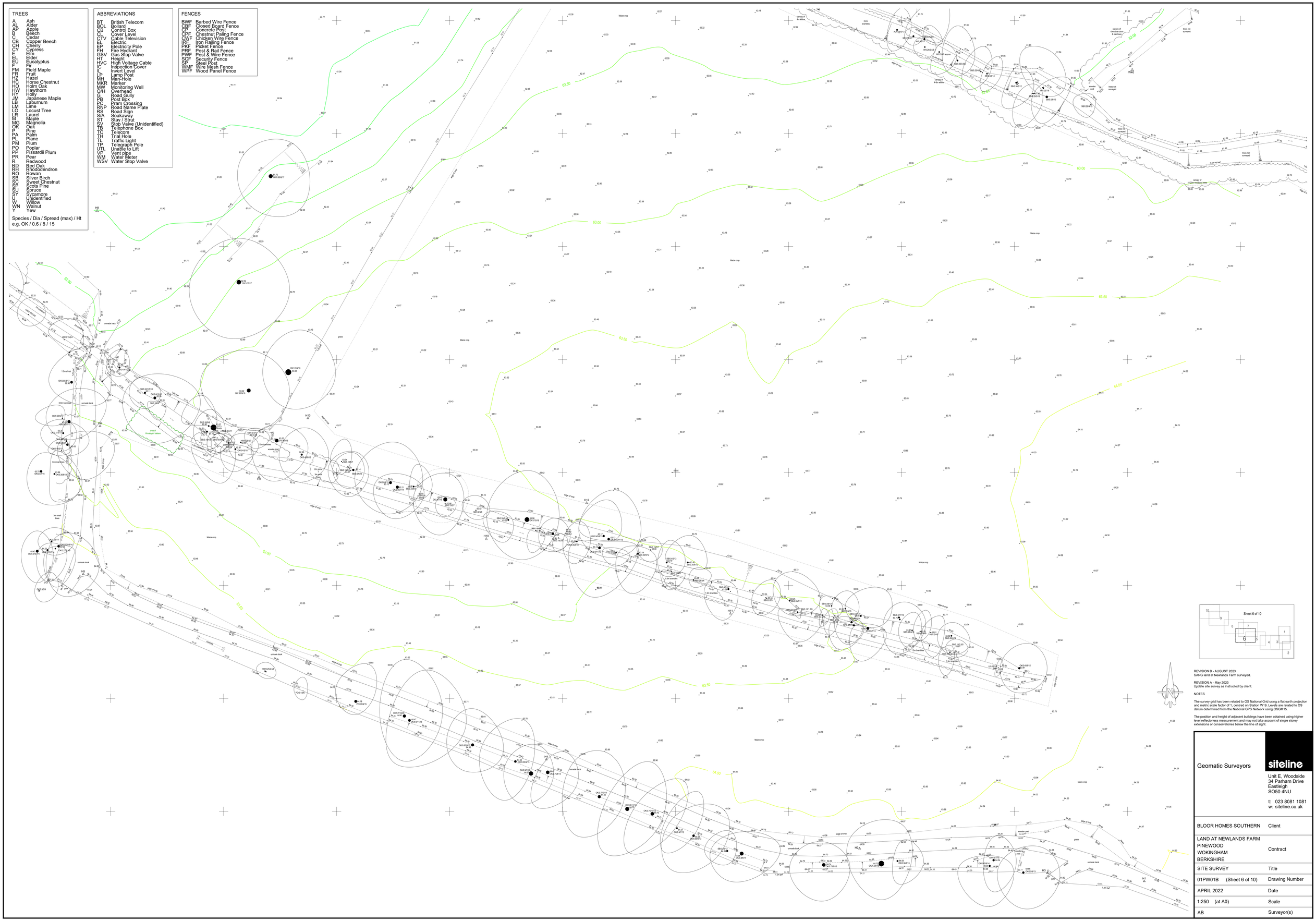

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01PW01B (Sheet 6 of 10)	Drawing Number
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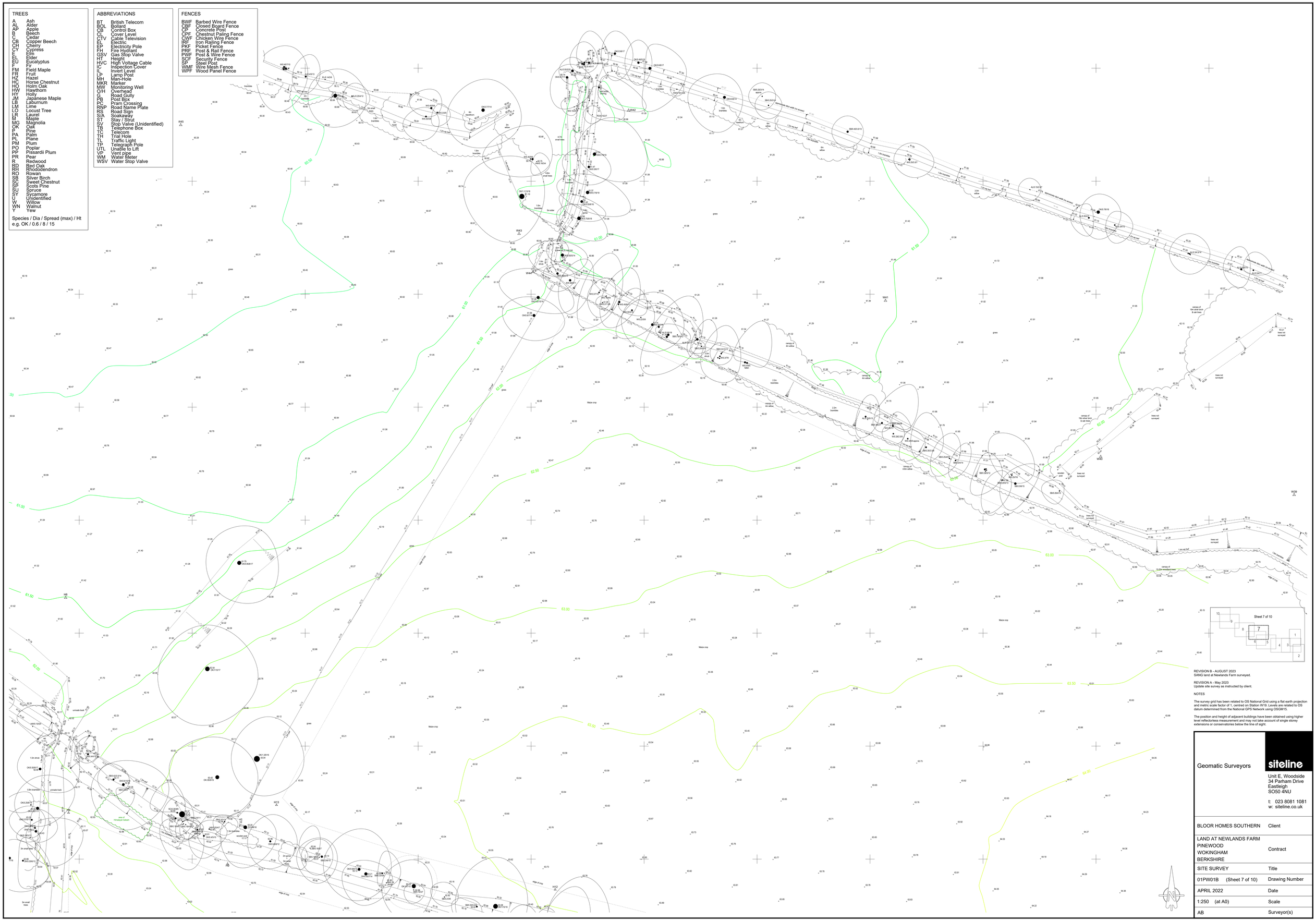

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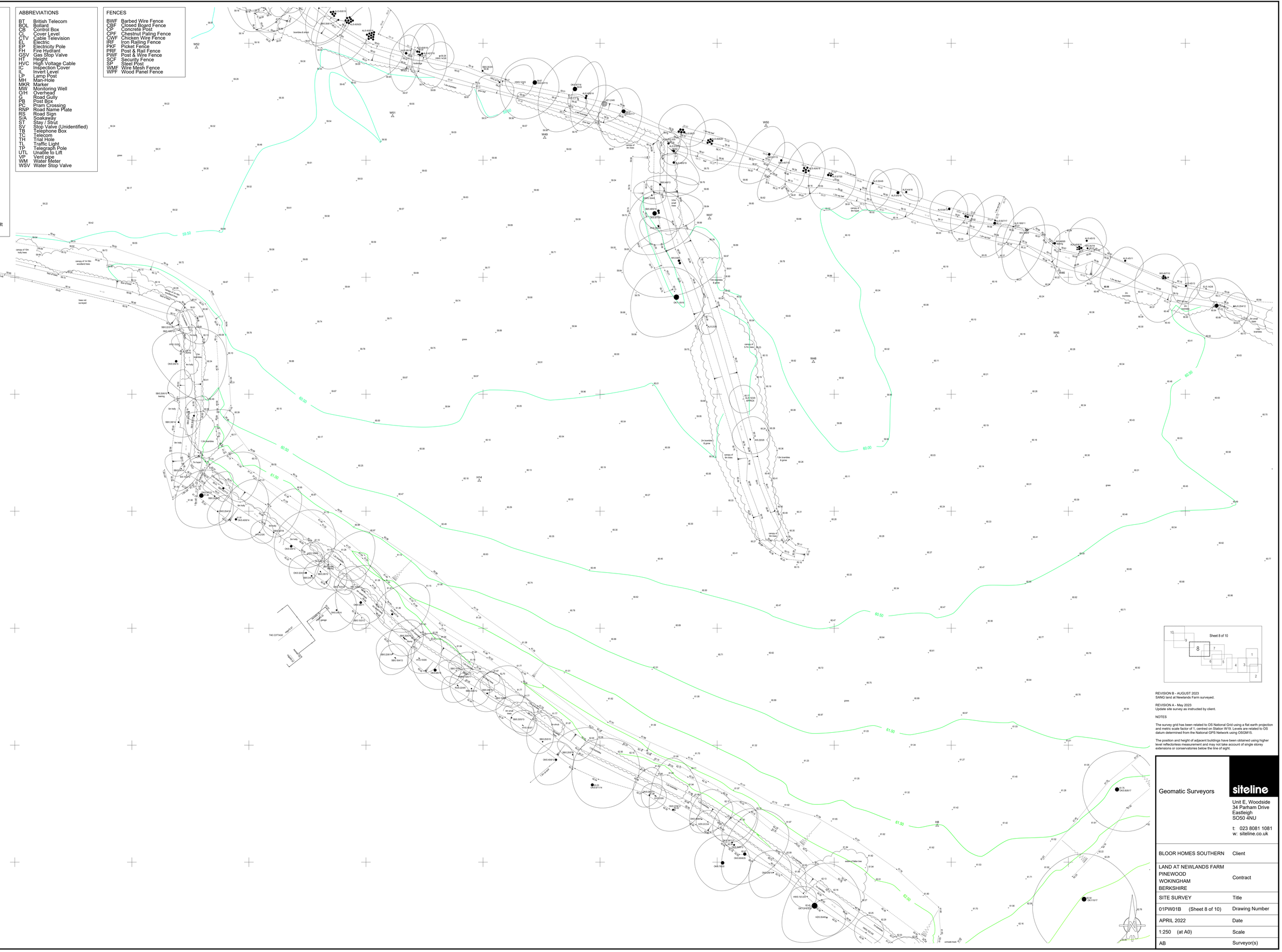

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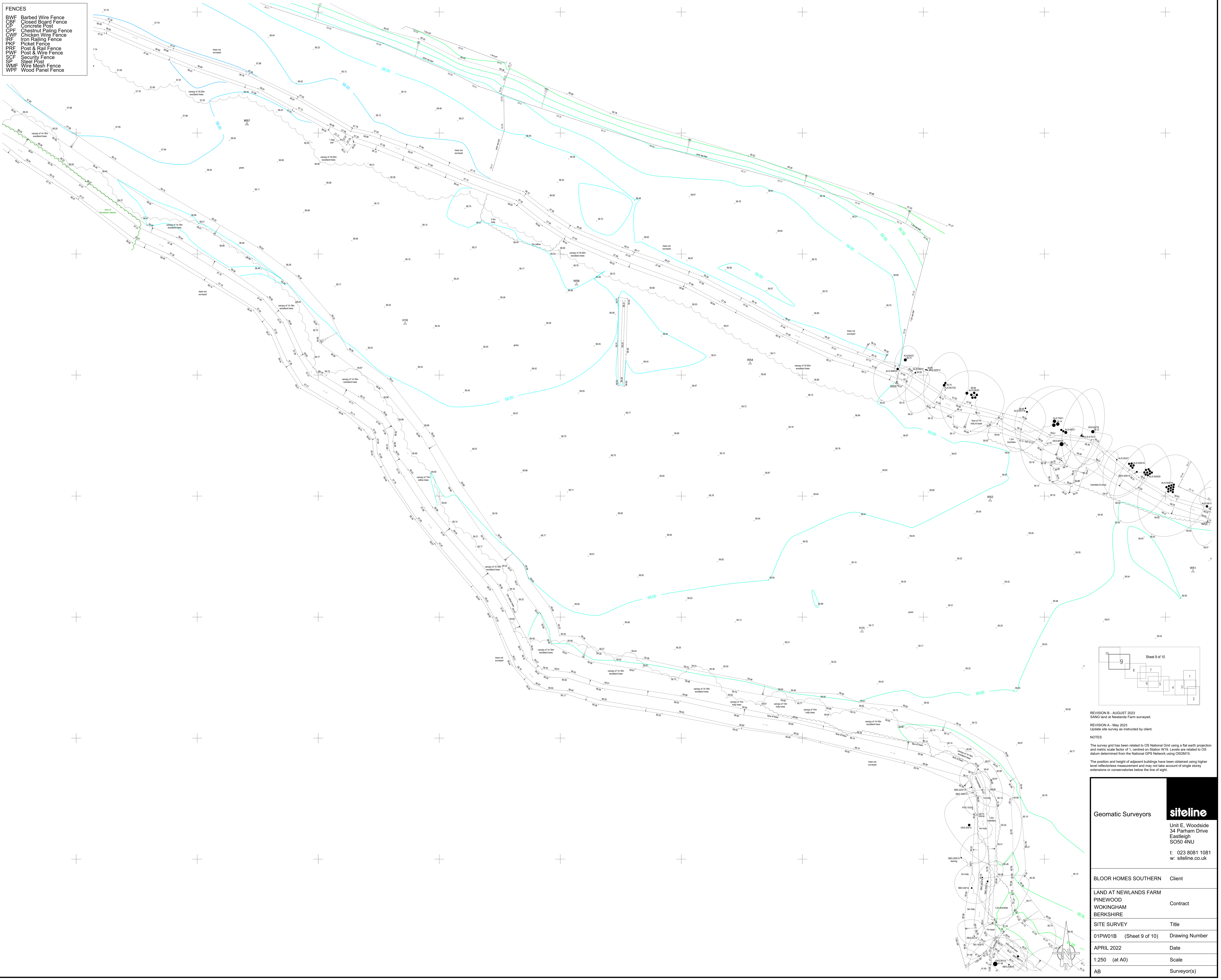

Sheet 9 of 10

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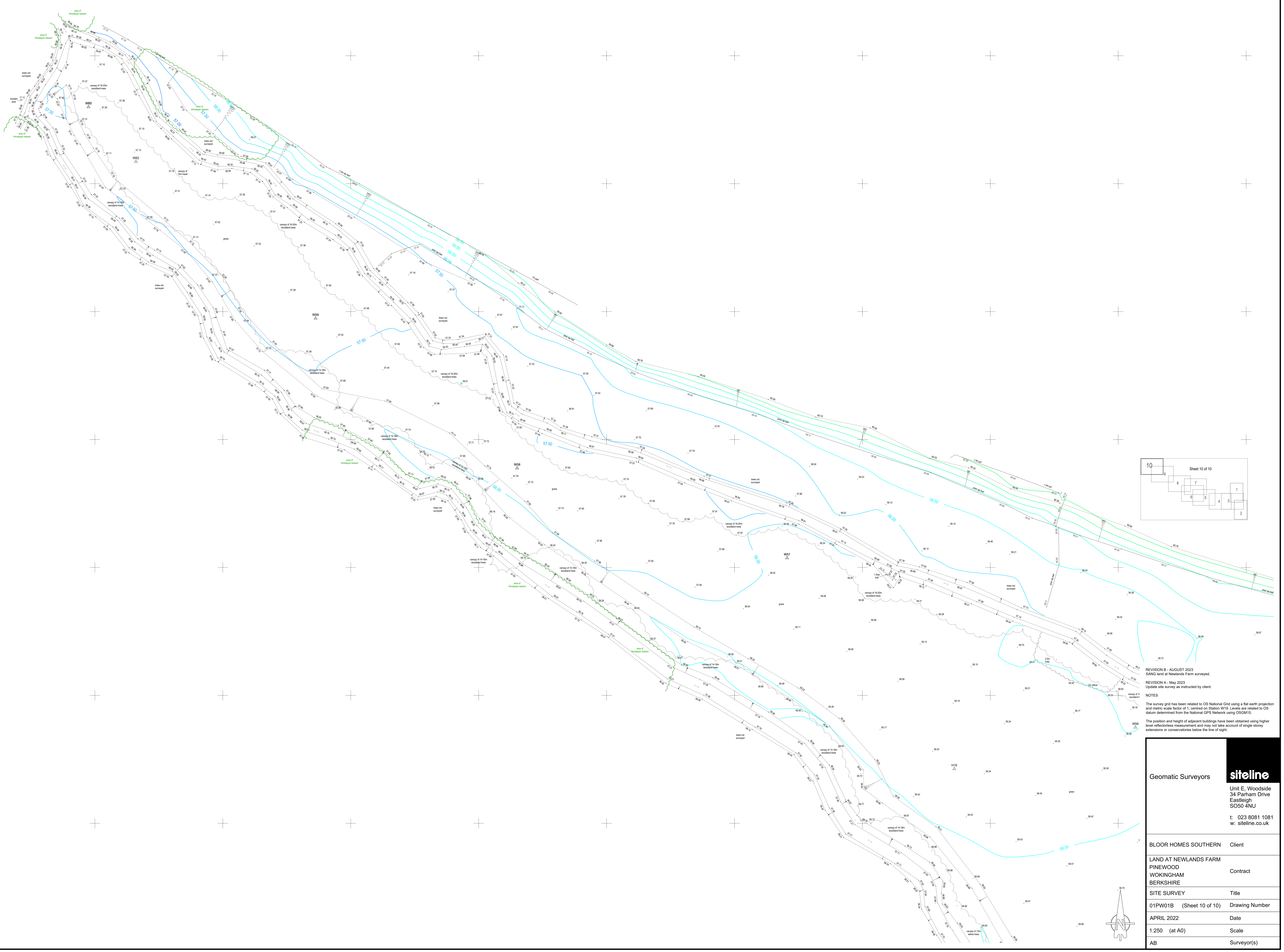

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APPENDIX C – Drainage Strategy Drawing & Supporting Calculations

Mileswood Farm

Industrial Estate

Drain

HWM

HEADWALL
IL 63.210

S5 FLOW CONTROL CHAMBER
HYDROBRAKE
DISCHARGE RATE: 2l/s
DESIGN HEAD: 1.20m
CL:65.600
IL 63.446

FORMATION GRADIENT TO BE AMENDED TO ALLOW WATER TO DRAIN TO PIPE

UNDERGROUND CELLULAR STORAGE
MIN CL:65.600
IL: 63.459
DEPTH:1.20m
VOLUME: 141m³

S6
1200Ø
CL:65.620
IL:64.680

S7
1200Ø
CL:66.900
IL:64.592

S8
1200Ø
CL:66.150
IL:64.785

S4
1200Ø
CL:66.630
IL:64.889

S3
1200Ø
CL:66.750
IL:65.025

S2
600Ø
CL:66.760
IL:65.360

3000

3000

3000

3000

12000

10000

RH

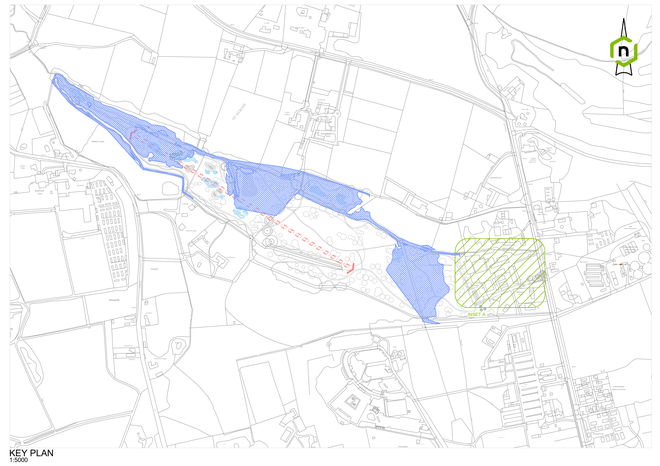
FIRST 10m TO BE IMPERMEABLE TARMAC TO AVOID GRAVEL TRANSER. TARMAR AREA TO DRAIN INTO POROUS SURFACE.

RODDING EYE

Newlands

Farm

INSET A



KEY PLAN
1:5000

GENERAL NOTES

1. THIS DRAWING SHOULD NOT BE REPRODUCED IN WHOLE OR PART WITHOUT THE WRITTEN CONSENT OF LINK ENGINEERING.
2. DO NOT SCALE FROM THIS DRAWING. UNITS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
3. THE CONTRACTOR IS TO CHECK ALL INFORMATION PROVIDED PRIOR TO COMMENCING WORKS AND SEEK CLARIFICATION FROM THE ENGINEER IN RESPECT TO ANY AMBIGUITIES FOUND.
4. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER SCHEME SPECIFIC DRAWINGS.
5. FOUL AND SURFACE WATER DRAINAGE STRATEGIES, INCLUDING SURFACE WATER ATTENUATION AND WATER QUALITY REQUIREMENTS, SHALL BE DESIGNED IN STRICT ACCORDANCE WITH THE SITE SPECIFIC FLOOD RISK ASSESSMENT RECOMMENDATIONS.
6. ALL ADOPTABLE DRAINAGE WORKS SHALL BE DESIGNED IN ACCORDANCE WITH "SEWERS FOR ADOPTION" 6th EDITION, THE "CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY" 6th EDITION AND ANY SUBSEQUENT AMENDMENTS TO THESE DOCUMENTS AS ADVISED.
7. ALL ADOPTABLE DRAINAGE WORKS SHALL BE ADOPTED VIA THE WATER INDUSTRY ACT 1991 BY THE REGIONAL WATER COMPANY.
8. HIGHWAY DRAINS TO BE ADOPTED UNDER SECTION 38 OF THE HIGHWAYS ACT 1980 SHALL COMPLY WITH THE WATER UK GUIDE 'SEWERS FOR ADOPTION 6TH EDITION'.
9. NON-ADOPTED DRAINAGE, TO BUILDING REGULATIONS PART H, (INCLUDING DITCHES AND PONDS) ARE TO REMAIN THE RESPONSIBILITY OF THE DEVELOPER/SITE OWNER UNLESS OTHERWISE TRANSFERRED.
10. PIPE MATERIALS SHALL BE AS FOLLOWS:
    DIAMETER:
    1500 TO 2250 - CLAYWARE CLASS 120 TO TO BS EN 295
    3000 AND ABOVE - CLASS 120 CONCRETE TO BS EN 1916
    PLASTIC PIPEWORK MAY BE PROPOSED AND IS SUBJECT TO APPROVAL BY THE DESIGN ENGINEER AS APPROPRIATE
11. BACKFILL TO TRENCHES MAY BE SUITABLE EXCAVATED MATERIAL IN LANDSCAPED AREAS. GRANULAR MATERIAL BACKFILL IS TO BE USED UNDER HARDSTANDINGS AND ROADS.
12. ALL DRAINAGE UNDER THE PROPOSED ADOPTABLE ROADS MUST BE BACKFILLED WITH AN APPROVED GRADED GRANULAR MATERIAL.
13. ALL MANHOLE COVER, AND GULLY TOPS ARE TO COMPLY WITH THE STRENGTH / GROUP REQUIREMENTS OF BS EN 124 AND KITE MARKED.
14. COVER LEVELS FOR MANHOLES ARE TO BE ADJUSTED TO MATCH SURROUNDING FINISHED LEVELS ONSITE.
15. ALL TRAPPED GULLIES POTS TO BS 5911 SHALL HAVE A MINIMUM SIZE OF 900mm X 450mm.
16. ALL DRAINAGE LAID WITHIN THE HIGHWAY SHOULD HAVE A MINIMUM COVER OF 0.9m MEASURED FROM THE TOP OF THE PIPE BARREL TO THE FINISHED ROAD SURFACE.
17. WHERE PIPE WORK HAS LESS THAN 1.2m COVER BENEATH ROADS AND 0.9m COVER BENEATH LANDSCAPING, THE PIPES ARE TO BE SURROUNDED WITH 150mm OF CLASS ST4 CONCRETE WITH FLEXIBILITY OF JOINTS MAINTAINED AS STATED IN CLAUSE 5.2.26 OF THE WATER UK GUIDE.
18. CONCRETE BED AND SURROUND TO PIPE WORK SHALL USE SULPHATE-RESISTING CEMENT UNLESS ADVISED OTHERWISE WITHIN THE SITE INVESTIGATION REPORT.
19. ALL DRAINAGE UNDER PROPOSED ADOPTABLE ROADS AND FOOTWAYS TO BE MINIMUM 150mm DIAMETER. ALL MANHOLES TO BE PRECAST CONCRETE.
20. ALL CONNECTIONS TO HIGHWAY DRAINS MUST BE MADE WITH FACTORY MADE JUNCTIONS.

NOTES

POROUS PAVING:
TRUGRID PAVING GRIDS (OR SIMILAR)
DEPTH: 40mm
AREA: 1850m²
VOLUME: 74m³

KEY

- APPLICATION BOUNDARY
- PROPOSED PRIVATE SURFACE DRAINAGE
- PROPOSED PRIVATE PERFORATED PIPE
- PROPOSED PERMEABLE PAVING WITH UNDERLYING POROUS SUBBASE TO ACT AS ATTENUATION
- PROPOSED CELLULAR STORAGE ATTENUATION FOR STORM EVENTS UPTO 100YEAR+40%CC
- RODDING EYE
- FALL
- PAVED TARMAC FOR FIRST 10m OF ACCESS ROAD
- FLOOD ZONE 3

Rev.	Amendments	Date	By
-	INITIAL ISSUE.	21.12.23	FA

Revisions

Client: BLOOR HOMES

LINK ENGINEERING
Find us @ www.linkeng.co.uk

Project: LE22724
NEWLANDS FARM, WOKINGHAM

Drawing: PROPOSED DRAINAGE STRATEGY

Scale @ A0	Drawn	Checked	Rev
1:200 @ A0	FA	KL	-

Status: TENDER (D2)

Drawing No: NL-LE-GEN-XX-DR-CE-400

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflows Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area

Type : Catchment Area

Area (ha)	0.024

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (1)

Type : Catchment Area

Area (ha)	0.024

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Dynamic Sizing

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Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (2)

Type : Catchment Area

Area (ha)	0.017

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (3)

Type : Catchment Area

Area (ha)	0.027

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (4)

Type : Catchment Area

Area (ha)	0.03

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (5)

Type : Catchment Area

Area (ha)	0.039

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflows Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (6)

Type : Catchment Area

Area (ha)	0.023

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Junctions Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

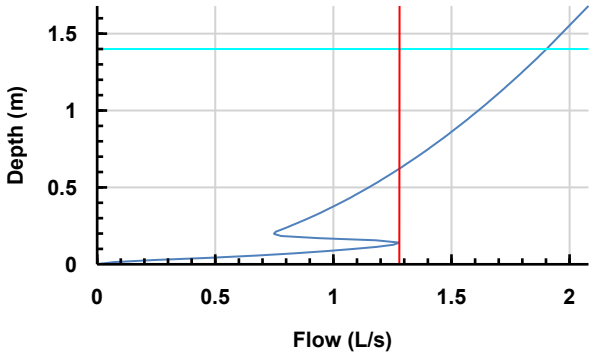
Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
S7	Manhole	483799.856	166199.913	66.900	2.308	64.592	Circular	1.200
S6	Manhole	483818.972	166207.098	65.800	1.120	64.680	Circular	1.200
S5	Manhole	483826.699	166191.512	66.150	1.365	64.785	Circular	1.200
S4	Manhole	483850.889	166196.287	66.630	1.741	64.889	Circular	1.200
S3	Manhole	483881.376	166207.168	66.750	1.725	65.025	Circular	1.200
S2	Manhole	483922.059	166222.181	66.760	1.400	65.360	Circular	0.600
S1	Manhole	483963.915	166235.683	67.000	1.125	65.875	Circular	0.450
Flow Control	Manhole	483796.653	166207.686	65.600	2.154	63.446	Circular	1.200

Name	Lock
S7	None
S6	None
S5	None
S4	None
S3	None
S2	None
S1	None
Flow Control	None

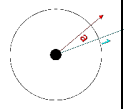
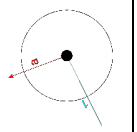
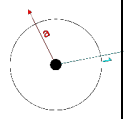
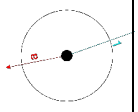
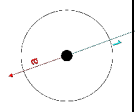
Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
S7	Outlet	PN.1.006	Free Discharge
S6	Outlet	PN.1.005	Free Discharge
S5	Outlet	PN.1.004	Free Discharge
S4	Outlet	PN.1.003	Free Discharge
S3	Outlet	PN.1.002	Free Discharge
S2	Outlet	PN.1.001	Free Discharge
S1	Outlet	PN.1.000	Free Discharge
Flow Control	Outlet	(None)	Hydro-Brake®

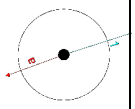
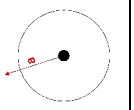
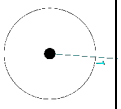
Invert Level (m)	63.446
Design Depth (m)	1.400
Design Flow (L/s)	1.9
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐
Unit Reference	CHE-0058-1900-1400-1900



Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Manhole Schedule Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Name	Cover Level (m) Invert Level (m)	Manhole Schematic	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)			Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
				Outgoing Connections				Cover
S7	66.900 64.592		Diameter / Length: 1.200	{1} PN.1.005	Pipe	64.592	Diam/Width:300	Manhole
E:483799.856 N:166199.913	2.308			{a} PN.1.006	Pipe	64.592	Diam/Width:300	Not Applicable
S6	65.800 64.680		Diameter / Length: 1.200	{1} PN.1.004	Pipe	64.680	Diam/Width:300	Manhole
E:483818.972 N:166207.098	1.120			{a} PN.1.005	Pipe	64.680	Diam/Width:300	Not Applicable
S5	66.150 64.785		Diameter / Length: 1.200	{1} PN.1.003	Pipe	64.785	Diam/Width:300	Manhole
E:483826.699 N:166191.512	1.365			{a} PN.1.004	Pipe	64.785	Diam/Width:300	Not Applicable
S4	66.630 64.889		Diameter / Length: 1.200	{1} PN.1.002	Pipe	64.889	Diam/Width:300	Manhole
E:483850.889 N:166196.287	1.741			{a} PN.1.003	Pipe	64.889	Diam/Width:300	Not Applicable
S3	66.750 65.025		Diameter / Length: 1.200	{1} PN.1.001	Pipe	65.100	Diam/Width:225	Manhole
E:483881.376 N:166207.168	1.725			{a} PN.1.002	Pipe	65.025	Diam/Width:300	Not Applicable

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Manhole Schedule Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Name	Cover Level (m) Invert Level (m)	Manhole Schematic	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)			Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
				Outgoing Connections				Cover
S2	66.760 65.360		Diameter / Length: 0.600	{1} PN.1.000	Pipe	65.435	Diam/Width:150	Manhole
E:483922.059 N:166222.181	1.400			{a} PN.1.001	Pipe	65.360	Diam/Width:225	Not Applicable
S1	67.000 65.875		Diameter / Length: 0.450					Manhole
E:483963.915 N:166235.683	1.125			{a} PN.1.000	Pipe	65.875	Diam/Width:150	Not Applicable
Flow Control	65.600 63.446		Diameter / Length: 1.200	{1} PN.1.007	Pipe	63.446	Diam/Width:150	Manhole
E:483796.653 N:166207.686	2.154							Not Applicable

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Summary Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	S1		Time of Concentration	0.024	100	10	110	0.026
Catchment Area (1)	S2		Time of Concentration	0.024	100	10	110	0.026
Catchment Area (2)	S3		Time of Concentration	0.017	100	10	110	0.019
Catchment Area (3)	S4		Time of Concentration	0.027	100	10	110	0.030
Catchment Area (4)	S5		Time of Concentration	0.030	100	10	110	0.033
Catchment Area (5)	S6		Time of Concentration	0.039	100	10	110	0.043
Catchment Area (6)	S7		Time of Concentration	0.023	100	10	110	0.026
TOTAL		**0.0**		**0.185**				**0.203**

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Network Design Criteria Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

Pipe Options

Lock Slope Options	None
Design Options	Minimise Excavation
Design Level	Level Soffits
Min. Cover Depth (m)	0.900
Min. Slope (1:X)	500.00
Max. Slope (1:X)	40.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Manhole Options

Apply Offset	☐

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Title: Rainfall Analysis Criteria	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Shortest
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	10
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☑
Rainfall Depth (mm)	1.0
Run Time (mins)	1440

Rainfall

FEH

Type: FEH

Site Location	GB 483879 166162 SU 83879 66162
Rainfall Version	2022
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
2.0	0.000
30.0	35.000
100.0	40.000

Storm Durations

Duration (mins)	Run Time (mins)
60	120
120	240
240	480
360	720
480	960
960	1920
1440	2880

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Junctions Summary Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S7	FEH: 2 years: +0 %: 60 mins: Summer	66.900	64.592	64.621	0.029	18.2	0.032	0.000	18.2	22.793	OK
S6	FEH: 2 years: +0 %: 60 mins: Summer	65.800	64.680	64.778	0.098	15.9	0.111	0.000	15.9	19.904	OK
S5	FEH: 2 years: +0 %: 60 mins: Summer	66.150	64.785	64.863	0.078	12.1	0.088	0.000	12.1	15.109	OK
S4	FEH: 2 years: +0 %: 60 mins: Summer	66.630	64.889	64.963	0.074	9.1	0.083	0.000	9.1	11.379	OK
S3	FEH: 2 years: +0 %: 60 mins: Summer	66.750	65.025	65.085	0.060	6.4	0.068	0.000	6.4	7.997	OK
S2	FEH: 2 years: +0 %: 60 mins: Summer	66.760	65.360	65.413	0.053	4.7	0.015	0.000	4.7	5.879	OK
S1	FEH: 2 years: +0 %: 60 mins: Summer	67.000	65.875	65.912	0.037	2.4	0.006	0.000	2.4	2.969	OK
Flow Control	FEH: 2 years: +0 %: 360 mins: Winter	65.600	63.446	63.759	0.313	1.3	0.354	0.000	1.3	33.235	OK

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Junctions Summary Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

FEH: 30 years: Increase Rainfall (%): +35: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S7	FEH: 30 years: +35 %: 60 mins: Summer	66.900	64.592	64.649	0.057	60.9	0.065	0.000	63.1	76.091	OK
S6	FEH: 30 years: +35 %: 60 mins: Summer	65.800	64.680	64.861	0.181	53.2	0.205	0.000	53.2	66.433	OK
S5	FEH: 30 years: +35 %: 60 mins: Summer	66.150	64.785	64.947	0.162	40.4	0.184	0.000	40.4	50.423	OK
S4	FEH: 30 years: +35 %: 60 mins: Summer	66.630	64.889	65.035	0.146	30.4	0.165	0.000	30.4	37.963	OK
S3	FEH: 30 years: +35 %: 60 mins: Summer	66.750	65.025	65.137	0.112	21.3	0.127	0.000	21.3	26.651	OK
S2	FEH: 30 years: +35 %: 60 mins: Summer	66.760	65.360	65.461	0.101	15.7	0.028	0.000	15.7	19.625	OK
S1	FEH: 30 years: +35 %: 60 mins: Summer	67.000	65.875	65.947	0.072	7.9	0.011	0.000	7.9	9.917	OK
Flow Control	FEH: 30 years: +35 %: 360 mins: Winter	65.600	63.446	64.386	0.941	1.6	1.064	0.000	1.6	55.224	OK

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Junctions Summary Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S7	FEH: 100 years: +40 %: 360 mins: Winter	66.900	64.592	64.914	0.322	20.2	0.364	0.000	20.2	172.921	Surcharged
S6	FEH: 100 years: +40 %: 360 mins: Winter	65.800	64.680	64.914	0.234	17.6	0.265	0.000	17.6	151.039	OK
S5	FEH: 100 years: +40 %: 60 mins: Summer	66.150	64.785	64.985	0.200	54.3	0.226	0.000	54.3	67.896	OK
S4	FEH: 100 years: +40 %: 60 mins: Summer	66.630	64.889	65.068	0.179	40.9	0.202	0.000	40.9	51.120	OK
S3	FEH: 100 years: +40 %: 60 mins: Summer	66.750	65.025	65.160	0.135	28.7	0.152	0.000	28.7	35.888	OK
S2	FEH: 100 years: +40 %: 60 mins: Summer	66.760	65.360	65.480	0.120	21.1	0.034	0.000	21.1	26.420	OK
S1	FEH: 100 years: +40 %: 60 mins: Summer	67.000	65.875	65.961	0.086	10.7	0.014	0.000	10.7	13.345	OK
Flow Control	FEH: 100 years: +40 %: 360 mins: Winter	65.600	63.446	64.913	1.468	2.0	1.660	0.000	1.9	63.632	OK

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area
Critical by Return Period: FEH: 2 years: Increase Rainfall (%): +0: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	2.4
Total Inflow Volume (m³)	2.970

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	0.3
10	0.3
15	0.4
20	0.5
25	1.0
30	2.4
35	2.4
40	1.1
45	0.5
50	0.4
55	0.3
60	0.3
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (1)
Critical by Return Period: FEH: 2 years: Increase Rainfall (%): +0: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	2.3
Total Inflow Volume (m³)	2.910

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	0.3
10	0.3
15	0.4
20	0.5
25	1.0
30	2.3
35	2.3
40	1.0
45	0.5
50	0.4
55	0.3
60	0.3
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (2)
Critical by Return Period: FEH: 2 years: Increase Rainfall (%): +0: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	1.7
Total Inflow Volume (m³)	2.118

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	0.2
10	0.2
15	0.3
20	0.4
25	0.7
30	1.7
35	1.7
40	0.8
45	0.4
50	0.3
55	0.2
60	0.2
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (3)
Critical by Return Period: FEH: 2 years: Increase Rainfall (%): +0: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	2.7
Total Inflow Volume (m³)	3.384

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	0.3
10	0.4
15	0.4
20	0.6
25	1.2
30	2.7
35	2.7
40	1.2
45	0.6
50	0.4
55	0.4
60	0.3
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (4)
Critical by Return Period: FEH: 2 years: Increase Rainfall (%): +0: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	3.0
Total Inflow Volume (m³)	3.732

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	0.3
10	0.4
15	0.5
20	0.7
25	1.3
30	3.0
35	3.0
40	1.3
45	0.7
50	0.5
55	0.4
60	0.4
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (5)
Critical by Return Period: FEH: 2 years: Increase Rainfall (%): +0: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	3.8
Total Inflow Volume (m³)	4.801

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	0.4
10	0.5
15	0.6
20	0.9
25	1.7
30	3.8
35	3.8
40	1.7
45	0.9
50	0.6
55	0.5
60	0.5
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (6)
Critical by Return Period: FEH: 2 years: Increase Rainfall (%): +0: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	2.3
Total Inflow Volume (m³)	2.886

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	0.3
10	0.3
15	0.4
20	0.5
25	1.0
30	2.3
35	2.3
40	1.0
45	0.5
50	0.4
55	0.3
60	0.3
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +35: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	7.9
Total Inflow Volume (m³)	9.918

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	0.9
10	1.1
15	1.3
20	1.8
25	3.5
30	7.9
35	7.9
40	3.5
45	1.8
50	1.3
55	1.1
60	0.9
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (1)
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +35: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	7.8
Total Inflow Volume (m³)	9.708

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	0.9
10	1.0
15	1.3
20	1.7
25	3.4
30	7.8
35	7.8
40	3.4
45	1.7
50	1.3
55	1.0
60	0.9
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (2)
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +35: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	5.6
Total Inflow Volume (m³)	7.026

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	0.7
10	0.7
15	0.9
20	1.3
25	2.5
30	5.6
35	5.6
40	2.5
45	1.3
50	0.9
55	0.8
60	0.7
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (3)
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +35: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	9.1
Total Inflow Volume (m³)	11.316

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	1.1
10	1.2
15	1.5
20	2.0
25	4.0
30	9.1
35	9.1
40	4.0
45	2.0
50	1.5
55	1.2
60	1.1
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (4)
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +35: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	10.0
Total Inflow Volume (m³)	12.462

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	1.2
10	1.3
15	1.6
20	2.2
25	4.4
30	10.0
35	10.0
40	4.4
45	2.2
50	1.6
55	1.3
60	1.2
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (5)
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +35: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	12.8
Total Inflow Volume (m³)	16.020

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	1.5
10	1.7
15	2.1
20	2.9
25	5.7
30	12.8
35	12.8
40	5.7
45	2.9
50	2.1
55	1.7
60	1.5
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (6)
Critical by Return Period: FEH: 30 years: Increase Rainfall (%): +35: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	7.7
Total Inflow Volume (m³)	9.648

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	0.9
10	1.0
15	1.3
20	1.7
25	3.4
30	7.7
35	7.7
40	3.4
45	1.7
50	1.3
55	1.0
60	0.9
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area
Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +40: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	10.7
Total Inflow Volume (m³)	13.346

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	1.3
10	1.4
15	1.7
20	2.4
25	4.7
30	10.7
35	10.7
40	4.7
45	2.4
50	1.7
55	1.4
60	1.3
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (1)
Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +40: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	10.5
Total Inflow Volume (m³)	13.076

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	1.2
10	1.4
15	1.7
20	2.3
25	4.6
30	10.5
35	10.5
40	4.6
45	2.4
50	1.7
55	1.4
60	1.2
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (2)
Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +40: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	7.6
Total Inflow Volume (m³)	9.469

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	0.9
10	1.0
15	1.2
20	1.7
25	3.3
30	7.6
35	7.6
40	3.4
45	1.7
50	1.2
55	1.0
60	0.9
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (3)
Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +40: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	12.2
Total Inflow Volume (m³)	15.236

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	1.4
10	1.6
15	2.0
20	2.7
25	5.4
30	12.2
35	12.2
40	5.4
45	2.7
50	2.0
55	1.6
60	1.4
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (4)
Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +40: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	13.4
Total Inflow Volume (m³)	16.778

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	1.6
10	1.8
15	2.2
20	3.0
25	5.9
30	13.4
35	13.4
40	6.0
45	3.0
50	2.2
55	1.8
60	1.6
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (5)
Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +40: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	17.3
Total Inflow Volume (m³)	21.567

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	2.0
10	2.3
15	2.8
20	3.9
25	7.6
30	17.2
35	17.3
40	7.7
45	3.9
50	2.8
55	2.3
60	2.0
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflow Results Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (6)
Critical by Return Period: FEH: 100 years: Increase Rainfall (%): +40: 60 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	10.4
Total Inflow Volume (m³)	12.986

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	1.2
10	1.4
15	1.7
20	2.3
25	4.6
30	10.4
35	10.4
40	4.6
45	2.3
50	1.7
55	1.4
60	1.2
65	0.0
70	0.0
75	0.0
80	0.0
85	0.0
90	0.0
95	0.0
100	0.0
105	0.0
110	0.0
115	0.0
120	0.0

APPENDIX D – Pond Model Simulation Results

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflows Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area

Type : Catchment Area

Area (ha)	0.257

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (1)

Type : Catchment Area

Area (ha)	1.091

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (2)

Type : Catchment Area

Area (ha)	0.289

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (3)

Type : Catchment Area

Area (ha)	0.76

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (4)

Type : Catchment Area

Area (ha)	1.558

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (5)

Type : Catchment Area

Area (ha)	0.336

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflows Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

Catchment Area (6)

Type : Catchment Area

Area (ha)	0.351

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	50
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Pond 2

Type : Pond

Dimensions

Exceedance Level (m)	58.392
Depth (m)	1.300
Base Level (m)	57.092
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	6.582
Total Volume (m³)	795.114

Depth (m)	Area (m²)	Volume (m³)
0.000	491.19	0.000
1.300	1393.45	1175.180

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Advanced

Base Infiltration Rate (m/hr)	0.018
Side Infiltration Rate (m/hr)	0.018
Safety Factor	2.0
Perimeter	Circular
Length (m)	43.458
Friction Scheme	Manning's n
n	0.025

Pond 3

Type : Pond

Dimensions

Exceedance Level (m)	59.416
Depth (m)	1.300
Base Level (m)	58.116
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.39
Total Volume (m³)	201.843

Depth (m)	Area (m²)	Volume (m³)
0.000	123.13	0.000
1.300	357.51	299.195

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (2)
Bypass Destination	(None)
Capacity Type	No Restriction

Advanced

Base Infiltration Rate (m/hr)	0.018
Safety Factor	2.0
Perimeter	Circular
Length (m)	23.117
Friction Scheme	Manning's n
n	0.025

Pond 4

Type : Pond

Dimensions

Exceedance Level (m)	59.685
Depth (m)	1.300
Base Level (m)	58.385
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	4.079
Total Volume (m³)	644.565

Depth (m)	Area (m²)	Volume (m³)
0.000	470.34	0.000
1.300	966.37	914.718

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (3)
Bypass Destination	(None)
Capacity Type	No Restriction

Advanced

Base Infiltration Rate (m/hr)	0.018
Side Infiltration Rate (m/hr)	0.018
Safety Factor	2.0
Perimeter	Circular
Length (m)	43.458
Friction Scheme	Manning's n
n	0.025

Pond 5

Type : Pond

Dimensions

Exceedance Level (m)	59.893
Depth (m)	1.300
Base Level (m)	58.593
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	5.504
Total Volume (m³)	1224.712

Depth (m)	Area (m²)	Volume (m³)
0.000	900.25	0.000
1.300	1822.22	1734.752

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (4)
Bypass Destination	(None)
Capacity Type	No Restriction

Advanced

Base Infiltration Rate (m/hr)	0.018
Side Infiltration Rate (m/hr)	0.018
Safety Factor	2.0
Perimeter	Circular
Length (m)	59.771
Friction Scheme	Manning's n
n	0.025

Pond 7

Type : Pond

Dimensions

Exceedance Level (m)	61.618
Depth (m)	1.300
Base Level (m)	60.318
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.713
Total Volume (m³)	202.622

Depth (m)	Area (m²)	Volume (m³)
0.000	117.00	0.000
1.300	375.29	304.122

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (6)
Bypass Destination	(None)
Capacity Type	No Restriction

Advanced

Base Infiltration Rate (m/hr)	0.018
Side Infiltration Rate (m/hr)	0.018
Safety Factor	2.0
Perimeter	Circular
Length (m)	22.714
Friction Scheme	Manning's n
n	0.025

Pond 6

Type : Pond

Dimensions

Exceedance Level (m)	61.032
Depth (m)	1.300
Base Level (m)	59.732
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	4.515
Total Volume (m³)	191.571

Depth (m)	Area (m²)	Volume (m³)
0.000	93.04	0.000
1.300	401.94	298.290

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (5)
Bypass Destination	(None)
Capacity Type	No Restriction

Advanced

Base Infiltration Rate (m/hr)	0.018
Side Infiltration Rate (m/hr)	0.018
Safety Factor	2.0
Perimeter	Circular
Length (m)	39.194
Friction Scheme	Manning's n
n	0.025

Pond 1

Type : Pond

Dimensions

Exceedance Level (m)	57.250
Depth (m)	1.300
Base Level (m)	55.950
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	5.107
Total Volume (m³)	195.514

Depth (m)	Area (m²)	Volume (m³)
0.000	84.83	0.000
1.300	440.07	311.183

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area
Bypass Destination	(None)
Capacity Type	No Restriction

Advanced

Base Infiltration Rate (m/hr)	0.018
Side Infiltration Rate (m/hr)	0.018
Safety Factor	2.0
Perimeter	Circular
Length (m)	42.192
Friction Scheme	Manning's n
n	0.025

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflows Summary Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FEH: 2 years: +0 %: 60 mins: Summer	0.26	23.1	28.837
Catchment Area (1)	FEH: 2 years: +0 %: 60 mins: Summer	1.09	97.9	122.215
Catchment Area (2)	FEH: 2 years: +0 %: 60 mins: Summer	0.29	25.9	32.372
Catchment Area (3)	FEH: 2 years: +0 %: 60 mins: Summer	0.76	68.2	85.139
Catchment Area (4)	FEH: 2 years: +0 %: 60 mins: Summer	1.56	139.9	174.544
Catchment Area (5)	FEH: 2 years: +0 %: 60 mins: Summer	0.34	30.2	37.651
Catchment Area (6)	FEH: 2 years: +0 %: 60 mins: Summer	0.35	31.5	39.346

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Inflows Summary Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

FEH: 30 years: Increase Rainfall (%): +35: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FEH: 30 years: +35 %: 60 mins: Summer	0.26	77.1	96.314
Catchment Area (1)	FEH: 30 years: +35 %: 60 mins: Summer	1.09	326.9	408.062
Catchment Area (2)	FEH: 30 years: +35 %: 60 mins: Summer	0.29	86.6	108.068
Catchment Area (3)	FEH: 30 years: +35 %: 60 mins: Summer	0.76	227.7	284.313
Catchment Area (4)	FEH: 30 years: +35 %: 60 mins: Summer	1.56	466.8	582.809
Catchment Area (5)	FEH: 30 years: +35 %: 60 mins: Summer	0.34	100.7	125.715
Catchment Area (6)	FEH: 30 years: +35 %: 60 mins: Summer	0.35	105.2	131.373

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FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FEH: 100 years: +40 %: 60 mins: Summer	0.26	103.8	129.668
Catchment Area (1)	FEH: 100 years: +40 %: 60 mins: Summer	1.09	440.0	549.400
Catchment Area (2)	FEH: 100 years: +40 %: 60 mins: Summer	0.29	116.5	145.501
Catchment Area (3)	FEH: 100 years: +40 %: 60 mins: Summer	0.76	306.6	382.788
Catchment Area (4)	FEH: 100 years: +40 %: 60 mins: Summer	1.56	628.5	784.688
Catchment Area (5)	FEH: 100 years: +40 %: 60 mins: Summer	0.34	135.6	169.264
Catchment Area (6)	FEH: 100 years: +40 %: 60 mins: Summer	0.35	141.7	176.884

Newlands Farm:	Date: 24/11/2023		
	Designed by: FA	Checked by: KL	Approved By: NHM
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Half Drain Down Time (mins)	Percentage Available (%)	Status
Pond 2	FEH: 2 years: +0 %: 480 mins: Winter	57.502	57.502	0.410	0.410	25.5	247.755	0.000	0.0	1231	68.840	OK
Pond 3	FEH: 2 years: +0 %: 960 mins: Winter	58.569	58.569	0.453	0.453	3.8	70.533	0.000	0.0	1932	65.055	OK
Pond 4	FEH: 2 years: +0 %: 480 mins: Winter	58.704	58.704	0.318	0.318	17.8	166.239	0.000	0.0	1011	74.209	OK
Pond 5	FEH: 2 years: +0 %: 480 mins: Winter	58.937	58.937	0.344	0.344	36.4	345.515	0.000	0.0	1091	71.788	OK
Pond 7	FEH: 2 years: +0 %: 960 mins: Winter	60.845	60.845	0.527	0.527	4.7	83.615	0.000	0.0	1531	58.733	OK
Pond 6	FEH: 2 years: +0 %: 960 mins: Winter	60.296	60.296	0.564	0.564	4.5	80.773	0.000	0.0	1523	57.837	OK
Pond 1	FEH: 2 years: +0 %: 960 mins: Winter	56.410	56.410	0.460	0.460	3.4	59.235	0.000	0.0	1280	69.703	OK

Newlands Farm:	Date: 24/11/2023		
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Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Charles House: 148 Great Charles Street Birmingham B3 3HT		

FEH: 30 years: Increase Rainfall (%): +35: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Half Drain Down Time (mins)	Percentage Available (%)	Status
Pond 2	FEH: 30 years: +35 %: 960 mins: Winter	58.015	58.015	0.923	0.923	36.2	709.581	0.000	0.0	2476	10.757	OK
Pond 3	FEH: 30 years: +35 %: 1440 mins: Winter	59.120	59.120	1.004	1.004	6.7	203.012	0.000	0.0	5544	-0.579	Flood Risk
Pond 4	FEH: 30 years: +35 %: 960 mins: Winter	59.187	59.187	0.801	0.801	25.2	486.597	0.000	0.0	2365	24.508	OK
Pond 5	FEH: 30 years: +35 %: 960 mins: Winter	59.451	59.451	0.858	0.858	51.6	1007.836	0.000	0.0	2532	17.708	OK
Pond 7	FEH: 30 years: +35 %: 960 mins: Winter	61.412	61.413	1.094	1.094	11.6	232.245	0.000	0.0	2801	-14.620	Flood Risk
Pond 6	FEH: 30 years: +35 %: 960 mins: Winter	60.823	60.823	1.091	1.091	11.1	221.218	0.000	0.0	2591	-15.476	Flood Risk
Pond 1	FEH: 30 years: +35 %: 960 mins: Winter	56.855	56.855	0.905	0.905	8.5	165.278	0.000	0.0	2141	15.465	OK

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FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Half Drain Down Time (mins)	Percentage Available (%)	Status
Pond 2	FEH: 100 years: +40 %: 960 mins: Winter	58.204	58.204	1.112	1.112	46.3	928.601	0.000	0.0	2884	-16.788	Flood Risk
Pond 3	FEH: 100 years: +40 %: 1440 mins: Winter	59.319	59.319	1.203	1.203	8.5	265.543	0.000	0.0	7250	-31.559	Flood Risk
Pond 4	FEH: 100 years: +40 %: 960 mins: Winter	59.381	59.381	0.996	0.996	32.3	641.132	0.000	0.0	2858	0.533	OK
Pond 5	FEH: 100 years: +40 %: 960 mins: Winter	59.656	59.656	1.063	1.063	66.1	1325.212	0.000	0.0	3051	-8.206	Flood Risk
Pond 7	FEH: 100 years: +40 %: 960 mins: Winter	61.614	61.614	1.296	1.296	14.9	302.534	0.000	0.0	3198	-49.310	Flood Risk
Pond 6	FEH: 100 years: +40 %: 960 mins: Winter	61.006	61.006	1.274	1.274	14.3	287.786	0.000	0.0	2920	-50.224	Flood Risk
Pond 1	FEH: 100 years: +40 %: 960 mins: Winter	57.009	57.009	1.059	1.059	10.9	215.662	0.000	0.0	2420	-10.305	Flood Risk

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