Proposed Residential Development
Land North of Reading Road, Arborfield

Flood Risk Assessment & SuDS Statement

January 2026

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1.0 Executive Summary

Infra Engineering Practice Ltd have been instructed on behalf of Dandara Southern to prepare a Flood Risk Assessment (FRA) in accordance with the guidance set out in the Ministry for Housing, Communities and Local Government National Planning Policy Framework (NPPF) in support of the appeal against refusal to grant planning permission for an outline planning application for the erection of up to 111 No. dwellings and associated infrastructure.

This report summaries the methodology and results of the FRA in relation to the proposed development at the land north of Reading Road in Arborfield, Wokingham. It is an update to the Flood Risk and Drainage Strategy prepared by RCP Consulting (document reference DANS-E254-274, revision 2, dated 29 November 2024) following the release of updated national flood risk mapping.

It focuses on the site-specific flood risk assessment and surface water management in line with the requirements of the EA and Wokingham Borough Council (WBC). It considers EA standing advice, the NPPF, and WBC Polices.

According to data supplied by the Environment Agency (EA), the site lies predominantly within Flood Zone 1, considered a low risk of flooding from fluvial sources. However, there are now small, isolated areas of Flood Zone 2 and 3 on the western boundary and in the vicinity of a watercourse that traverses the western part of the site that warrant further assessment and consideration.

It is demonstrated that the built development can be fully accommodated within Flood Zone 1. There is the potential for a footbridge to enable pedestrian access to surplus greenspace on the west of the site. However, we are informed that this footpath is not necessary to deliver the public open space requirements for the site and that it may be constructed with no built form within the Flood Zones if necessary.

The risk of surface water flooding to the site is shown to vary from low to high across the site. A baseline model produced by Ardent Consulting Engineers has informed the assessment. Mitigation measures are suggested to demonstrate that the development can be delivered without putting proposed homes or occupants at risk of surface water flooding or increasing flood risk elsewhere.

As such, it is deemed that a Sequential Test and Exception Test are not required.

A surface water drainage strategy has been developed and hydraulically modelled incorporating sustainable drainage systems (SuDS) in line with the NPPF and EA standing advice. The strategy is based on control of surface water run-off rates thus ensuring that the development does not increase the risk of flooding from the site during peak storm events. Water treatment is also designed into the SuDS to ensure that water quality is not impacted by the proposed development.

2.0 Introduction

Infra Engineering Practice Ltd have been instructed on behalf of Dandara Southern to prepare an update to the Flood Risk Assessment (FRA) and surface water drainage strategy in support of the appeal against refusal to grant planning permission for an outline planning application for the erection of up to 111 No. dwellings and associated infrastructure at land north of Reading Road, Arborfield.

The appellant sought planning permission from Wokingham Borough Council for the outline proposal of 111 residential units with associated works, parking, landscaping, publicly accessible open space and access from Reading Road (with all matters reserved except for means of access). The application for planning permission (reference 243099) was refused on 20 May 2025. This decision is the subject of a planning appeal (reference 3371069) which is due to be considered further by the Inspector by means of an inquiry.

The National Planning Policy Framework (NPPF) was published in March 2012 and updated in February 2025 by the Ministry for Housing, Communities and Local Government and replaced all planning policy statements, including Planning Policy Statement 25 (PPS 25): Development and Flood Risk. The NPPF sets out the Government's planning policy for England and how these are expected to be applied. The Planning Practice Guidance (PPG), published in March 2014 and updated in September 2025 provides additional guidance, and retains key elements of the now superseded PPS 25.

When the original FRA for the development site was prepared, it was located wholly within Flood Zone 1 where the risk of flooding is very low. However, updated flood risk mapping has since been released by the Environment Agency (EA) which now identifies parts of the site in Flood Zone 2 and 3.

The requirements in the NPPF (foot note 63) state the following:

"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."

The EA's standing advice (published in March 2014 and updated October 2025) highlights that an FRA is required to ensure flood risk to the proposed development is considered as well as the impact the development will have elsewhere on people and property. In addition, the FRA should consider the risk of flooding from other sources (groundwater, overland flow, sewers).

The PPG sets out the objectives of a site-specific FRA as to establish:

- *"whether the 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."*

As such this report has been prepared in accordance with the requirements of the NPPF, PPG and EA Guidance.

3.0 Proposed Development Site

3.1 Site Location

The site is greenfield in nature consisting of grassland, fields, hedgerows and trees and is in the southwest of Wokingham. The site is bounded by Church Lane to the west, fields to the east, Reading Road to the south and the northern boundary is formed by treeline and residential properties further north. There is an existing watercourse which runs along the southern boundary as well as traversing the western part of the site. These watercourses are classified as Main Rivers by the EA. There is also an existing ordinary watercourse which runs just outside and along the eastern boundary. The masterplan proposals will seek to ensure an 8m easement from each side of this "Main River" in accordance with requirements from the EA. The approximate centre of the site is at Ordnance Survey (OS) Grid Reference 475380; 167511

The approximate size of the residential development is 6.45 hectares (ha) and located in Arborfield.

Existing Topography

A topographical survey was carried out in October 2024 by NRS Surveying (reference NRS001) and is related to Ordnance Survey Datum.

The survey shows levels across the site falling from the East to West from 57.51mAOD to 47.22mAOD respectively (see **Appendix A**).

3.2 Development Proposals

The proposed development comprises of up to 111 residential dwellings with private gardens, access, open space and associated development infrastructure (see **Appendix B**).

3.3 Existing Geological Information

Based on the British Hydrogeological Survey Maps, the site is underlain by the London Clay Formation with a superficial deposit of River Terrace Deposits in the western part of the site and a pocket of Head Deposit in the centre of the site comprising of GRAVEL, SAND, SILT and CLAY.

The EA website mapping identifies that the bedrock deposit is designated as an unproductive aquifer zone which exhibits low permeability and has negligible significance for water supply or river base flow.

Ground investigation conducted by Wilson Bailey Partnerships (WBP) in October 2024 indicated that in the central western part of the site London Clay was encountered at the base of most of the boreholes, although prevailing ground conditions across the western central part of the site comprised 2m or so of firm clay over 1m of gravel overlying London Clay. Groundwater was encountered at the top of the gravel and during the course of the day rose under a sub-artesian pressure to less than about 0.50m below ground level. In the central eastern part of the site there were areas of variable ground conditions were encountered across this part of the site including the same 2m deep clay layer overlying sand and gravel, together with a location where no gravel was encountered, and a further location where silty sand with occasional gravel was encountered to the full depth of investigation at 4m below ground level. Extracts of the findings of the WBP report is presented in **Appendix C.**

3.4 National Policy Context

National policy regarding flood risk is contained within the National Planning Policy Framework (updated February 2025), Planning Practice Guidance (September 2025). The PPG directs applicants to use Environment Agency guidance relating to flood risk assessments.

The Department for Environment, Food and Rural Affairs (DEFRA) released the national standards for sustainable drainage systems in June 2025 (updated July 2025). These replace the previous non-statutory technical standards for SuDS which were published in March 2015. The document sets out non-statutory standards for SuDS to be read in conjunction with the NPPF and PPG.

As of the 15 April 2015, Wokingham Borough Council (WBC) as the Lead Local Flood Authority (LLFA) became a statutory consultee on all major planning applications. As such, it assessed the planning application in respect of surface water drainage and sustainable drainage systems which was previously the responsibility of the Environment Agency.

The LLFA's primary duties are to ensure that flood risks from surface water runoff, groundwater and ordinary watercourses are identified and managed properly. The use of SuDS are a material consideration in planning conditions. As such, the proposed use of SuDS

are expected to be demonstrated on all major developments unless it can be demonstrated otherwise.

3.5 Existing Flood Defences

The site does not benefit from any current flood defences.

3.6 NPPF Flood Zone and Vulnerability

The Planning Practice Guidance (**Table 1**) confirms the flood zone Classification based upon the probability of flooding. The site is shown to lie within Flood Zones 1, 2 and 3.

Table 2 of the Planning Practice Guidance confirms the 'Flood Risk Vulnerability Classification' of a site, depending on its proposed use. The classification is then applied to Table 3 to determine whether:

- The proposed development is suitable for the flood zone in which it is located.
- An Exception Test is required for the proposed development.

The proposed development is classified as 'More Vulnerable' according to the NPPF and suited for the flood zone in which it is located.

It should also be noted per the updated Government guidance on Flood Risk and coastal change dated 17th September 2025 and requirements for how the sequential test should be applied to planning application it notes the following: *"In applying paragraph 175 a proportionate approach should be taken. Where a site-specific flood risk assessment demonstrates clearly that the proposed layout, design, and mitigation measures would ensure that occupiers and users would remain safe from current and future surface water flood risk for the lifetime of the development (therefore addressing the risks identified e.g. by Environment Agency flood risk mapping), without increasing flood risk elsewhere, then the sequential test need not be applied"*

On this site, the site-specific flood risk assessment will demonstrate that the risk of flooding from surface water can be addressed without the risk of the future occupiers and without increasing the risk of flooding elsewhere.

4.0 Flood Risk to the Site

The degree of detail appropriate to an FRA depends upon the scale and potential impact of the proposed development to and from the surrounding boundaries. In this case, the applicant has the intention of re-developing an area of land which is located within Flood Zones 1, 2 and 3. There are also areas of the site which are subject to existing surface water flooding.

4.1 Strategic Flood Risk Assessment

The National Planning Policy Framework confirms that Regional Planning Bodies (RPBs) or local planning authorities (LPAs) should prepare strategic Flood Risk Assessments (SFRAs) in consultation with the EA. The SFRA is then used to refine information on areas liable to flooding by taking into account other sources of flooding and the impacts associated with climate change in addition to the EA flood map data.

The document informs the Council's policies in the emerging Local Development framework and a strategic approach to the allocation of sites for development and the future management of flood risk, in line with the National Planning Policy Framework.

JBA consulting prepared the following Level 1 and Level 2 Reports for Wokingham Borough Council:

- Wokingham Borough Council – Level 1 Strategic Flood Risk Assessment (May 2023)
- Wokingham Borough Council – Level 2 Strategic Flood Risk Assessment (August 2023)

The objective of the SFRA was the following:

- To collate and analyse the latest available information and data for current and future (i.e. climate change) flood risk from all sources, and how these may be mitigated for development.
- To inform decisions in the emerging LPU, including the selection of development sites and planning policies.
- To provide evidence to support the application of the sequential test for the allocation of new development sites, to support WBC in the preparation of the LPU.
- To provide a comprehensive set of maps presenting flood risk from all sources that can be used as evidence base for use in the update to the Local Plan.
- To provide advice for applicants carrying out site-specific Flood Risk Assessments (FRAs) and outline specific measures or objectives that are required to manage flood risk.

4.2 Existing Information on Flooding

Fluvial Flood Risk

Based on a review of Appendix A- Interactive Flood Risk Mapping Page D2 of the WBC Level 1 SFRA , (see **Figure 1**), the development site appears to lie wholly within Flood Zone 1, considered to be at low risk from fluvial and tidal flooding.

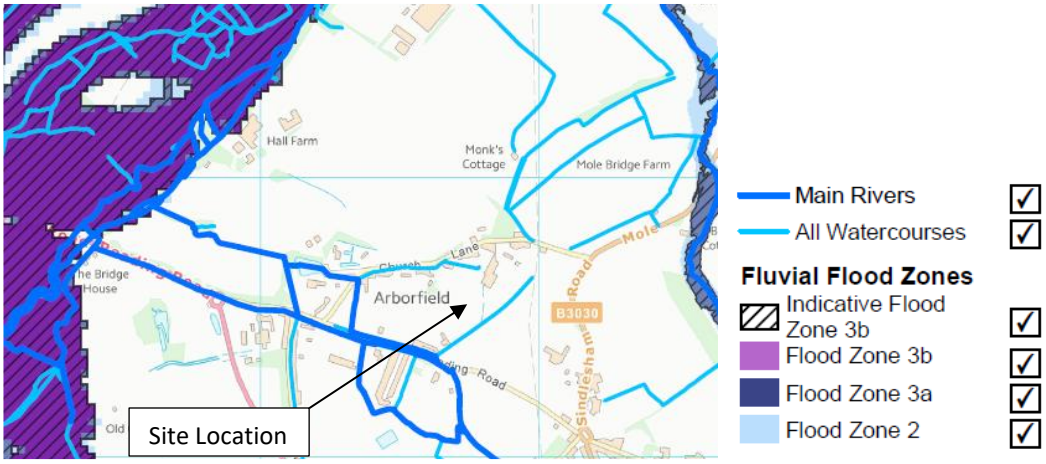


Figure 1: Extract of Flood Zone Map from WBC Level 1 SFRA

However, following the publishing of the SFRA and the submission of the RCP Consulting Engineers Ltd site-specific FRA for the site, national flood risk mapping has been updated. Figure 2 shows that parts of the site are now within Flood Zone 2 and 3.

Flood Zone 3 represents a high probability of flooding from rivers and the sea. As this is not a coastal location, the risk is isolated to fluvial (river) flooding. In Flood Zone 3, in any year, land has a 1% (1 in 100) or more chance of flooding.

Flood Zone 2 represents a medium probability of flooding. In this zone, in any year, land has between a 1% and 0.1% (between 1 in 100 and 1 in 1,000) chance of flooding from rivers.

All built development aside from a potential footbridge allowing access to the additional greenspace in the west of the site has been demonstrated to be within Flood Zone 1. No buildings, vehicular access or land level changes are proposed in Flood Zone 2 or 3. As such, product 4 data which would detail the flood depths and levels in those zones has not been requested. This is because the flood depths and levels are not a risk to the occupiers of the site.



Figure 2: Extract of the flood map for planning (Flood Zone 2 and 3)- Updated March 2025

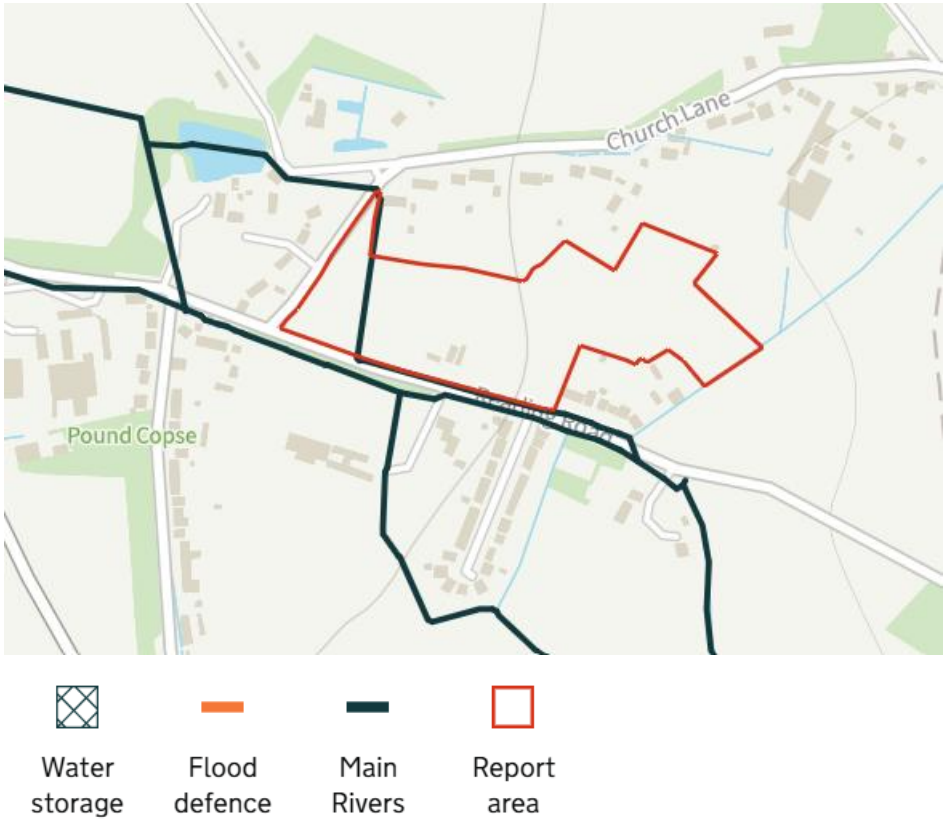


Figure 3: Extract of the flood map for planning (Main Rivers and flood defences)

The existing watercourses which run through the western part of the site and along the southern boundary are classified as "Main River" by the EA, as such the development proposals will maintain an 8m easement either side of the watercourse in accordance with the requirements of the EA.

Existing access to the site crosses the southern "Main River" with existing culverts. The masterplan proposals will seek to cross this watercourse at a different location. The detailed proposals will need to be supported with a Flood Permit Application to the EA, with associated hydraulic modelling which will demonstrate that the construction of the proposed access will have no negative impact to the existing flows or capacity of the existing watercourse.

Surface Water Flood Risk

The risk of surface water flooding to the site is shown to vary from low to high across the site. There are areas of high risk shown to enter the site from the northeast and east and traverse westwards towards the existing watercourse. The surface water maps indicate a potential depression associated with a historical pond just east of this watercourse. (See **Figure 4 and Figure 5** below).

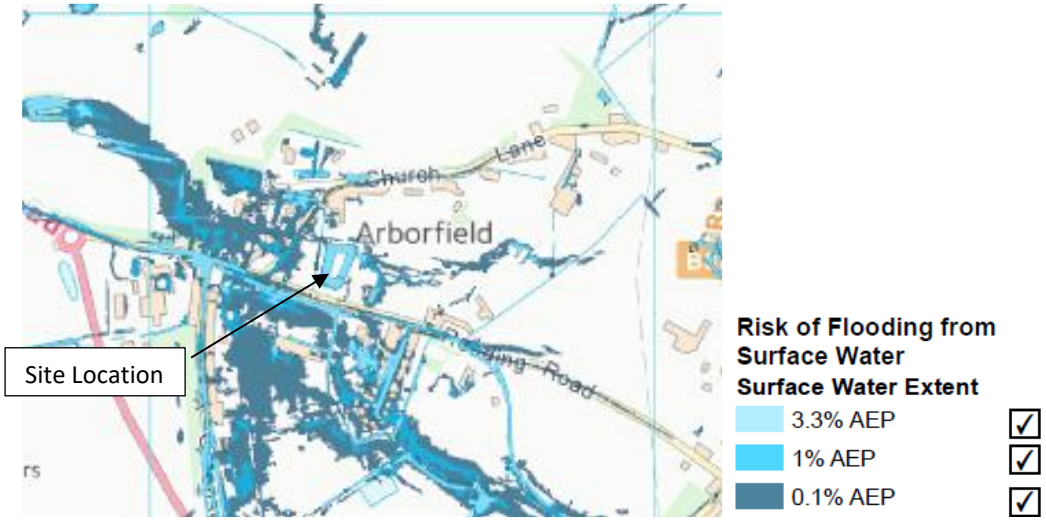


Figure 4: Extract of Risk of Surface Water Flooding from WBC Level 1 SFRA



Figure 5: Extract of Risk of Surface Water Flooding from WBC Level 1 SFRA

The SFRA defines surface water zones at either lower or higher risk of surface water flooding based on the extent of the 1%AEP plus 40% climate change allowance surface water event. Chapter 3.22 of the SFRA states the following:

"*Surface water mapping does not strictly describe the same conceptual risk zone as is defined for river and sea flooding (even though it is notionally associated with the same probability) as the mapping is based on different assumptions. However, it does create a product that can accommodate sequential testing, as it can facilitate strategic decisions that direct development to land in a "lower risk surface water flood zone". Using this mapping, it is not anticipated that the sequential test for surface water would normally require alternative sites at lower risk to be considered, because the widespread and dendritic nature of surface water flood risk is conceptually very different to river and sea flood risk.*"

The EA flood map for planning also provides surface water flood risk maps which are shown for the site in Figure 6, Figure 7 and Figure 8 below.

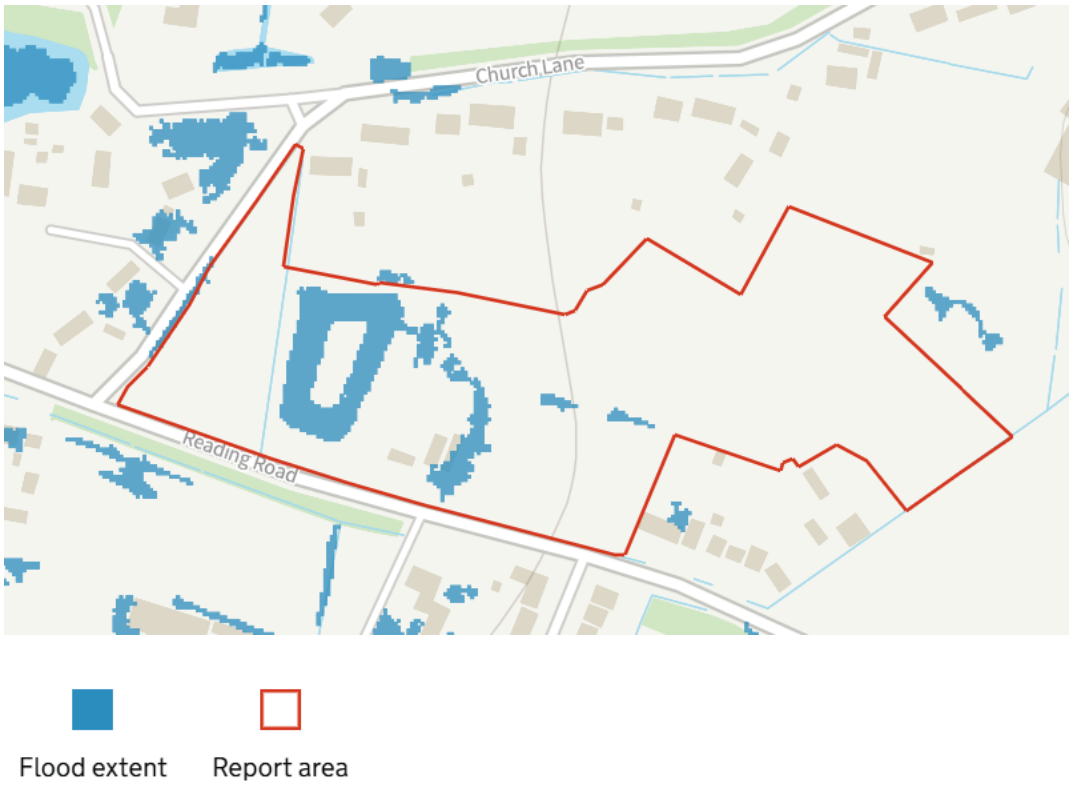


Figure 6: Extract of the Flood map for planning for at least 3.33% (1 in 30) annual likelihood of surface water flooding

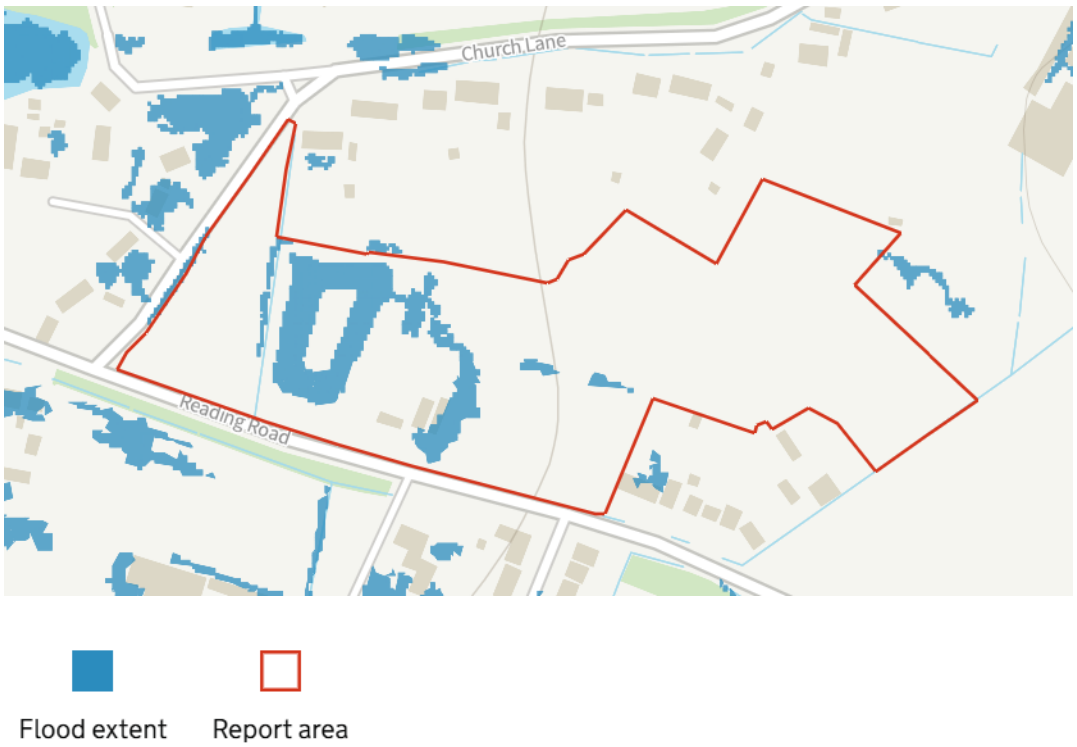


Figure 7: Extract of the Flood map for planning for between 1% and 3.33% (between 1 in 100 and 1 in 30) annual likelihood of surface water flooding

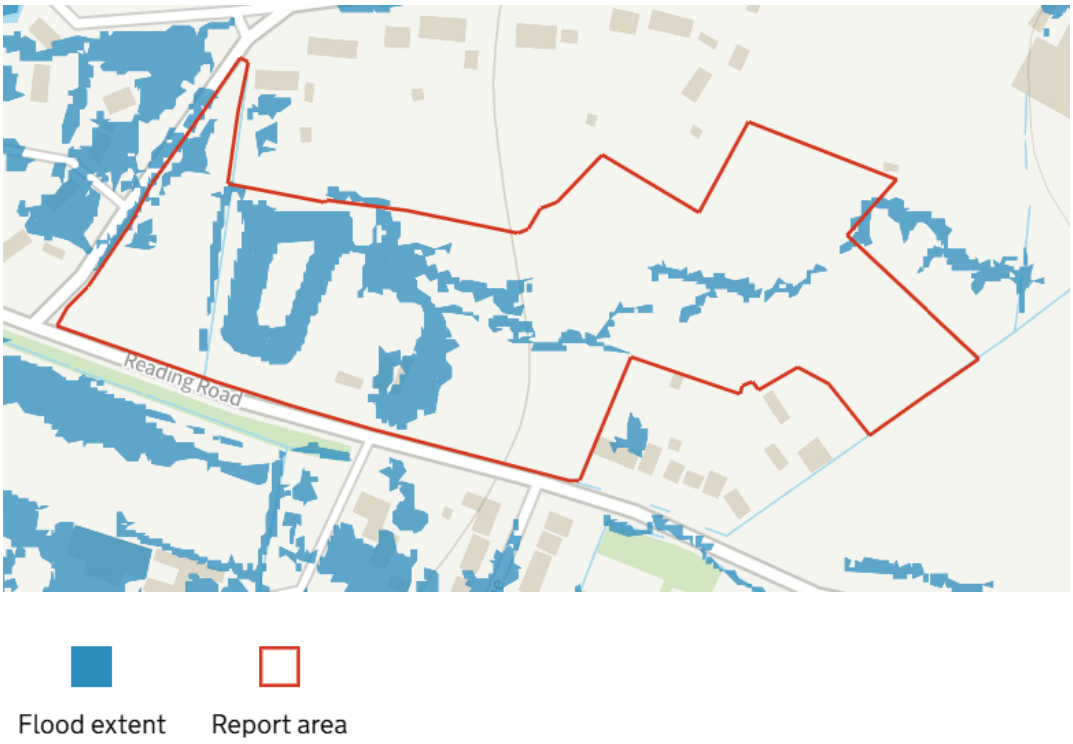


Figure 8: Extract of the Flood map for planning for between 0.1% and 1% (between 1 in 1000 and 1 in 100) annual likelihood of surface water flooding

It should be noted that the risk of surface water mapping is based on high level LiDAR level information. To further assess the specific risk of existing surface water flooding to the site and determine the extents of flow paths and potential storage, further modelling has been undertaken based on site specific topographic survey information.

A baseline model has been produced by Ardent Consulting Engineers (ACE) which determine the detailed 1%AEP plus 40% flow paths as well as providing further details on the associated flow rates and depths of surface water during this surface water event.

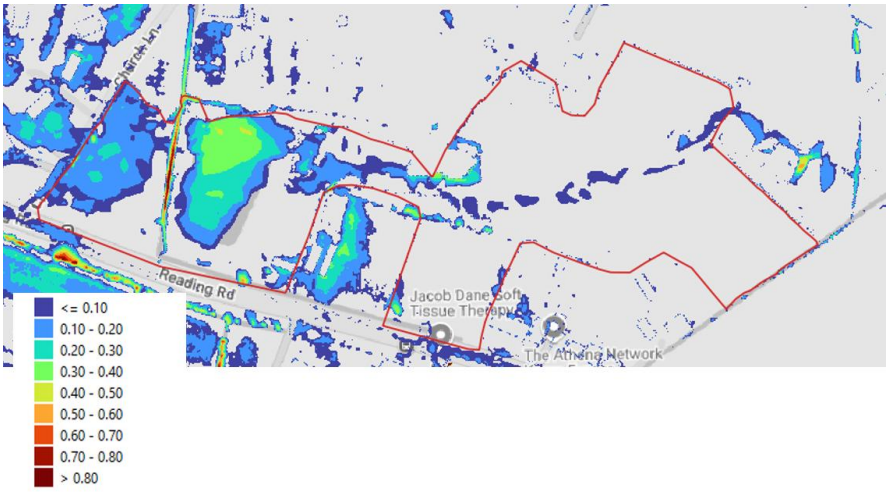


Figure 9: Extract of Surface Water Flooding Depths from ACE

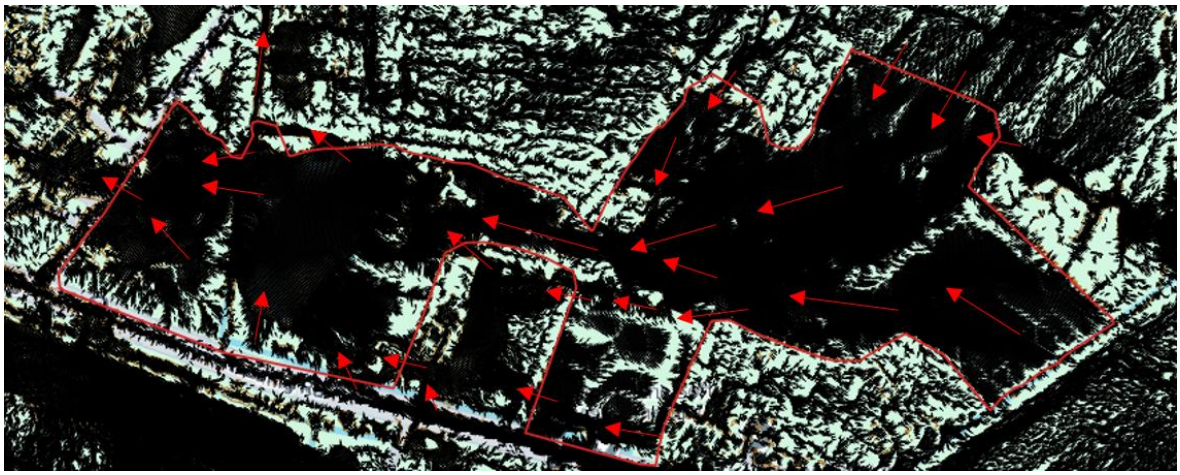


Figure 10: Extract of Surface Water Flooding Flow Path Directions from ACE

The assessment confirms surface water flows entering from the east and northeast of the site and traversing westwards. Figure 4 provides details on depths of water and provides an indication on the existing area of surface water flood storage being offered by the site.

Surface Water Flood Risk Mitigation Proposals

The development of the masterplan will need to ensure that the proposed homes and occupants are not at risk from this existing surface water flooding, in addition to this the masterplan will need to ensure that the volume of surface water flood storage currently being offered by the site is still provided within the development proposals in order to ensure that surface water flood risk is not increased.

Whilst this application seeks only outline permission at this stage, the illustrative masterplan has been developed with due consideration of the need to implement mitigation measures relating to the above matters. The development proposals will intercept potential overland flows along the northeastern and eastern boundaries through the use of cut-off ditches and convey these flows in a series of new swales through the development and connect to a large detention basin just north and adjacent to the proposed onsite attenuation basin. This will ensure that the development proposals do not provide any increase of flood risk downstream of the site. Details of the outline mitigation measures are provided in **Appendix D** and supported by the Hydrological modelling provided by Ardent Consulting Engineers.

Ground Water Flooding

The site is considered to be at low risk of groundwater flooding with less than 25% of areas susceptible to groundwater flooding according to the EA Risk of Groundwater Flooding maps.

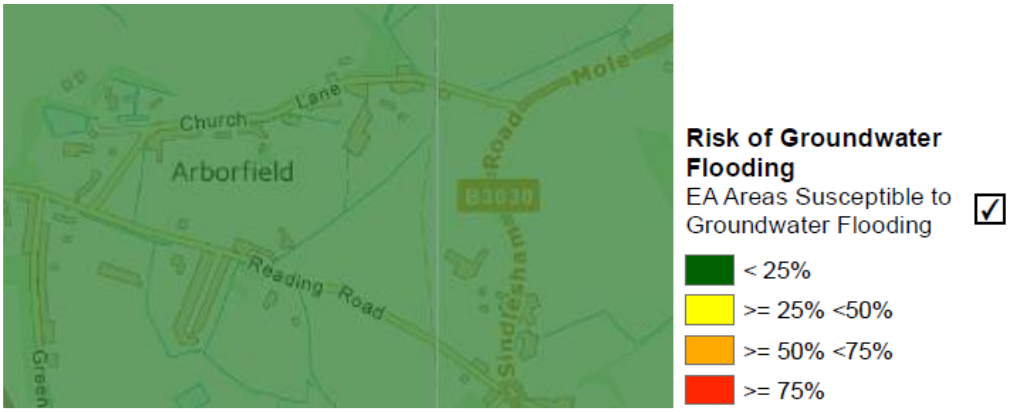


Figure 11: Extract of Risk of Groundwater Flooding from WBC Level 1 SFRA

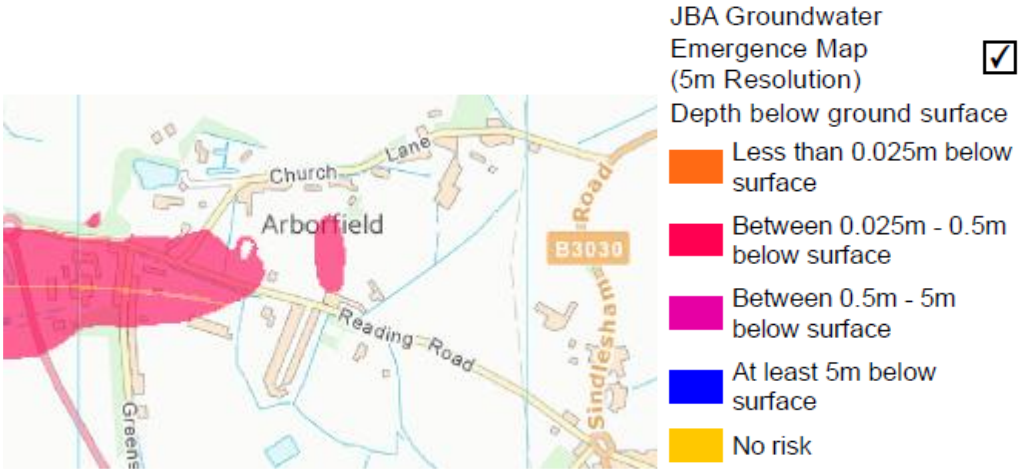


Figure 12: Extract of Risk of Groundwater Flooding from WBC Level 1 SFRA

The Level 1 SFRA indicates that parts of the site may have groundwater emergence between 0.025m to 0.5m below surface, which aligns with the locations of the superficial gravel head deposits as well as the shallow groundwater encountered onsite.

Risks associated with groundwater flooding can be mitigated through the design of the finished ground levels on the masterplan.

Flood Risk from Sewers

Sewer flooding occurs when the network capacity is exceeded, surcharged sewer networks can lead to flooding from backed up manholes and gully connections.

There are no records of sewer flooding occurring on-site and therefore, the risk of flooding from this source is considered low.

Flood Risk from Other Sources

The SFRA, EA and GOV.UK websites indicate the site does not fall within the extent of flooding from reservoirs, canals or other artificial sources.

Therefore, the site has been found to be at low risk of flooding from these sources.

Historic Flooding

Under Section 19 of the Flood and Water Management Act (2010) Wokingham Borough Council acting as the Lead Local Flood Authority (LLFA) have a duty to investigate and publish reports on major flood incidents in the borough. They have one published Section 19 report relating to the winter of 2013/2014 and published in January 2016.

Within this report there is a section and appendix related to Arborfield. It was reported that *"the village suffered flooding as a result of groundwater flooding and foul sewer flooding. A number of properties and roads also experienced surface water flooding as a result of high groundwater levels which reduced the volume of water that was able to infiltrate into the surrounding fields, resulting in overland flows."*

High groundwater levels led to reported overland flow in the west of this site, towards Church Lane, which was flooded. The flood extents do not affect the site. However, the proposed sustainable drainage system, including mitigation for surface water flooding and a detailed management and maintenance plan should result in an improved drainage regime in this area, resulting in reduced overland flow towards Church Lane.

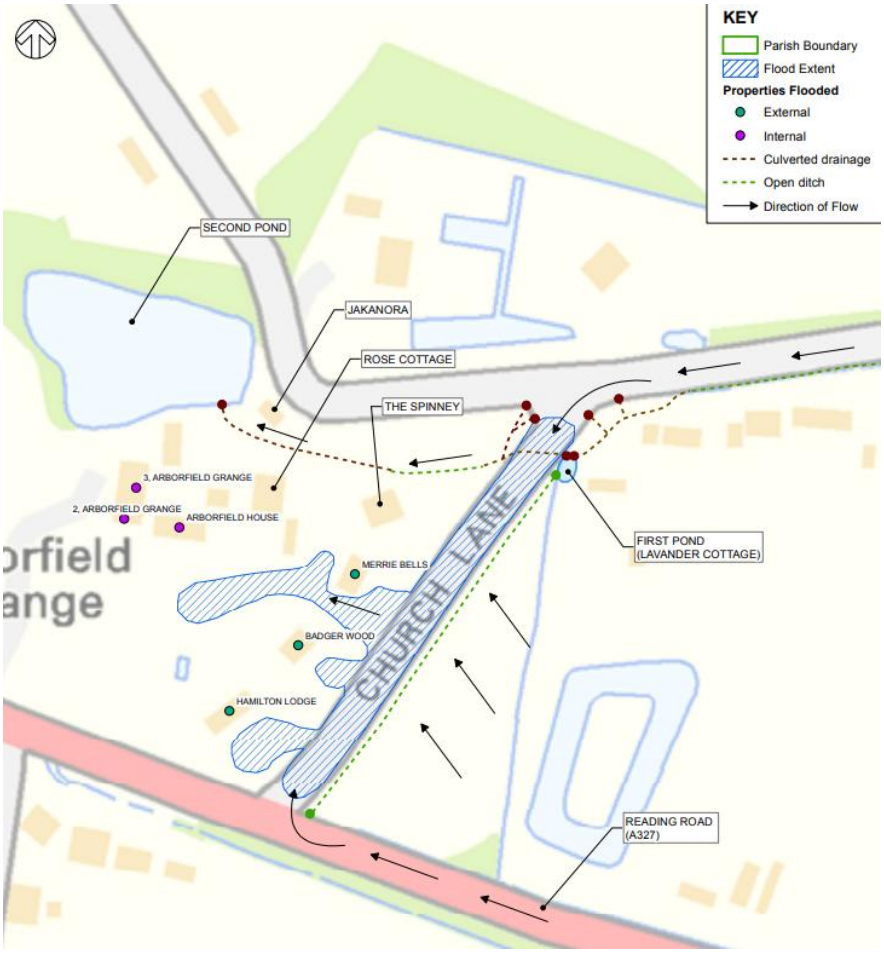


Figure 13: Extract (Appendix 2) from the January 2016 WBC Section 19 Report related to the flooding incidents of winter 2013/2014.

4.3 Climate Change

As of the 19th February 2016 (updated May 2022), the EA has updated guidance on the application of climate changes allowances for the following:

- peak river flow by river basin district
- peak rainfall intensity
- sea level rise
- offshore wind speed and extreme wave height

Peak river flow allowances are now to be based on River Basin areas thus making them more geographically relevant, based on the range of predicted allowances.

Fluvial Flood Risk

When allowances for climate change are made, the flood risk on the site is marginally increased. This is shown in **Figure 14**. As no built development is located within the updated flood risk extents no mitigation is required.

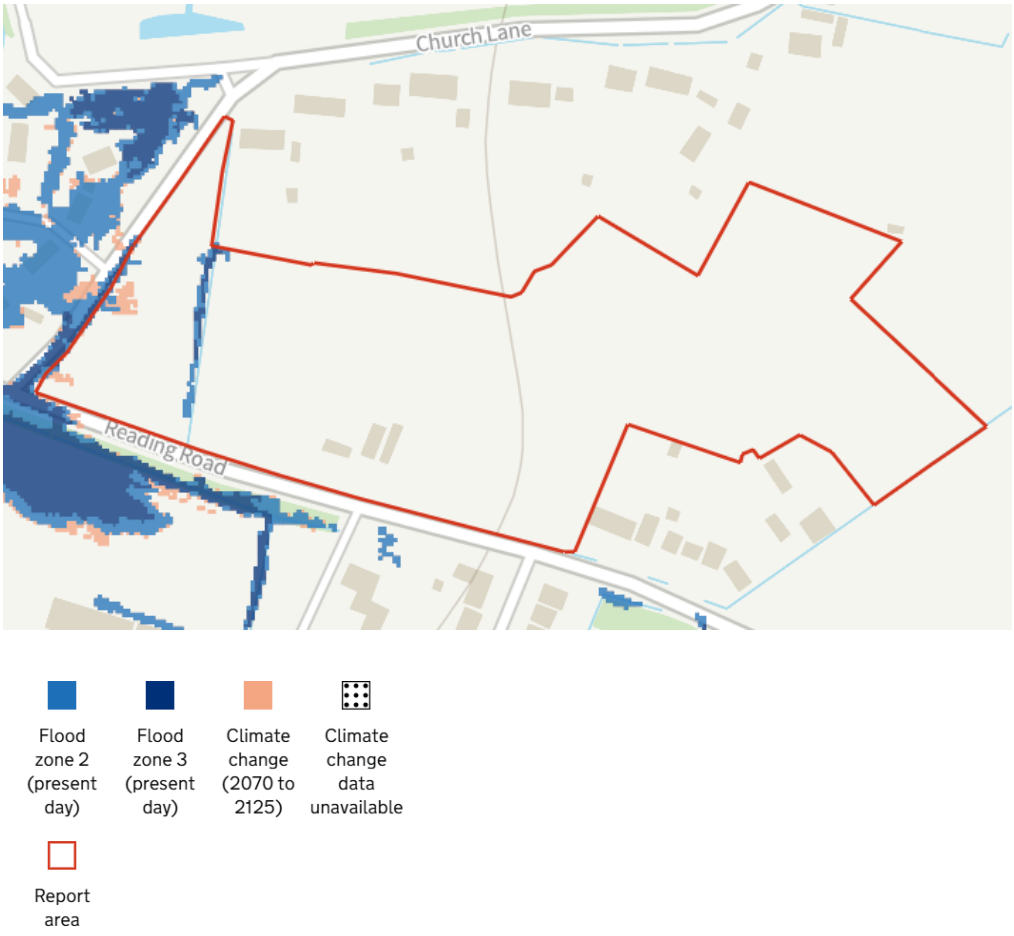


Figure 14: Extract of the flood map for planning, Flood Zones 2 and 3, including an allowance for climate change (2070 to 2125)

Surface Water Flood Risk

The flood map for planning does not currently show climate change scenarios for surface water. In the absence of this data the flood map for between 0.1% and 1% (between 1 in 1000 and 1 in 100) annual likelihood of surface water flooding is used as a proxy to account for climate change on the 1% (1 in 100) annual exceedance probability event (see **Figure 8**).

Surface water flood risk for this event is assessed in section 4.2.

Rainfall

Increases in peak rainfall over time is to be assessed on two scenarios to assess the sensitivity of the areas as per **Table 1** below.

Loddon and tributaries Management Catchment peak rainfall allowances	**3.3% annual exceedance rainfall event 2050s**	**3.3% annual exceedance rainfall event 2070s**	**1%annual exceedance rainfall event 2050s**	**1%annual exceedance rainfall event 2070s**
Upper end	+35%	+35%	+40%	+40%
Central	+20%	+25%	+20%	+25%

Table 1: Extract from DEFRA website for Loddon and tributaries Management Catchment peak rainfall allowances

As a conservative approach, a lifetime of the development should be considered of up to 100 years (i.e. up to 2126) when assessing flood risk for residential developments. According to Table 1 above, an increase of 40% on the peak rainfall intensity should be expected. To mitigate any residual risk at the site as a result of climate change, an appropriate climate change allowance (i.e. 40% increase in rainfall intensity) will therefore be considered and accommodated within the design strategy for managing surface water run-off.

5.0 Sequential Test

The NPPF (paragraph 170) states that, "Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere."

The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source.

Paragraph 175 of the NPPF states that:

"The sequential test should be used in areas known to be at risk now or in the future from any form of flooding, ***except in situations where*** *a site-specific flood risk assessment demonstrates that* ***no built development*** *within the site boundary, including access or escape routes, land raising or other potentially vulnerable elements,* ***would be located on an area that would be at risk of flooding from any source, now or in the future*** *(having regard to potential changes in flood risk."* (Our emphasis).

The PPG (paragraph 024) clarifies that only "where it is not possible to locate development in low-risk areas, the Sequential Test should go on to compare reasonably available sites". This implies that the Sequential Test, comparing other reasonably available sites, is not necessary where built development is demonstrated to be in low-risk areas.

The preliminary site layout demonstrates that no buildings or vehicular accesses are located within Flood Zone 2 or 3 (areas at risk of fluvial flooding). Similarly, no land level changes are proposed in these flood risk areas. A potential footpath link to the green space to the west of the site may be proposed to cross the Main River and Flood Zone 3. The design of this link can be provided as a clear span bridge ensuring it is kept clear of the extents of Flood Zones 2 and 3. As it can be demonstrated that all built development can be located outside of Flood Zone 2 and 3, a sequential test is not required relating to fluvial flood risk.

National flood risk maps also show the site to be at risk of surface water flooding. This is discussed and assessed in detail in section 5.2 of this report. Built development is expected in some of these areas. However, paragraph 027 of the PPG states that;

"In applying paragraph 175 a proportionate approach should be taken. Where a site-specific flood risk assessment demonstrates clearly that the ***proposed layout, design, and mitigation measures would ensure that occupiers and users would remain safe from current and future surface water flood risk*** *for the lifetime of the development (therefore addressing the risks identified e.g. by Environment Agency flood risk mapping), without increasing flood risk elsewhere, then the* ***sequential test need not be applied****."* (Our emphasis).

Section 4.2 of this report demonstrates that surface water flow will be intercepted along the northeastern and eastern boundaries through the use of cut-off ditches. Flow would then be conveyed in a series of new swales through the development and connect to a large detention basin just north and adjacent to the proposed onsite attenuation basin. This will ensure that the development proposals do not provide any increase of flood risk downstream of the site. Details of the outline mitigation measures are provided in

Appendix D and supported by the Hydrological modelling provided by Ardent Consulting Engineers.

These measures demonstrate that occupiers and users will remain safe from current and future surface water flood risk. Therefore, the Sequential Test is not required.

6.0 The Exception Test

The sequential test approach is aimed to steer new development to areas of lowest probability of flooding. As demonstrated in section 5, this is not required. However, as parts of the site lie within Flood Zone 2 and 3 the Exception Test may also need to be applied.

In this regard to determine the suitability and classification of the development, as a check of the proposed scheme, consultation has been made to tables 2 and 3 of the NPPF.

Table 2 of the NPPF technical guidance determines that the proposed development is considered to be a 'more vulnerable' land class usage, in terms of flood risk, as illustrated in **Figure 15**.

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 for hazardous waste[6].
- Sites used for holiday or short-let caravans and camping, *subject to a specific warning and evacuation plan.*[7]

Figure 15: Extract of Table 2: Flood Risk Vulnerability Classification

Table 3 of the NPPF considers sites providing a 'more vulnerable' land-class usage in a Flood Risk Zone 3 area as requiring an Exception Test (see **Figure 16**):

Table 3: Flood risk vulnerability and flood zone 'compatibility'

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate.
× Development should not be permitted.

Figure 16: Table 3 - Flood Risk Vulnerability and Flood Zone 'Compatibility'

However, as no built development will be located within Flood Zone 2 or 3 and all 'more vulnerable' development will be located in Flood Zone 1, it is deemed that the development is appropriate.

7.0 Surface Water Management

Wokingham Borough Council (WBC) are the Lead Local Flood Authority (LLFA) and the statutory consultee on surface water management on all planning applications within the Borough.
The surface water management on the site should ensure that there is no adverse impact on flood risk elsewhere as a result of a change in the surface water run-off regime from the development.

Based on the shallow ground investigations, infiltration drainage is not being proposed for this site. The LLFA consultation response to the planning application (**Appendix F**) confirmed acceptance that infiltration is not viable on the site.

Despite ground conditions not being conducive to the use of infiltration techniques, the surface water drainage strategy incorporates the use of a lined attenuation basins, swales and ponds which features a bio-retention areas which will provide treatment of surface water prior to discharging to the existing watercourse which runs through the site. The LLFA had no objection to this strategy (subject to condition) when consulted, this is evidenced in **Appendix F**.

7.1 Existing Surface Water Drainage Regime

The existing site is greenfield with existing watercourses running through the western part of the site as well as along the southern boundary. Any existing exceedance flows would continue eastwards overland to the existing watercourse which runs through the site.

7.2 Design Principles

Key design principles in the following guidance documents steer the approach to managing surface water run-off at sites:

- Building Regulations hierarchy of drainage (H3);
- Interim Code of Practice for SuDS; and
- CIRIA best practice guidance, including the use of the 'SuDS management train'

Building Regulations hierarchy of drainage outlines the preferred methods for the disposal of surface water with infiltration methods being the preferred option. If this is not possible the next favoured option is to drain to an existing watercourse. If neither of these options are feasible, the regulations state that rainwater discharge should be directed to a sewer.

The Interim Code of Practice for SuDS provides guidance about the hydraulic design criteria for Sustainable drainage systems. This in general refers to both peak rate of run-off and the volume of run-off, post development. Prior to mitigation measures such as the use of SuDS

attenuation features, both the volume and peak rate of run-off may increase post development.

The design principles for surface water management extend beyond simple hydraulic criteria. CIRIA guidance promotes the use of the SuDS management train, a concept where SuDS techniques are used to treat, convey and store surface water run-off. This approach is considered as part of the SuDS selection methodology.

7.3 Sustainable Drainage Systems

To drain the development in a sustainable manner whilst complying with the requirements of the NPPF, the scheme should seek to adopt an appropriate form(s) of sustainable urban drainage systems (SuDS).

SuDS techniques comprise of implementation of infiltration drainage devices to discharge surface water to the underlying soil stratum (where ground conditions permit). These may be in the form of conventional soakaways, infiltration basins and ponds, filter strips, bio-retention areas, swales, permeable surfaces, green roofs, over-sized pipes/tanks or geo-cellular attenuation units.

An additional 40% storage provision should be provided as an allowance for any potential climate change impact (as stated in Table 1: Peak rainfall intensity allowance in small and urban catchment associated with a residential scheme).

The SuDS philosophy is steered to maximize the benefits and minimise the negative impacts of surface water run-off from developed areas. CIRIA C753 The SuDS Manual determines the design criteria for SuDS to be based upon water quantity, water quality, amenity and biodiversity. Table 7.1 of The SuDS Manual assesses each SuDS component to the delivery of the design criteria. Where broadly ranking the SuDS, components depicted in Table 7.2 by applying a score for the deliverance of the design criteria, a theoretical SuDS hierarchy can be determined for the selection of SuDS against the design criteria as represented in Table 3.

SuDS in the form of swales, attenuation basins and ponds with bio-retention areas have been incorporated within the scheme. and it has therefore been concluded that the SuDS design criteria as described in the SuDS Manual has been met and accords with current best practice.

SuDS Component	Potential of delivering SuDS Design Criteria
Infiltration Systems	High
Swales	
Bioretention systems	
Pervious Pavements	
Detention Basins	
Trees	
Green Roofs	
Ponds and Wetlands	
Filter Drains	
Filter Strips	
Rainwater Harvesting Systems	
Proprietary Treatment Systems	
Attenuation Storage Tanks	Low

Table 2: Theoretical SuDS Hierarchy

Infiltration Drainage

Based on the existing geology, preliminary soakage testing and ongoing winter ground water level monitoring, ground conditions are not conducive to the use of infiltration drainage.

Existing Watercourses

There is an existing watercourse, classified as a Main River, which runs within the western part of the site which currently accommodates run-off from the existing site.

In reviewing the hierarchy for a proposed outfall and constraints associated with the development we have determined the proposed discharge from the residential site will continue to the existing watercourse to closely replicate the existing drainage regime and greenfield discharge arrangement.

7.4 Surface Water Drainage Strategy

In view of the requirements of the NPPF, PPG & WBC the design parameters and constraints associated with redeveloping this site, a surface water drainage strategy design has been devised and hydraulically modelled to demonstrate that the outline scheme can be suitably implemented without increasing the level of flood risk, when the surface water drainage system experiences a 1 in 100 year rainfall event (including an allowance for climate change).

The surface water drainage scheme has been designed to ensure:

- A reduction in the pre-development site discharge for peak storm events.
- Sustainable Drainage systems (SuDS) are wholly incorporated within the scheme.
- Consideration is given for the improvement of water quality within the design.
- The designed drainage scheme can satisfactorily retain a critical 1 in 100 Year storm event with climate change.

Having taken into consideration the above points, an outline scheme has been devised and hydraulically modelled based on attenuation techniques with a restricted discharge to the existing watercourse at the predevelopment Greenfield run-off rates. A copy of the proposed outline surface water strategy can be found in **Appendix D.**

7.4.1 Access Roads, Shared Surfaces, Private Drives and Roof Drainage

The proposed run-off from the access roads, drives and parking bays should be conveyed to the new below ground surface water network via trapped gullies. Rainfall run-off from the roofs of the new properties should also discharge directly into the below ground surface water network. The attenuation basins, bioretention areas and swales will provide treatment and convey flows up to the final discharge into the watercourse. A detailed surface water drainage strategy will be developed during the Reserved Matters stage to reflect the principles set out in this outline drainage strategy.

7.4.2 Flow Control

A maximum overall development discharge is proposed to be limited to the Mean Annual Average greenfield equivalent run-off rate (Qbar) which is calculated at 1.67l/s/ha

The hydraulic models of the proposed surface water networks, incorporating the SuDs attenuation basins and flow control devices can be found in **Appendix E.**

The hydraulic calculations have been simulated under various scenarios up to and included the critical 1 in 100 Year storm event with additional 40% allowance for climate change. The simulations confirm that the storm can be managed and maintained within the site without flooding.

The hydraulic model of the proposed surface water network, incorporating the SuDS attenuation systems can be found in **Appendix E**.

The hydraulic calculations have been simulated under various scenarios up to and included the critical 1 in 100 Year storm event with additional 40% allowance for climate change plus an additional 10% to account for urban creep. The simulations confirm that the storm can be managed and maintained within the site without offsite flooding.

Impermeable Outline Development Area (Ha)	Q2 Year (L/sec)	Q30 Year (L/Sec)	Q100 Year Plus Climate (L/Sec)
2.44	4.08	4.08	4.08

Table 3: Summary of Post Development Run-off with mitigation measures

7.4.3 Water Quality

It is important to address issues with regards to quality when considering surface water management. As the surface water is proposed to be discharge to the existing downstream watercourse, treatment is proposed as part of a SuDS Management Train in accordance with the recommendations of the SuDS Manual (CIRIA 753) and as required by the LLFA.

Chapter 26 of the CIRIA SuDS Manual (2015) provides guidance on methods that should be used to design SuDS to meet the water quality design criteria and good practice design standards. Diffuse urban pollution is a significant factor in compromising groundwater and receiving water standards that are required under the EA Water Framework Directive. Chapter 4 of the SuDs Manual summarises factors, which influence pollution levels in urban run-off. This summary is presented in **Table 4**

Factors influencing pollution levels in urban run-off
The amount and type of pollution washed off a surface will depend on many things including: • Planning activities on, above and adjacent to the surface that affect the deposition of pollutants, their retention on the surface and the extent to which they are mixed with run-off (including pollution prevention strategies) • Unplanned activities (accidents and spillages) that can cause temporary unexpected high pollution concentrations

- The surface location and type, affecting wash-off rates and contaminant movement mechanisms
- The drainage path
- The length of the dry weather period before the rainfall event
- The intensity and the duration of the rainfall, and the associated flow velocities

Any further pollutant transformations occurring during residence and conveyance within gullies, chambers, pipe or channel networks, gravels, soils and vegetation and quiescent bodies of water.

Table 4: Extract of Box 4.1 of the SuDS Manual (CIRIA 753)

Table 4.3 of the SuDS Manual classifies the pollution hazard level for residential sites, including residential car parks, low traffic roads as being "low" and thus only requiring a "Simple index approach" in terms of the requirements for the discharge to surface waters, including coasts and estuaries.

The SuDS Manual summarises the steps for the simple index approach:

Step 1 – *Allocated suitable pollution hazard indices for the proposed land use*

Step 2 – *Select SuDS with a total pollution mitigation index that equals or exceeds the pollution index*

Step 3 – *Where the discharge to a protected surface waters or groundwater, consider the need for a more precautionary approach*

The SuDS Manual describes "protected surface waters" as protected surface water resources, which include those designated for drinking water abstraction or for other environmental protection reasons.

Table 26.2 of the SuDS manual notes the following pollution hazard indices for residential land use development:

Land Use	Pollution Hazard Level	Total suspended solids (TSS)	Metals	Hydrocarbons
Individual property driveways, residential car parks, low traffic roads (eg. cul-de sacs, home zones and general access roads) and non-residential car parking with infrequent change (eg schools, offices)	Low	0.5	0.4	0.4

i.e. Less than 300 vehicle movements/day				

Figure 17: Extract of Table 26.2 of SuDS Manual (2015)

Table 26.3 of the SuDS Manual provides details of the SuDS pollution mitigation indices for various types of SuDS components.

	Mitigation indices		
Type of SuDS component	**TSS**	**Metals**	**Hydrocarbons**
Filter Strip	0.4	0.4	0.5
Filter Drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable Paving	0.7	0.6	0.7
Detention Basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8

Figure 18: Extract of Table 26.3 of SuDS Manual (2015)

As such the total SuDS mitigation index (**Figure 18**) must be greater than the pollution hazard index (figure 6), furthermore when used in combination of two or more SuDS components, a factor of 0.5 is used to account for the reduced performance of the secondary or tertiary components associated with the already reduced inflow of concentration, therefore:

Total SuDS mitigation index = mitigation index$_1$ + 0.5(mitigation index$_2$)

As such all the run-off from the development site is proposed to be conveyed through attenuation basins, ponds and bioretention areas thus providing a far greater SuDS mitigation index than what is required to meet the minimum standards.

Long Term Maintenance

Consideration has been given to the long-term maintenance of the proposed drainage structures. SuDS attenuation basin, swales and all associated external pipework, chambers and manholes will be the responsibility of a management company.

A detailed maintenance schedule will be provided by the designers during the detailed design stage of the surface water proposals.

Exceedance

Whilst the drainage system has been designed to a very high standard (1 in 100 Year storm event plus climate change and an allowance for urban creep), it is possible that a more extreme event will occur and that the design standard for the system will be exceeded. It is best practice to design the drainage system to shed water, primarily into landscaped and other areas, therefore reducing the risk of flooding areas of built development during extreme events.

A strategy for directing overland flows for the site will be confirmed using overland flow modeling as part of the detailed design once key ground levels and development levels across the site have been finalized.

8.0 Foul Water Drainage Strategy

Thames Water are the Local Sewerage Authority in this area. The development proposals will seek to discharge to the existing Thames Water public sewer network located south of the development via a new onsite pumping station.

The proposed connection to the existing foul water network will be carried out under a Section 106 Agreement (Water Industry Act) with Thames Water.

All domestic foul drainage should be designed in accordance with Part H of the Building Regulations.

Thames Water had no objection to the planning application when consulted. They have also confirmed in correspondence that the proposed sanitary waste treatment (SWT) for Arborfield is currently compliant and is forecast to remain compliant with its dry weather flow (DWF) permit throughout the period of 2025-2030. Based on this, the development is demonstrated not to contribute to unacceptable levels of water pollution or adversely affect water quality. Both the Thames Water planning consultation and correspondence are evidenced in **Appendix G**.

9.0 Conclusions

A preliminary design surface water drainage strategy has been prepared and hydraulically modelled which demonstrates that the redevelopment proposals can be successfully implemented and designed to withstand the impact of a 1 in 100 year rainfall event (including 40% climate change and 10% urban creep allowance), in accordance with the NPPF, PPG and WBC requirements.

In view of this assessment, the report concludes that:

i. That the site is located mainly within Flood Zone 1 with no buildings, vehicular access, or land level changes in Flood Zone 2 or 3;

ii. The Sequential Test and Exception Test are not required;

iii. The development and its occupants are not at an increased risk of flooding;

iv. The development does not increase the risk of flooding elsewhere;

v. The development can be drained in a sustainable manner using SuDS techniques;

vi. The development will satisfactorily manage and maintain a 1 in 100 Year storm event with allowance for climate change.

The findings of this report identify the opportunity to promote the sustainable re-use of existing resources and potential to implement an appropriate SuDS strategy.

Appendix (A)

Topographical Survey

DITCH ENDS AT THIS LOCATION

Gate in this area no access due to dense vegetation

Limited access in this area

Area not cleared

Dense vegetation and trees

Approximate position and size possible mutt-bole

Possible culvert

Road Name Plate

Bus stop

Bus Shelter

Shed

Borehole

Ditch

Note: Area not cleared at time of survey

Vegetation and small trees

Dense vegetation

Grass

Asphalt

Gravel

Vegetation

Boundary fence

Balfour Beatty 132kv

Balfour Beatty 33kv

Cross Island Service 1 fibre

Cross Island Service 2 fibre

STA E:476207.524 N:167925.790 H=47.790

STB E:476207.524 N:167925.790 H=48.010

STC E:476207.524 N:167925.790 H=48.010

STD E:476207.524 N:167925.790 H=48.010

STE E:476206.007 N:167925.480 H=48.308

STF E:476206.007 N:167925.480 H=48.308

STG E:476169.611 N:167922.724 H=48.077

SW1 E:476206.125 N:167925.790 H=48.000

READING ROAD

SLOW

SLOW

Title: Topographic Survey	Surveyed:	NR, GB & PS	Scale: 1:200 (A0 Sheet)
	Drawn:	MH	
	Checked:	NR, GB & PS	
Client: dandara	Job No: NRS001A	Sheet: 01	Rev: A
Project: Reading Road, Arbofield Return	Rev	Notes	Drawn / Date
	Notes:	Previous Survey "NRS001 08/10/2024" has been inserted into this model for reference.	
Date: 14/11/2024	Postcode: RG2 9JB		

NRS Surveying Limited,
6 Purbrook Way,
Havant,
Hampshire
PO9 3RY
Mobile:
07564 602518.
Email: nrsurveying@gmail.com

Sheet Layout

Sheet 01 | Sheet 02 | Sheet 03 | Sheet 04 | Sheet 05

GENERAL NOTES

Irrespective of the information provided by a utility survey and statutory plans, excavation work should be undertaken with extreme caution and in accordance with HSE Guidelines - HSG47 Avoiding Danger from Underground Services

Utilities may continue outside of the survey area. Any paint marks outside of the area are for investigative purposes only and may not represent the full extent of the sub-surface utilities.

Where logic indicates a utility exists but which cannot be positively confirmed with the technology, an assumed route (ASR) is recorded. All assumed service routes (ASR) have been highlighted with a background yellow colour for visual enhancement.

GPR is utilised across the site in all accessible areas where ground conditions, obstructions allow. Areas of dense vegetation, unclear areas, marsh land, steep banks etc. will not be covered by GPR.

Vertical & Horizontal Position - Vertical position (depth) is indicative to the top of the utility/feature and should not be taken as exact, as this could be the surround to the service rather than the service itself. Where depth information from the technology is unclear, depth is not shown.

Warranty
This drawing does not provide an absolute representation of the sub-surface. Utilities have been detected using non-invasive technologies only and the performance can be adversely affected by ground, weather and site conditions outside of NRS Surveying Ltd control; therefore, some utilities may be undetectable. While NRS Surveying Ltd uses reasonable endeavours to detect all utilities, it does not warrant that 100% detection will be achieved and that approximate depth penetration of the technologies NRS Surveying Ltd uses will not be greater than two metres.

PAS128 SURVEYS

(0.60d B2P) 0.65d = Depth in metres, B2 = Quality Level, P = Post processed GPR

Key to Quality Levels	
Quality Level	Definition
D	Undefined (Stats, desktop records search)
B4	Suspected to exist, not detected by GPR or EML
B3	Horizontal position located by one technique only
B2	Horizontal and vertical position located by one technique only
B1	Horizontal and vertical position located by multiple techniques
A	Horizontal and vertical position verified visually of the service

Unable to Survey | GPR | Possible Service | Anomalous Ground

TOPOGRAPHIC LEGEND

Building | Fence
Canopy | Heras Fence
Cover with Chamber Extents | Kerb Channel
Crash Barrier | Kerb Top
Drainage Channel | Levels
Drop Kerb | Overhead Service
Edge Detail | Tree (dimensions in metres)
Embankment Slope | Wall

ABBREVIATIONS

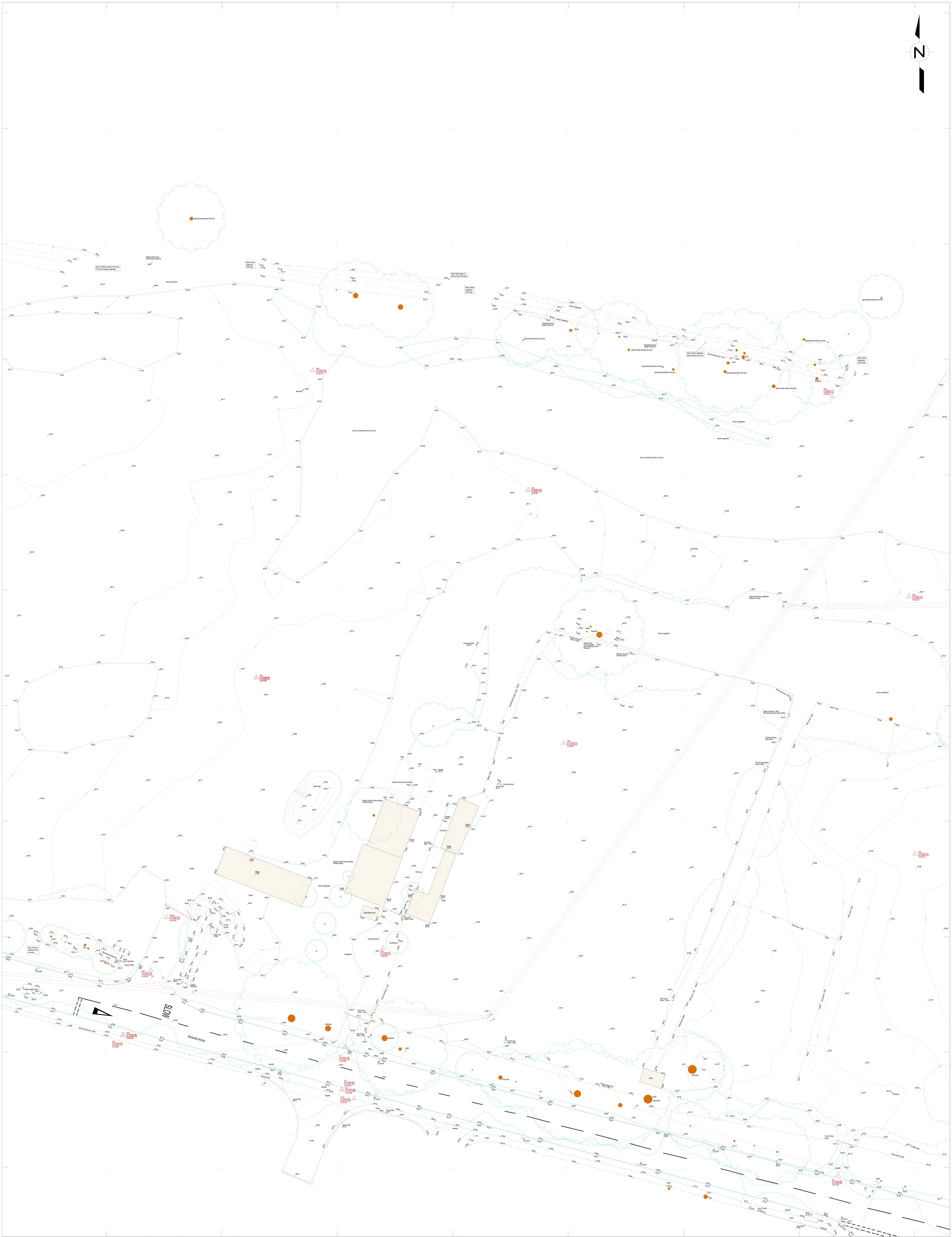
Bellsha Beacon	LIG	Light in Ground	BB
Bollard	MH	Manhole Cover	B
Borehole	MKR	Marker Post	BH
Cabinet	NDA	No Depth Attainable	CAB
Cover Level	PB	Post Box	CL
Concrete Paving Slabs	PM	Phone Mast	CPS
Cable Television	P	Post	CTV
Charging Point	PE	Polyethylene Pipe Material	EVCP
Down Pipe	RE	Rodding Eye	DP
Electric Pole	RS	Road Sign	EP
Earth Rod	RWP	Rain Water Pipe	ER
Finished Floor Level	SIG	Service in Ground	FFL
Feeder Pillar	SP	Sign Post	FP
Fire Hydrant	SC	Stop Cock	FH
Flood Light	SV	Sluice Valve	FL
Gas Valve	TP	Telegraph Pole	GV
Gully	TL	Traffic Light	GU
Inspection Chamber	TM	Ticket Machine	IC
Invert Level	VP	Vent Pipe	IL
Lighting Bollard	WP	Waste Pipe	LB
Lamp Post	WM	Water Meter	LP
	WV	Water Valve	

Assumed Route Service highlighted yellow, includes linetype as above to note service type.

UTILITY LEGEND

BT	British Telecom	FUEL	Fuel Pipeline
CATV	Cable Television	G	Gas Pipe
CCTV	Closed Circuit Television	GPR	Unknown GPR Target
E	Unidentified Telecoms	HP	Heating Pipes
DR	Unidentified Drainage	HV	High Voltage Cable
CW	Combined Water	MS	Multiple Service Route
FW	Foul Water	O	Oil Pipeline
SW	Storm Water	SL	Street Lighting
ER	Earth	TC	Traffic Controls
E	Electric Cable	U	Unknown Service
ED	Empty Duct	UC	Unknown Cable
FO	Fibre Optic	UP	Unknown Pipeline
FM	Fire Hydrant Main	W	Water Main
AREA	Contracted Survey Area	BT	
AREA	Previous Survey Area		
AREA	GPR Data Collection Area		
(0.60d)	Depth to Top of Service	(<0.60d)	Approximate Depth to Top of Service
	Unable to Trace (Due to Blockage)		End of Trace
	Unable to Trace Further		Unable to Trace
	Unable to Trace (Capped Port)		

UTL	Unable to Lift (Cover)
UTS	Unable to Survey
UTT	Unable to Trace (Service)



Title: Topographic Survey

Surveyed:	NR, GB & PS	Scale:
Drawn:	MH	1:200 (A0 Sheet)
Checked:	NR, GB & PS	

Client: dandara

Job No:	Sheet:	Rev:
NRS001A	02	A

Rev	Notes	Drawn	Date

Notes: Previous Survey "NRS001 08/10/2024" has been inserted into this model for reference.

Project: Reading Road, Arbofield Return

Date:	14/11/2024	Postcode:	RG2 9JB

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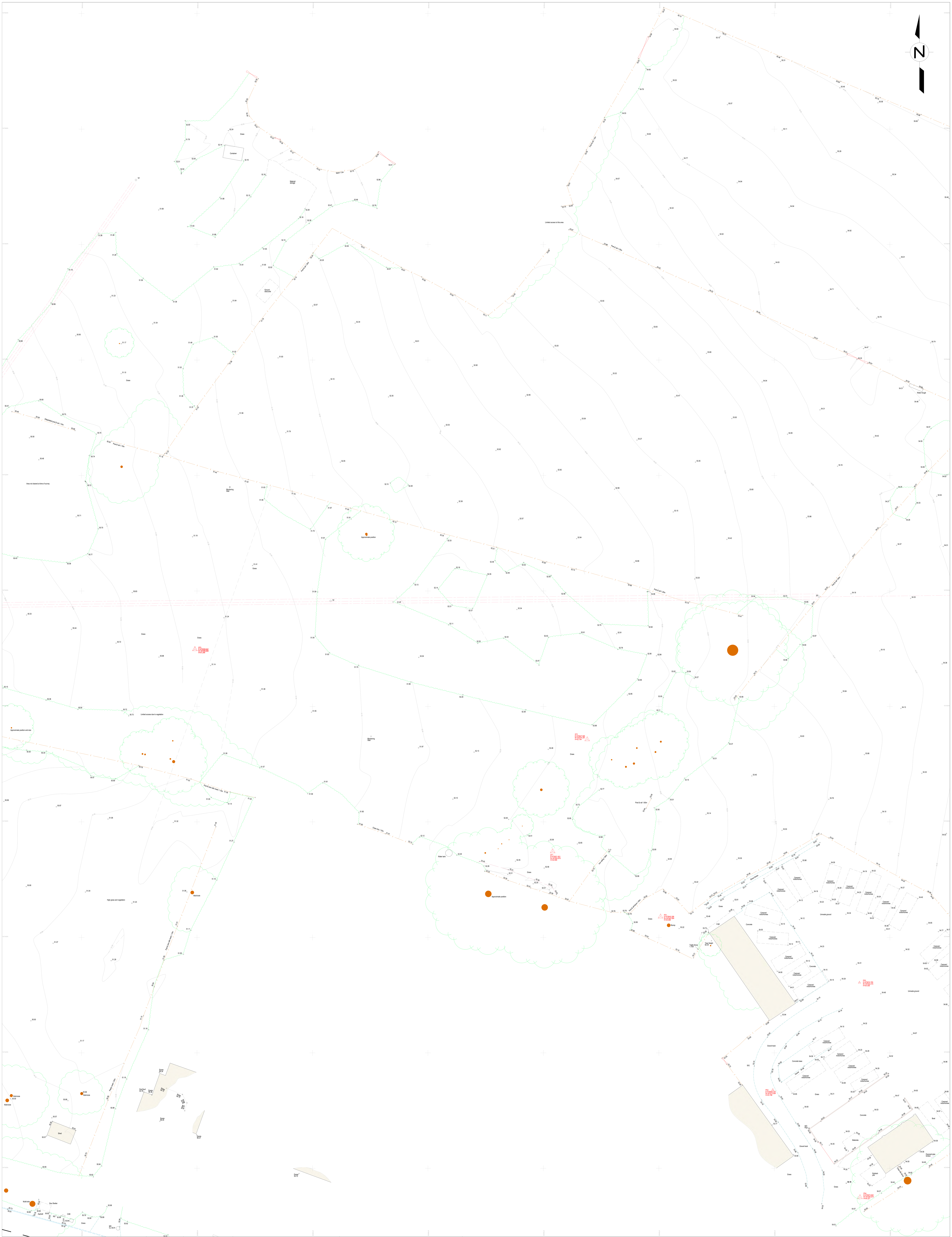
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AREA	Previous Survey Area	UTS	Unable to Survey
AREA	GPR Data Collection Area	UTT	Unable to Trace (Service)
(0.60d)	Depth to Top of Service	(~0.60d)	Approximate Depth to Top of Service
	Unable to Trace (Due to Blockage)		End of Trace
	Unable to Trace Further		Unable to Trace
	Unable to Trace (Capped Port)		



Title:	Surveyed:	NR, GB & PS	Scale:
Topographic Survey	Drawn:	MH	1:200 (A0 Sheet)
	Checked:	NR, GB & PS	

Client: dandara

Job No:	Sheet:	Rev:
NRS001A	03	A

Rev	Notes	Drawn	Date

Notes: Previous Survey "NRS001 08/10/2024" has been inserted into this model for reference.

Project:

Reading Road, Arbofield Return

Date:	14/11/2024	Postcode:	RG2 9JB

nrs surveying limited

NRS Surveying Limited,
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Sheet Layout

Sheet 01 | Sheet 02 | Sheet 03 | Sheet 04 | Sheet 05

GENERAL NOTES

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Utilities may continue outside of the survey area. Any paint marks outside of the area are for investigative purposes only and may not represent the full extent of the sub-surface utilities.

Where logic indicates a utility exists but which cannot be positively confirmed with the technology, an assumed route (ASR) is recorded. All assumed service routes (ASR) have been highlighted with a background yellow colour for visual enhancement.

GPR is utilised across the site in all accessible areas where ground conditions, obstructions allow. Areas of dense vegetation, unclear areas, marsh land, steep banks etc. will not be covered by GPR.

Vertical & Horizontal Position - Vertical position (depth) is indicative to the top of the utility/feature and should not be taken as exact, as this could be the surround to the service rather than the service itself. Where depth information from the technology is unclear, depth is not shown.

Warranty
This drawing does not provide an absolute representation of the sub-surface. Utilities have been detected using non-invasive technologies only and the performance can be adversely affected by ground, weather and site conditions outside of NRS Surveying Ltd control, therefore, some utilities may be undetectable. While NRS Surveying Ltd uses reasonable endeavours to detect all utilities, it does not warrant that 100% detection will be achieved and that approximate depth penetration of the technologies NRS Surveying Ltd uses will not be greater than two metres.

PAS128 SURVEYS

(0.60d B2P) 0.65d = Depth in metres, B2 = Quality Level, P = Post processed GPR

Key to Quality Levels	
Quality Level	Definition
D	Undefined (Stats, desktop records search)
B4	Suspected to exist, not detected by GPR or EML
B3	Horizontal position located by one technique only
B2	Horizontal and vertical position located by one technique only
B1	Horizontal and vertical position located by multiple techniques
A	Horizontal and vertical position verified visually of the service

Unable to Survey — GPR Possible Service — Anomalous Ground

TOPOGRAPHIC LEGEND

Building	Fence
Canopy	Heras Fence
Cover with Chamber Extents	Kerb Channel
Crash Barrier	Kerb Top
Drainage Channel	Levels + 10.00
Drop Kerb	Overhead Service
Edge Detail	Tree (dimensions in metres)
Embankment Slope	Wall

ABBREVIATIONS

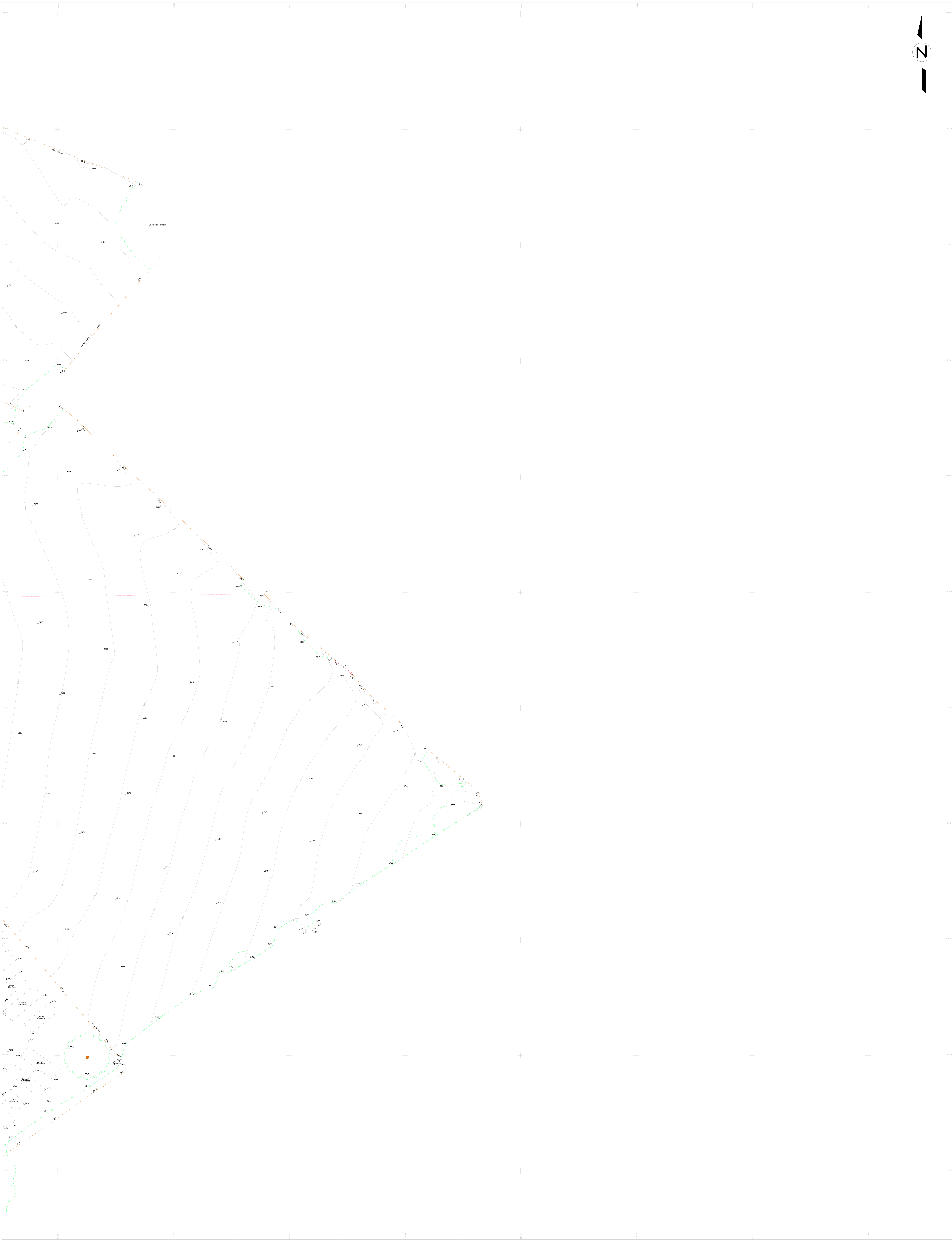
BB	Belisha Beacon	LIG	Light in Ground
B	Bollard	MH	Manhole Cover
BH	Borehole	MKR	Marker Post
CAB	Cabinet	NDA	No Depth Attainable
CL	Cover Level	PB	Post Box
CPS	Concrete Paving Slabs	PM	Phone Mast
CTV	Cable Television	P	Post
EVCP	Charging Point	PE	Polyethylene Pipe Material
DP	Down Pipe	RE	Rodding Eye
EP	Electric Pole	RS	Road Sign
ER	Earth Rod	RWP	Rain Water Pipe
FFL	Finished Floor Level	SIG	Service in Ground
FP	Feeder Pillar	SP	Sign Post
FH	Fire Hydrant	SC	Stop Cock
FL	Flood Light	SV	Sluice Valve
GV	Gas Valve	TP	Telegraph Pole
GU	Gully	TL	Traffic Light
IC	Inspection Chamber	TM	Ticket Machine
IL	Invert Level	VP	Vent Pipe
LB	Lighting Bollard	WP	Waste Pipe
LP	Lamp Post	WM	Water Meter
		WV	Water Valve

UTILITY LEGEND

BT	British Telecom	Fuel Pipeline	FUEL
CATV	Cable Television	Gas Pipe	G
CCTV	Closed Circuit Television	Unknown GPR Target	GPR
C	Unidentified Telecoms	Heating Pipes	HP
DR	Unidentified Drainage	High Voltage Cable	HV
CW	Combined Water	Multiple Service Route	MS
FW	Foul Water	Oil Pipeline	O
SW	Storm Water	Street Lighting	SL
ER	Earth	Traffic Controls	TC
E	Electric Cable	Unknown Service	U
ED	Empty Duct	Unknown Cable	UC
FO	Fibre Optic	Unknown Pipeline	UP
FM	Fire Hydrant Main	Water Main	W

Assumed Route Service highlighted yellow, includes linetype as above to note service type. — BT

AREA	Contracted Survey Area	UTL	Unable to Lift (Cover)
AREA	Previous Survey Area	UTS	Unable to Survey
AREA	GPR Data Collection Area	UTT	Unable to Trace (Service)
(0.60d)	Depth to Top of Service	(~0.60d)	Approximate Depth to Top of Service
B	Unable to Trace (Due to Blockage)	E	End of Trace
F	Unable to Trace Further	U	Unable to Trace
C	Unable to Trace (Capped Port)		



Title:	Surveyed:	NR, GB & PS	Scale:
Topographic Survey	Drawn:	MH	1:200 (A0 Sheet)
	Checked:	NR, GB & PS	

Client: dandara

Job No:	Sheet:	Rev:
NRS001A	04	A

Rev	Notes	Drawn	Date

Notes: Previous Survey "NRS001 08/10/2024" has been inserted into this model for reference.

Project: Reading Road, Arbofield Return

Date:	14/11/2024	Postcode:	RG2 9JB

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Sheet Layout

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Warranty
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PAS128 SURVEYS

(0.60d B2P) 0.65d = Depth in metres, B2 = Quality Level, P = Post processed GPR

Key to Quality Levels

Quality Level	Definition
D	Undefined (Stats, desktop records search)
B4	Suspected to exist, not detected by GPR or EML
B3	Horizontal position located by one technique only
B2	Horizontal and vertical position located by one technique only
B1	Horizontal and vertical position located by multiple techniques
A	Horizontal and vertical position verified visually of the service

Unable to Survey — GPR Possible Service — Anomalous Ground

TOPOGRAPHIC LEGEND

Building	Fence
Canopy	Heras Fence
Cover with Chamber Extents	Kerb Channel
Crash Barrier	Kerb Top
Drainage Channel	Levels + 10.00
Drop Kerb	Overhead Service
Edge Detail	Tree (dimensions in metres)
Embankment Slope	Wall

ABBREVIATIONS

BB	Belisha Beacon	LIG	Light in Ground
B	Bollard	MH	Manhole Cover
BH	Borehole	MKR	Marker Post
CAB	Cabinet	NDA	No Depth Attainable
CL	Cover Level	PB	Post Box
CPS	Concrete Paving Slabs	PM	Phone Mast
CTV	Cable Television	P	Post
EVCP	Charging Point	PE	Polyethylene Pipe Material
DP	Down Pipe	RE	Rodding Eye
EP	Electric Pole	RS	Road Sign
ER	Earth Rod	RWP	Rain Water Pipe
FFL	Finished Floor Level	SIG	Service in Ground
FP	Feeder Pillar	SP	Sign Post
FH	Fire Hydrant	SC	Stop Cock
FL	Flood Light	SV	Sluice Valve
GV	Gas Valve	TP	Telegraph Pole
GU	Gully	TL	Traffic Light
IC	Inspection Chamber	TM	Ticket Machine
IL	Invert Level	VP	Vent Pipe
LB	Lighting Bollard	WP	Waste Pipe
LP	Lamp Post	WM	Water Meter
		WV	Water Valve

UTILITY LEGEND

BT	British Telecom	FUEL	Fuel Pipeline
CATV	Cable Television	G	Gas Pipe
CCTV	Closed Circuit Television	GPR	Unknown GPR Target
C	Unidentified Telecoms	HP	Heating Pipes
DR	Unidentified Drainage	HV	High Voltage Cable
CW	Combined Water	MS	Multiple Service Route
FW	Foul Water	O	Oil Pipeline
SW	Storm Water	SL	Street Lighting
ER	Earth	TC	Traffic Controls
E	Electric Cable	U	Unknown Service
ED	Empty Duct	UC	Unknown Cable
FO	Fibre Optic	UP	Unknown Pipeline
FM	Fire Hydrant Main	W	Water Main

Assumed Route Service highlighted yellow, includes linetype as above to note service type. BT

AREA	Contracted Survey Area	UTL	Unable to Lift (Cover)
AREA	Previous Survey Area	UTS	Unable to Survey
AREA	GPR Data Collection Area	UTT	Unable to Trace (Service)
(0.60d)	Depth to Top of Service	(~0.60d)	Approximate Depth to Top of Service
B	Unable to Trace (Due to Blockage)	E	End of Trace
F	Unable to Trace Further	U	Unable to Trace
C	Unable to Trace (Capped Port)		



UTILITY LEGEND

BT	British Telecom	FW	Fire Hydrant Main
CCTV	Closed Circuit Television	FP	Fuel Pipeline
UNKN	Unidentified Service	GAS	Gas Pipe
UD	Unidentified Drainage	GPR	Unknown GPR Target
CW	Combined Water	HV	High Voltage Cable
FW	Foul Water	MSR	Multiple Service Route
SW	Storm Water	OP	Oil Pipeline
ER	Earth	SL	Street Lighting
E	Electric Cable	TC	Traffic Controls
ED	Empty Duct	UC	Unknown Service
FO	Fibre Optic	UP	Unknown Cable
		UW	Unknown Pipeline
		W	Water Main

Assumed Route Service highlighted yellow, includes linetype as above to note service type.

	Contracted Survey Area	UTL	Unable to Lift (Cover)
	Previous Survey Area	UTS	Unable to Survey
	GPR Data Collection Area	UTT	Unable to Trace (Service)
(0.604)	Depth to Top of Service	(0.604)	Approximate Depth to Service
B2	Unable to Trace (Due to Blockage)	EoT	End of Trace
B1	Unable to Trace Further		Unable to Trace
B,F	Unable to Trace (Capped Port)		

PAS128 SURVEYS

(0.604 B2P) 0.604 = Depth in metres, B2 = Quality Level, P = Post processed GPR

Key to Quality Levels

Quality Level	Definition
D	Undefined (Walk, Wish, Commence search)
B4	Suspected to exist, not detected by GPR or ESML
B3	Horizontal position located by one technique only
B2	Horizontal and vertical position located by one technique only
B1	Horizontal and vertical position verified by multiple techniques
A	Horizontal and vertical position verified via survey of the service

Anomalous Ground — Possible Service — Unable to Survey

ABBREVIATIONS

BB	Beltelw Beacon	LIG	Light in Ground
B	Bollard	MH	Manhole Cover
BH	Borehole	MKR	Marker Post
CAB	Cabinet	NDA	No Depth Attainable
CL	Cover Level	PB	Post Box
CONC	Concrete Pedestal	PH	Phone Point
CTV	Cable Television	P	Post
EVCP	Charging Point	PE	Polyethylene Pipe Material
FH	Fire Hydrant	PC	Polyvinyl Chloride
EP	Electric Pole	RS	Road Sign
ER	Earth Rod	RWP	Rain Water Pipe
FFL	Finished Floor Level	SIG	Service in Ground
FP	Feeder Pillar	SP	Sign Post
FB	Flower Bed	ST	Stop Tap
FL	Fixed Light	SV	Stone Valve
GV	Gas Valve	TP	Telegraph Pole
GU	Gully	TL	Traffic Light
IC	Inspection Chamber	TM	Ticket Machine
LB	Lighting Bollard	VP	Vent Pipe
LB	Lighting Bollard	vpr	Waste Pipe
LP	Lamp Post	WM	Water Meter
		WV	Water Valve

TOPOGRAPHIC LEGEND

	Building		Fence
	Canopy		Heras Fence
	Cover with Chamber Extents		Kerb Channel
	Crash Barrier		Kerb Top
	Drainage Channel		Levels
	Drop Kerb		Overhead Service
	Edge Detail		Tree (dimensions in metres)
	Embankment Slope		Wall

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Warranty
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Sheet Layout



Rev	Notes	Drawn	Date

Notes: Previous Survey "NRS001 08/10/2024" has been inserted into this model for reference.

NRS Surveying Limited,
6 Purbrook Way,
Havant,
Hampshire
PO9 3RY
Mobile:
07564 602518.
Email: nrsurveying@gmail.com

Title:

Topographic Survey

Client:

dandara

Project:

Reading Road, Arbofield Return

Date:	14/11/2024	Postcode:	RG2 9JB
Surveyed:	NR, GB & PS	Scale:	
Drawn:	MH	1:200 (A0 Sheet)	
Checked:	NR, GB & PS		
Job No:		Sheet:	Rev:
NRS001A		05	A

Appendix (B)

Site Layout Plan

dandara
award winning property

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Do not scale other than for Local Authority Planning purposes.



illustrative masterplan

dha architecture ltd

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RG42 5QX

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land at reading road, arborfield

Illustrative Masterplan

22.11.2024	created
1:500 @ A0	scaling
SB/JeH/AJO	contact
052403-DAN-MP01	reference - revision

rev	date	by	details

Appendix (C)

Geotechnical Information

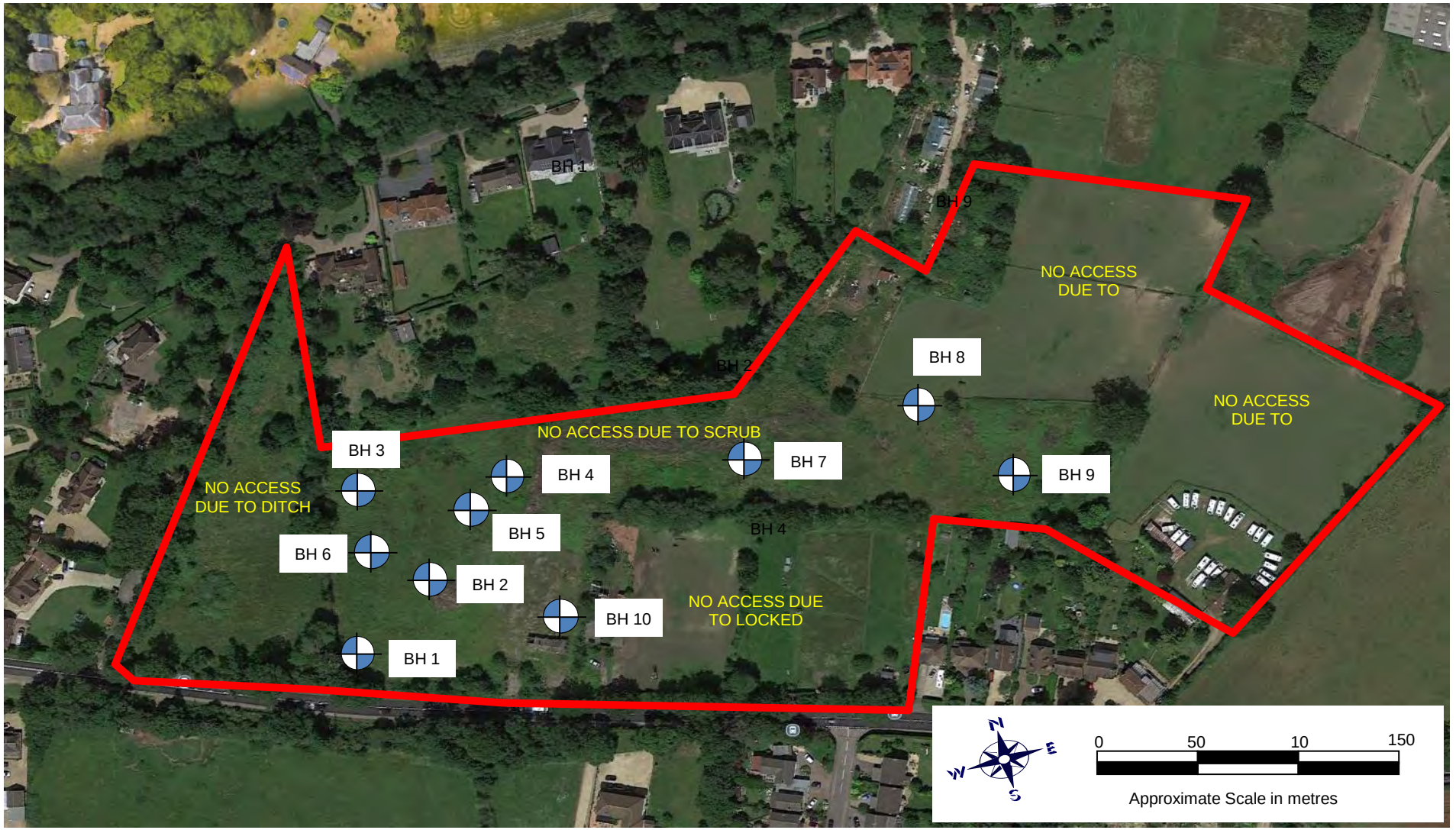
WILSON BAILEY
GEOTECHNICAL & ENVIRONMENTAL

Northdown Farmhouse
Donhead St Mary
Wiltshire
SP7 9DD

Site Plan

Site Reading Road Development Site, Arborfield

Client Dandara Southern Limited



Site Plan

WILSON BAILEY
GEOTECHNICAL & ENVIROMENTAL

Site	Number
Reading Road, Arborfield	BH1

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler			Dandara Southern Ltd	J202429
	Location	**Dates** 30/09/2024	**Engineer** DPB	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.80)	MADE GROUND (reworked soft brown and grey clay with occasional fine brick fragments)		
0.50	D1				0.80			
1.00-1.45	SPT N=10		2,2/1,3,3,3			Firm yellowish brown silty sandy CLAY		
1.00	D2				(1.00)			
1.50	D3							
			Water strike(1) at 1.80m.		1.80			▽1
					1.90	Pale orange-brown silty sandy fine GRAVEL		
2.00-2.45	SPT N=12		1,2/2,2,3,5			Firm yellowish brown and grey silty slightly sandy CLAY with occasional fine flint gravel		
2.00	D4				(1.00)			
2.50	D5							
					2.90			
3.00-3.45	SPT N=15		1,2/2,3,5,5			Firm brown and grey mottled CLAY		
3.00	D6				(1.10)			
3.50	D7							
					4.00			
4.00-4.45	SPT N=19		3,2/3,5,4,7			Complete at 4.00m		
4.00	D8							

Remarks
Groundwater encountered at 1.80m. Standpipe installed with a response zone from 1.00m to 3.00m.

Scale (approx)	Logged By
1:50	

Figure No. J202429.BH1

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WILSON BAILEY
GEOTECHNICAL & ENVIROMENTAL

Site	Number
Reading Road, Arborfield	BH10

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler			Dandara Southern Ltd	J202429
	Location	**Dates** 30/09/2024	**Engineer** DPB	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	MADE GROUND (reworked topsoil)		
					0.40			
0.50	D1					Firm brown silty sandy CLAY		
1.00	D2				(1.05)			
1.50	D3		Water strike(1) at 1.50m.		1.45			▽1
						Orange-brown silty sandy GRAVEL		
2.00	D4				(0.95)			
2.50	D5				2.40	Firm brown and grey mottled silty CLAY		
3.00	D6				(1.60)			
3.50	D7							
4.00	D8				4.00	Complete at 4.00m		

Remarks
Groundwater encountered at 1.50m.

Scale (approx)	Logged By
1:50	

Figure No. J202429.BH10

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WILSON BAILEY
GEOTECHNICAL & ENVIROMENTAL

Site	Number
Reading Road, Arborfield	BH2

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler			Dandara Southern Ltd	J202429
	Location	**Dates** 30/09/2024	**Engineer** DPB	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30) 0.30	TOPSOIL		
0.50	D1		Water strike(1) at 0.80m.		(0.80)	Firm brown silty sandy CLAY with scattered fine to medium flint gravel and bands of sand		▽1
1.00-1.45 1.00	SPT N=7 D2		1,1/1,1,2,3		1.10			
1.50	D3				(0.80)	Firm pale grey silty CLAY		
2.00-2.45 2.00	SPT N=5 D4		3,2/2,1,1,1		1.90			
2.50	D5				(0.80)	Orange-brown silty sandy fine to medium flint GRAVEL		
3.00-3.45 3.00	SPT N=11 D6		1,1/2,2,3,4		2.70			
3.50	D7				(1.30)	Firmdark grey silty sandy locally very sandy CLAY		
4.00-4.45 4.00	SPT N=15 D8		2,2/3,3,4,5		4.00	Complete at 4.00m		

Remarks
Groundwater encountered at 0.80m in sand layer.

Scale (approx)	Logged By
1:50	

Figure No. J202429.BH2

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WILSON BAILEY
GEOTECHNICAL & ENVIROMENTAL

Site	Number
Reading Road, Arborfield	BH3

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler			Dandara Southern Ltd	J202429
	Location	**Dates** 30/09/2024	**Engineer** DPB	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL		
					0.30	Soft pale brown and pale grey very silty very sandy CLAY		
0.50	D1				(0.60)			
1.00	D2				0.90	Firm pale orange-brown, yellowish brown and pale grey silty sandy locally very sandy CLAY with scattered fine to medium flint gravel		
1.50	D3				(1.00)			
2.00	D4		Water strike(1) at 1.90m.		1.90	Orange-brown silty sandy fine to medium flint GRAVEL		▽1
2.50	D5				(1.90)			
3.00	D6							
3.50	D7				3.80	Stiff dark grey and brown slightly silty CLAY		
4.00	D8				(0.65)			
4.45	D9				4.45	Complete at 4.45m		

Remarks
Groundwater encountered at 1.90m. Standpipe installed with a response zone from 1.00m to 3.00m.

Scale (approx)	Logged By
1:50	

Figure No. J202429.BH3

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WILSON BAILEY
GEOTECHNICAL & ENVIROMENTAL

Site	Number
Reading Road, Arborfield	BH4

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler			Dandara Southern Ltd	J202429
	Location	**Dates** 30/09/2024	**Engineer** DPB	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.50)	MADE GROUND (with fine brick fragments)		
0.50	D1				0.50	Firm pale yellowish brown and pale grey silty very sandy CLAY		
1.00-1.45 1.00	SPT N=15 D2		1,2/3,4,4,4		(1.50)			
1.50	D3		Water strike(1) at 1.80m.					▽1
2.00-2.45 2.00	SPT N=30 D4		5,4/6,8,8,8		2.00	Dense orange-brown silty sandy fine to medium flint GRAVEL		
2.50	D5				(2.00)			
3.00-3.45 3.00	SPT N=41 D6		4,8/9,10,11,11					
3.50	D7							
4.00	D8				4.00	Complete at 4.00m		

Remarks
Groundwater encountered at 1.80m. Standpipe installed with a response zone from 1.00m to 3.00m.

Scale (approx)	Logged By
1:50	

Figure No. J202429.BH4

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WILSON BAILEY
GEOTECHNICAL & ENVIROMENTAL

Site	Number
Reading Road, Arborfield	BH5

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler			Dandara Southern Ltd	J202429
	Location	**Dates** 30/09/2024	**Engineer** DPB	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	MADE GROUND (reworked topsoil)		
					(0.30) 0.50	Firm brown silty sandy CLAY with occasional fine flint gravel		
0.50	D1					Firm orange-brown,pale grey and yellowish brown silty sandy CLAY		
1.00	D2				(1.00)			
1.50	D3		Water strike(1) at 1.50m.		1.50			▽1
					(0.40) 1.90	Orange-brown silty locally clayey fine to medium SAND with occasional fine flint gravel		
2.00	D4				2.00	Firm pale grey very silty sandy CLAY		
						Complete at 2.00m		

Remarks
Groundwater encountered at 1.50m.

Scale (approx)	Logged By
1:50	

Figure No. J202429.BH5

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WILSON BAILEY
GEOTECHNICAL & ENVIROMENTAL

Site	Number
Reading Road, Arborfield	BH6

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler			Dandara Southern Ltd	J202429
	Location	**Dates** 30/09/2024	**Engineer** DPB	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	MADE GROUND (reworked topsoil)		
0.50	D1				(1.30)	MADE GROUND (reworked brown, pale brown and pale grey silty sandy clay with scattered gravel)		
1.00	D2							
1.50	D3		Water strike(1) at 1.50m.		1.50 (0.40)	Firm orange-brown, pale brown, pale grey silty sandy CLAY		▽1
2.00	D4				1.90 (1.10)	Orange-brown silty sandy locally clayey fine to medium flint GRAVEL		
2.50	D5							
3.00	D6				3.00	Complete at 3.00m		

Remarks
Groundwater encountered at 1.50m.

Scale (approx)	Logged By
1:50	

Figure No. J202429.BH6

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WILSON BAILEY
GEOTECHNICAL & ENVIROMENTAL

Site	Number
Reading Road, Arborfield	BH7

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler			Dandara Southern Ltd	J202429
	Location	**Dates** 30/09/2024	**Engineer** DPB	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	TOPSOIL		
						Firm pale brown silty sandy CLAY		
0.50	D1				(1.10)			
1.00	D2							
					1.30			
					(0.30)	Firm pale grey siltuy slightly sandy CLAY with scattered fine flint gravel		
1.50	D3		Water strike(1) at 1.60m.		1.60			▽1
					(0.30)	Pale grey silty fine to medium SAND with scattered fine to medium flint gravel		
					1.90			
2.00	D4					Firm pale brown silty CLAY		
					(0.90)			
2.50	D5							
					2.80			
3.00	D6					Stiff dark bluish grey CLAY		
					(1.20)			
3.50	D7							
4.00	D8				4.00			
						Complete at 4.00m		

Remarks
Groundwater encountered at 1.60m.

Scale (approx)	Logged By
1:50	

Figure No. J202429.BH7

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WILSON BAILEY
GEOTECHNICAL & ENVIROMENTAL

Site	Number
Reading Road, Arborfield	BH8

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler			Dandara Southern Ltd	J202429
	Location	**Dates** 30/09/2024	**Engineer** DPB	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	TOPSOIL		
						Firm brown silty sandy locally very silty very sand CLAY		
0.50	D1							
					(1.20)			
1.00	D2							
					1.40			▽1
1.50	D3		Water strike(1) at 1.40m.			Pale yellowish brown silty fine to medium SAND		
2.00	D4							
2.50	D5							
					(2.60)			
3.00	D6							
3.50	D7							
4.00	D8				4.00	Complete at 4.00m		

Remarks
Groundwater encountered at 1.40m. Standpipe installed with a resoponse zone from 1.00m to 4.00m.

Scale (approx)	Logged By
1:50	

Figure No. J202429.BH8

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WILSON BAILEY
GEOTECHNICAL & ENVIROMENTAL

Site	Number
Reading Road, Arborfield	BH9

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler			Dandara Southern Ltd	J202429
	Location	**Dates** 30/09/2024	**Engineer** DPB	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	TOPSOIL		
					(0.60)	Firm brown silty CLAY		
0.50	D1				0.80			
1.00	D2					Firm orange-brown silty sandy CLAY with layers of orange-brown silty sand		
1.50	D3				(1.40)			
2.00	D4		Water strike(1) at 2.00m.		2.20			▽1
2.50	D5					Pale brown silty SAND with scattered fine flint gravel		
3.00	D6				(1.60)			
3.50	D7				3.80			
4.00	D8				(0.20) 4.00	Stiff dark bluish grey slightly silty CLAY		
						Complete at 4.00m		

Remarks
Groundwater encountered at 2.00m rising to ground level.

Scale (approx)	Logged By
1:50	

Figure No. J202429.BH9

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Appendix (D)

Proposed Surface Water Strategy & Flood Mitigation Strategy



NOTES

1. All dimensions are in metres unless stated otherwise.
2. Do not scale from this drawing. Only written dimensions are to be used.
3. *This drawing is based upon DAN-E0254-001 which was originally produced by RCP Consulting Engineers Ltd.*
4. ***ANY VARIANCE OR DISCREPANCY MUST BE REPORTED BACK TO INFRA ENGINEERING PRACTICE LTD.***

KEY

- Site Boundary
- Surface Water Drainage (Subject to Detailed Design)
- Onsite lined attenuation basin to accommodate onsite surface water run-off
- Foul Water Drainage (Subject to Detailed Design)
- Foul Water Drainage Rising Main (Subject to Detailed Design)
- Proposed culvert (As part of existing surface water flood risk mitigation measures) (Subject to Detailed Design)
- Proposed cut off/conveyance swale (As part of existing surface water flood risk mitigation measures) (Subject to Detailed Design)
- Basin to accommodate compensatory storage requirements for existing flood risk from surface water (As part of existing surface water flood risk mitigation measures) (Subject to Detailed Design)

Rev	Note

FOR INFORMATION ONLY

Scale @ A1:
0 10 20 30 40 50m
Scale 1:1000
NORTH

Rev	Date	Drawn	Checked	Authorised

Project: Land North of Reading Road Arborfield

Title: Outline Drainage Strategy Layout

Client: dandara

Date: January 2026 | Drawn by : SB

Checked by : TS | Authorised by : TS

Drg No: IEP_001_022_001 | Rev: -

INFRAENGINEERING PRACTICE

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Appendix (E)

Drainage Hydraulic Model

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Terry Seymour
Site name:	
Site location:	

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.40174° N
Longitude:	0.9174° W
Reference:	3621705313
Date:	Nov 13 2024 20:11

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 2.44

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible.

SAAR (mm):	650	650
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	4.08	4.08
1 in 1 year (l/s):	3.47	3.47
1 in 30 years (l/s):	9.38	9.38
1 in 100 year (l/s):	13.01	13.01
1 in 200 years (l/s):	15.25	15.25

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Network Details

Manhole Schedule

Manhole	Catchment Area (ha)	Diameter (m)	Type	CL (m)	IL (m)	Depth To Soffit (m)	Easting (m)	Northing (m)
S32	0.075	1.350	Type C	54.108	52.608	1.200	475635.233	167566.567
S33	0.111	1.200	Type B	54.738	52.510	1.928	475671.144	167551.707
S34	0.000	1.350	Type C	54.108	52.340	1.468	475662.553	167528.954
S42	0.092	1.350	Type C	54.857	53.347	1.210	475691.291	167497.445
S41	0.000	1.350	Type C	54.249	52.749	1.200	475672.944	167514.667
S35	0.000	1.200	Type B	53.934	52.120	1.514	475659.922	167520.518
S36	0.049	1.200	Type B	53.651	51.770	1.581	475647.771	167521.059
S37	0.093	1.350	Type C	53.345	51.420	1.475	475635.620	167517.345
S38	0.042	1.350	Type C	52.867	51.201	1.215	475615.575	167535.687
S39	0.000	1.350	Type C	52.251	50.612	1.189	475584.534	167563.168
S40	0.166	1.350	Type C	52.175	50.483	1.242	475578.968	167560.608
S1	0.124	1.350	Type C	55.084	53.734	1.050	475691.329	167429.894
S2	0.000	1.350	Type C	54.398	53.048	1.050	475675.740	167450.221
S3	0.027	1.350	Type C	54.031	52.681	1.050	475664.203	167456.127
S4	0.060	1.350	Type C	53.473	52.123	1.050	475644.219	167459.149
S5	0.000	1.350	Type C	53.102	51.752	1.050	475628.355	167469.106
S6	0.206	1.350	Type C	52.883	51.533	0.900	475620.938	167486.344
S7	0.000	1.350	Type C	52.567	51.205	0.913	475604.525	167486.687
S8	0.043	1.350	Type C	52.150	50.767	0.932	475581.931	167494.172
S9	0.124	1.350	Type C	51.427	49.640	1.337	475545.328	167524.595
S10	0.000	1.350	Type B	51.139	49.160	1.529	475531.593	167511.959
S11	0.000	1.350	Type B	50.809	48.540	1.819	475511.815	167503.443
S12	0.137	1.500	Type B	50.504	48.299	1.605	475492.517	167502.894
S27	0.204	1.350	Type C	50.476	48.912	1.114	475509.246	167411.358
S28	0.000	1.350	Type B	50.942	48.715	1.777	475525.919	167467.967
S57	0.000	0.000	Type C	51.112	50.990	-0.178	475558.290	167460.508
S58	0.000	1.350	Type C	51.000	49.960	0.740	475548.163	167465.425
S59	0.000	1.350	Type C	51.039	49.640	1.099	475531.245	167469.523
S29	0.086	1.350	Type B	50.852	48.695	1.707	475521.791	167472.249
S30	0.074	1.350	Type C	50.527	48.622	1.455	475499.966	167469.257
S31	0.049	1.350	Type C	50.020	48.500	1.070	475464.262	167476.944
S23	0.064	1.350	Type C	49.917	48.500	1.117	475444.028	167451.332
S24	0.064	1.350	Type C	49.868	48.439	1.129	475442.749	167466.512
S25	0.032	1.350	Unknown	49.804	48.235	1.118	475439.934	167479.731
S26	0.000	1.500	Unknown	49.748	48.169	0.829	475440.872	167496.361
S13	0.173	1.500	Unknown	49.743	48.098	1.046	475443.484	167513.882
S14	0.000	1.500	Unknown	49.221	47.871	0.599	475387.377	167521.299
S17	0.000	1.350	Type C	49.625	48.421	0.905	475438.546	167420.077
S18	0.167	1.350	Type C	49.875	48.376	1.199	475440.986	167431.030
S19	0.000	1.200	Type B	50.372	48.253	1.819	475411.076	167437.557
S20	0.000	1.200	Type B	50.197	48.185	1.711	475396.887	167446.922
S21	0.068	1.200	Type B	49.989	48.116	1.573	475387.125	167461.168
S22	0.000	1.350	Type C	49.812	48.039	1.473	475383.680	167475.436
S15	0.080	1.500	Unknown	49.798	47.650	1.550	475381.760	167482.999
S43	0.000	1.200	Unknown	49.300	47.209	1.491	475341.289	167484.947
S16	0.000	0.000	Type C	48.200	47.160	0.440	475331.998	167503.923

Pipe Schedule

Pipe Number	US Manhole	US IL (m)	DS Manhole	DS IL (m)	Shape	Dimension (m)	Length (m)	Gradient (1:x)	Roughness (mm)	US Depth To Soffit (m)
1.000	S32	52.608	S33	52.510	Circ	0.3mØ	38.864	394.9	0.600	1.200
1.001	S33	52.510	S34	52.340	Circ	0.3mØ	24.322	143.1	0.600	1.928
1.002	S34	52.340	S35	52.120	Circ	0.3mØ	8.837	40.2	0.600	1.468
2.000	S42	53.347	S41	52.749	Circ	0.3mØ	25.163	42.1	0.600	1.210
2.001	S41	52.749	S35	52.120	Circ	0.3mØ	14.276	22.7	0.600	1.200
1.003	S35	52.120	S36	51.770	Circ	0.3mØ	12.163	34.8	0.600	1.514
1.004	S36	51.770	S37	51.570	Circ	0.3mØ	12.706	63.5	0.600	1.581
1.005	S37	51.420	S38	51.201	Circ	0.45mØ	27.171	124.3	0.600	1.475
1.006	S38	51.201	S39	50.612	Circ	0.45mØ	41.458	70.4	0.600	1.215
1.007	S39	50.612	S40	50.483	Circ	0.45mØ	6.127	47.5	0.600	1.189
1.008	S40	50.483	S9	49.640	Circ	0.45mØ	49.280	58.4	0.600	1.242

Pipe Schedule

Pipe Number	US Manhole	US IL (m)	DS Manhole	DS IL (m)	Shape	Dimension (m)	Length (m)	Gradient (1:x)	Roughness (mm)	US Depth To Soffit (m)
3.000	S1	53.734	S2	53.048	Circ	0.3mØ	25.617	37.3	0.600	1.050
3.001	S2	53.048	S3	52.681	Circ	0.3mØ	12.961	35.3	0.600	1.050
3.002	S3	52.681	S4	52.123	Circ	0.3mØ	20.211	36.2	0.600	1.050
3.003	S4	52.123	S5	51.752	Circ	0.3mØ	18.730	50.5	0.600	1.050
3.004	S5	51.752	S6	51.533	Circ	0.45mØ	18.765	85.8	0.600	0.900
3.005	S6	51.533	S7	51.205	Circ	0.45mØ	16.417	50.0	0.600	0.900
3.006	S7	51.205	S8	50.767	Circ	0.45mØ	23.802	54.4	0.600	0.913
3.007	S8	50.767	S9	49.640	Circ	0.45mØ	47.596	42.2	0.600	0.932
1.009	S9	49.640	S10	49.160	Circ	0.45mØ	18.663	38.9	0.600	1.337
1.010	S10	49.160	S11	48.540	Circ	0.45mØ	21.533	34.7	0.600	1.529
1.011	S11	48.540	S12	48.449	Circ	0.45mØ	19.305	211.8	0.600	1.819
1.012	S12	48.299	S13	48.098	Circ	0.6mØ	50.249	250.0	0.600	1.605
4.000	S27	48.912	S28	48.715	Circ	0.45mØ	59.013	300.0	0.600	1.114
4.001	S28	48.715	S29	48.695	Circ	0.45mØ	5.948	300.0	0.600	1.777
5.000	S57	50.990	S58	49.960	Circ	0.3mØ	11.258	10.9	0.600	-0.178
5.001	S58	49.960	S59	49.640	Circ	0.3mØ	17.407	54.4	0.600	0.740
5.002	S59	49.640	S29	48.845	Circ	0.3mØ	9.839	12.4	0.600	1.099
4.002	S29	48.695	S30	48.622	Circ	0.45mØ	22.029	300.0	0.600	1.707
4.003	S30	48.622	S31	48.500	Circ	0.45mØ	36.523	300.0	0.600	1.455
4.004	S31	48.500	S25	48.385	Circ	0.45mØ	24.487	213.5	0.600	1.070
6.000	S23	48.500	S24	48.439	Circ	0.3mØ	15.234	250.0	0.600	1.117
6.001	S24	48.439	S25	48.385	Circ	0.3mØ	13.515	250.0	0.600	1.129
4.005	S25	48.235	S26	48.169	Circ	0.75mØ	16.657	250.0	0.600	0.818
4.006	S26	48.169	S13	48.098	Circ	0.75mØ	17.714	250.0	0.600	0.829
1.013	S13	48.098	S14	47.871	Circ	0.75mØ	56.595	250.0	0.600	0.896
1.014	S14	47.871	S15	47.798	Circ	0.75mØ	38.710	524.4	0.600	0.599
7.000	S17	48.421	S18	48.376	Circ	0.3mØ	11.222	250.0	0.600	0.905
7.001	S18	48.376	S19	48.253	Circ	0.3mØ	30.614	250.0	0.600	1.199
7.002	S19	48.253	S20	48.185	Circ	0.3mØ	17.001	250.0	0.600	1.819
7.003	S20	48.185	S21	48.116	Circ	0.3mØ	17.269	250.0	0.600	1.711
7.004	S21	48.116	S22	48.039	Circ	0.3mØ	14.679	191.0	0.600	1.573
7.005	S22	48.039	S15	47.948	Circ	0.3mØ	7.803	85.0	0.600	1.473
1.015	S15	47.650	S43	47.209	Circ	0.75mØ	40.517	92.0	0.600	1.398
1.016	S43	47.209	S16	47.160	Circ	0.6mØ	21.129	427.4	0.600	1.491

Outfall Details

Outfall Manhole S16 : Free Discharge

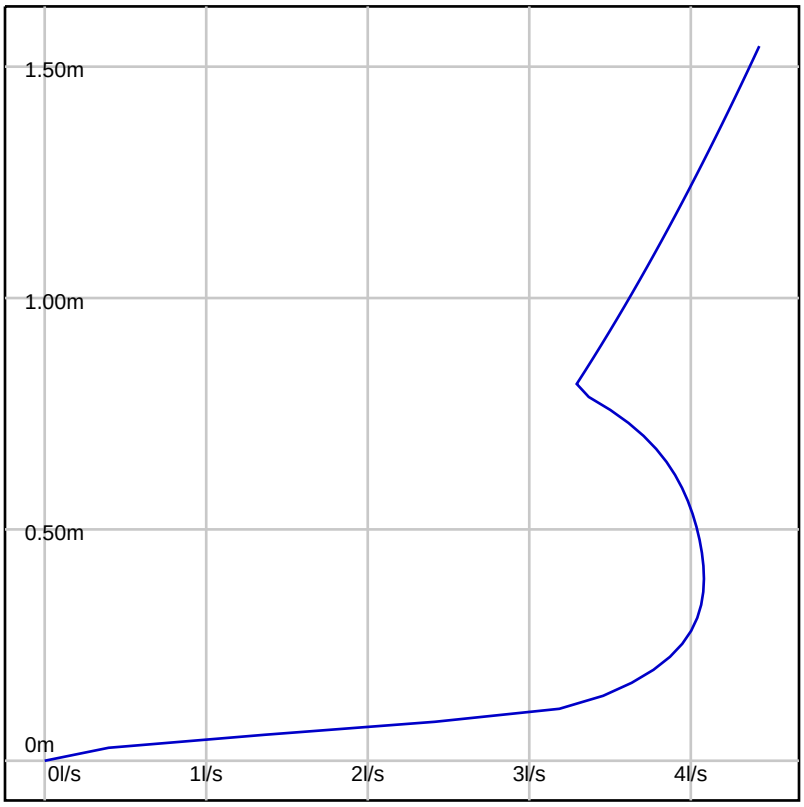
Flow Control Details

Controls within Manhole S43

Hydro-Brake® Optimum Control at Manhole S43

Model Ref	Design Depth (m)	Design Flow (l/s)	Depth Above Invert (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0091-4080-1300-4080	1.300	4.080	0.000	0.394	4.081	0.803	3.272

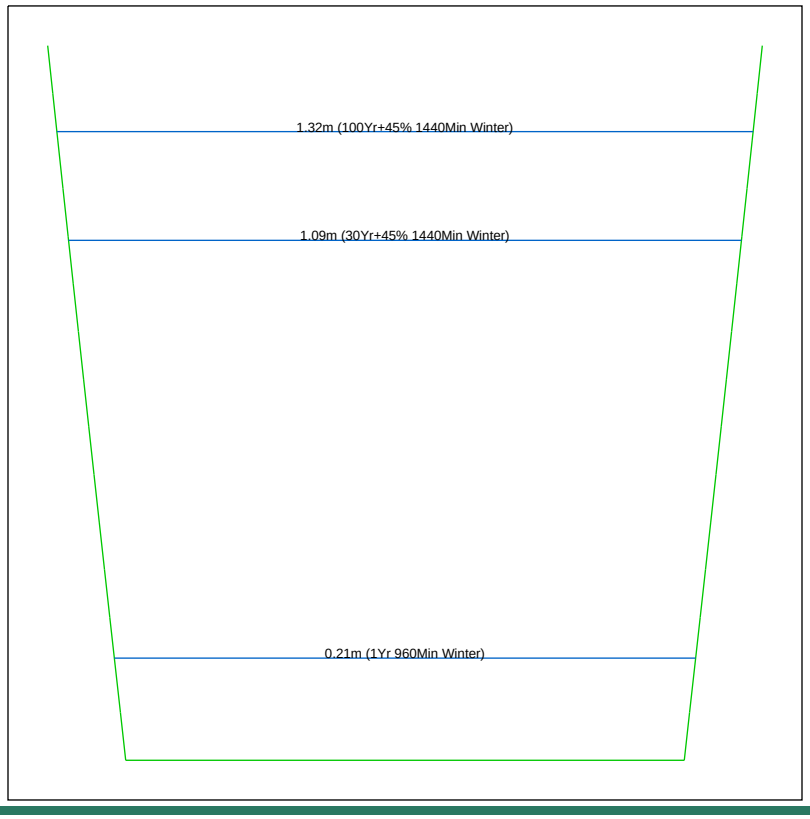
Hydro-Brake® Optimum Control at S43



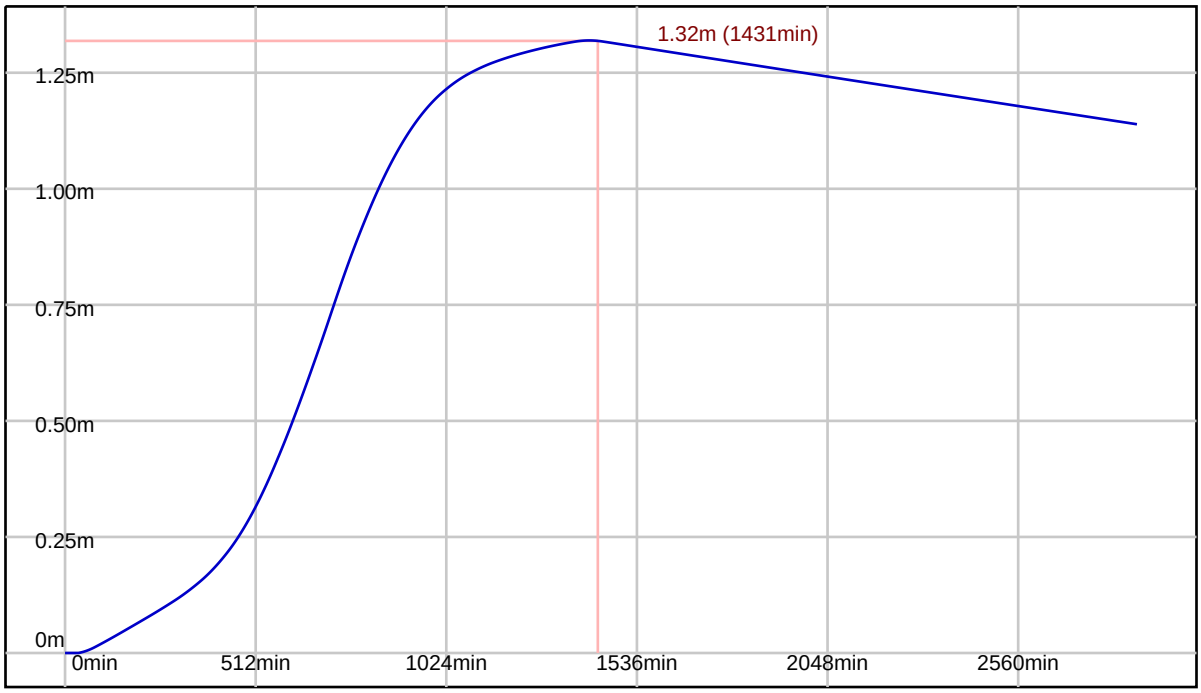
Pond Structure at Manhole S43

Pond Invert (m)	Max Depth (m)	Volume To Water Level (m3)	Water Level (m)	Freeboard (m)	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
47.800	1.500	1718.908	49.000	0.300	0.00000000	0.00000000	2.00

Pond Depth/Area Diagram at S43



Pond at S43 (100Yr+45% 1440Min Winter)



Simulation Settings

FEH2022 (point): Filename=FEH_Point_Descriptors_475410_167507_v5_0_1.xml

Summer (Cv: 0.75), Winter (Cv: 0.84)

Global Time of Entry: 5.0 mins

Durations (mins): 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Periods (yrs) + Climate Change: (1, +0%), (30, +45%), (100, +45%)

Simulated Rainfall Events

Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %	Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %
1Yr 30Min Winter	7.333	0.00	-0.35	30Yr+45% 960Min Summer	5.686	0.00	0.31
1Yr 30Min Summer	7.333	0.00	0.00	30Yr+45% 960Min Winter	5.686	0.00	0.60
1Yr 60Min Winter	4.431	0.00	-0.33	30Yr+45% 1440Min Summer	4.017	0.00	0.18
1Yr 60Min Summer	4.431	0.00	-0.26	30Yr+45% 1440Min Winter	4.017	0.00	0.67
1Yr 120Min Winter	3.998	0.00	-0.18	30Yr+45% 2160Min Summer	2.852	0.00	0.06
1Yr 120Min Summer	3.998	0.00	-0.21	30Yr+45% 2160Min Winter	2.852	0.00	0.40
1Yr 180Min Summer	3.527	0.00	-0.17	30Yr+45% 2880Min Summer	2.244	0.00	-0.00
1Yr 180Min Winter	3.527	0.00	-0.15	30Yr+45% 2880Min Winter	2.244	0.00	0.20
1Yr 240Min Winter	2.952	0.00	-0.14	30Yr+45% 4320Min Summer	1.626	0.00	-0.01
1Yr 240Min Summer	2.952	0.00	-0.16	30Yr+45% 4320Min Winter	1.626	0.00	0.12
1Yr 360Min Summer	2.325	0.00	-0.14	30Yr+45% 5760Min Summer	1.311	0.00	-0.01
1Yr 360Min Winter	2.325	0.00	-0.12	30Yr+45% 5760Min Winter	1.311	0.00	0.03
1Yr 480Min Summer	1.943	0.00	-0.12	30Yr+45% 7200Min Summer	1.119	0.00	-0.01
1Yr 480Min Winter	1.943	0.00	-0.10	30Yr+45% 7200Min Winter	1.119	0.00	0.00
1Yr 600Min Summer	1.659	0.00	-0.11	30Yr+45% 8640Min Summer	0.989	0.00	-0.02
1Yr 600Min Winter	1.659	0.00	-0.08	30Yr+45% 8640Min Winter	0.989	0.00	-0.01
1Yr 720Min Summer	1.448	0.00	-0.10	30Yr+45% 10080Min Summer	0.895	0.00	-0.01
1Yr 720Min Winter	1.448	0.00	-0.07	30Yr+45% 10080Min Winter	0.895	0.00	-0.01
1Yr 960Min Summer	1.175	0.00	-0.07	100Yr+45% 30Min Summer	106.510	0.00	-0.33
1Yr 960Min Winter	1.175	0.00	-0.07	100Yr+45% 30Min Winter	106.510	0.00	-0.17
1Yr 1440Min Winter	0.874	0.00	-0.05	100Yr+45% 60Min Summer	66.885	0.00	0.10
1Yr 1440Min Summer	0.874	0.00	-0.05	100Yr+45% 60Min Winter	66.885	0.00	0.38
1Yr 2160Min Summer	0.656	0.00	-0.04	100Yr+45% 120Min Summer	39.783	0.00	0.55
1Yr 2160Min Winter	0.656	0.00	-0.04	100Yr+45% 120Min Winter	39.783	0.00	0.87
1Yr 2880Min Summer	0.542	0.00	-0.04	100Yr+45% 180Min Summer	28.930	0.00	0.71
1Yr 2880Min Winter	0.542	0.00	-0.03	100Yr+45% 180Min Winter	28.930	0.00	1.03
1Yr 4320Min Summer	0.423	0.00	-0.03	100Yr+45% 240Min Summer	23.043	0.00	0.79
1Yr 4320Min Winter	0.423	0.00	-0.03	100Yr+45% 240Min Winter	23.043	0.00	1.15
1Yr 5760Min Summer	0.361	0.00	-0.03	100Yr+45% 360Min Summer	16.485	0.00	0.85
1Yr 5760Min Winter	0.361	0.00	-0.03	100Yr+45% 360Min Winter	16.485	0.00	1.26
1Yr 7200Min Summer	0.323	0.00	-0.03	100Yr+45% 480Min Summer	12.916	0.00	0.86
1Yr 7200Min Winter	0.323	0.00	-0.02	100Yr+45% 480Min Winter	12.916	0.00	1.29
1Yr 8640Min Summer	0.297	0.00	-0.02	100Yr+45% 600Min Summer	10.656	0.00	0.84
1Yr 8640Min Winter	0.297	0.00	-0.02	100Yr+45% 600Min Winter	10.656	0.00	1.28
1Yr 10080Min Winter	0.278	0.00	-0.02	100Yr+45% 720Min Summer	9.086	0.00	0.81
1Yr 10080Min Summer	0.278	0.00	-0.02	100Yr+45% 720Min Winter	9.086	0.00	1.25
30Yr+45% 30Min Summer	82.290	0.00	-0.48	100Yr+45% 960Min Summer	7.057	0.00	0.74
30Yr+45% 30Min Winter	82.290	0.00	-0.34	100Yr+45% 960Min Winter	7.057	0.00	1.15
30Yr+45% 60Min Summer	51.088	0.00	-0.16	100Yr+45% 1440Min Summer	4.949	0.00	0.84
30Yr+45% 60Min Winter	51.088	0.00	-0.09	100Yr+45% 1440Min Winter	4.949	0.00	0.93
30Yr+45% 120Min Summer	31.106	0.00	0.15	100Yr+45% 2160Min Summer	3.482	0.00	0.51
30Yr+45% 120Min Winter	31.106	0.00	0.36	100Yr+45% 2160Min Winter	3.482	0.00	0.85
30Yr+45% 180Min Summer	22.959	0.00	0.25	100Yr+45% 2880Min Summer	2.719	0.00	0.24
30Yr+45% 180Min Winter	22.959	0.00	0.53	100Yr+45% 2880Min Winter	2.719	0.00	3.10
30Yr+45% 240Min Summer	18.279	0.00	0.31	100Yr+45% 4320Min Summer	1.942	0.00	0.16
30Yr+45% 240Min Winter	18.279	0.00	0.61	100Yr+45% 4320Min Winter	1.942	0.00	1.88
30Yr+45% 360Min Summer	13.148	0.00	0.38	100Yr+45% 5760Min Summer	1.548	0.00	0.05
30Yr+45% 360Min Winter	13.148	0.00	0.69	100Yr+45% 5760Min Winter	1.548	0.00	1.15
30Yr+45% 480Min Summer	10.351	0.00	0.40	100Yr+45% 7200Min Summer	1.309	0.00	0.01
30Yr+45% 480Min Winter	10.351	0.00	0.70	100Yr+45% 7200Min Winter	1.309	0.00	0.43
30Yr+45% 600Min Summer	8.554	0.00	0.39	100Yr+45% 8640Min Summer	1.148	0.00	-0.00
30Yr+45% 600Min Winter	8.554	0.00	0.69	100Yr+45% 8640Min Winter	1.148	0.00	0.19
30Yr+45% 720Min Summer	7.299	0.00	0.37	100Yr+45% 10080Min Winter	1.033	0.00	0.14
30Yr+45% 720Min Winter	7.299	0.00	0.67	100Yr+45% 10080Min Summer	1.033	0.00	-0.01

Simulation Results

Return Period Yrs: 1.0

Climate Change %: 0

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S32	30 min Summer	16	52.655	0.047	3.116		OK
S33	30 min Summer	16	52.569	0.059	7.655		OK
S34	30 min Summer	17	52.382	0.042	7.440		OK
S42	30 min Summer	16	53.378	0.031	3.809		OK
S41	30 min Summer	16	52.776	0.026	3.811		OK
S35	30 min Summer	17	52.169	0.049	11.158		OK
S36	30 min Summer	17	51.832	0.062	13.107		OK
S37	30 min Summer	16	51.493	0.073	16.863		OK
S38	30 min Summer	17	51.269	0.067	18.490		OK
S39	30 min Summer	17	50.672	0.060	18.638		OK
S40	30 min Summer	17	50.556	0.073	24.891		OK
S1	30 min Summer	16	53.769	0.034	5.129		OK
S2	30 min Summer	16	53.082	0.034	5.132		OK
S3	30 min Summer	16	52.719	0.037	6.255		OK
S4	30 min Summer	16	52.170	0.047	8.727		OK
S5	30 min Summer	16	51.799	0.048	8.684		OK
S6	30 min Summer	16	51.591	0.058	17.123		OK
S7	30 min Summer	16	51.264	0.060	17.022		OK
S8	30 min Summer	17	50.825	0.058	18.395		OK
S9	30 min Summer	17	49.731	0.091	48.177		OK
S10	30 min Summer	17	49.248	0.088	48.191		OK
S11	30 min Summer	17	48.679	0.139	48.075		OK
S12	30 min Summer	18	48.436	0.137	51.886		OK
S27	30 min Summer	16	48.976	0.064	8.477		OK
S28	30 min Summer	17	48.781	0.066	8.133		OK
S57	-	0	50.990	0.000	0.000		OK
S58	-	0	49.960	0.000	0.000		OK
S59	-	0	49.640	0.000	0.000		OK
S29	30 min Summer	17	48.770	0.074	11.496		OK
S30	30 min Summer	17	48.705	0.083	14.332		OK
S31	30 min Summer	18	48.580	0.080	15.369		OK
S23	30 min Summer	16	48.540	0.039	2.665		OK
S24	30 min Summer	16	48.494	0.055	5.308		OK
S25	30 min Summer	17	48.319	0.084	21.895		OK
S26	30 min Summer	18	48.252	0.084	21.611		OK
S13	30 min Summer	18	48.255	0.157	79.579		OK
S14	30 min Summer	18	48.061	0.190	80.155		OK
S17	30 min Summer	16	48.439	0.018	0.000		OK
S18	30 min Summer	16	48.438	0.063	6.933		OK
S19	30 min Summer	17	48.315	0.062	6.626		OK
S20	30 min Summer	17	48.247	0.062	6.785		OK
S21	30 min Summer	17	48.184	0.068	9.342		OK
S22	30 min Summer	17	48.095	0.056	9.319		OK
S15	960 min Winter	751	48.014	0.364	3.744		OK
S43	960 min Winter	751	48.014	0.214	3.744		Surcharged
S16	960 min Winter	751	47.184	0.024	3.740		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	30 min Summer	16	S32	S33	0.053	0.362	3.046	0.055	OK
1.001	30 min Summer	16	S33	S34	0.050	0.963	7.528	0.081	OK
1.002	30 min Summer	17	S34	S35	0.045	1.113	7.508	0.043	OK
2.000	30 min Summer	16	S42	S41	0.029	1.095	3.811	0.022	OK
2.001	30 min Summer	16	S41	S35	0.038	0.752	3.805	0.016	OK
1.003	30 min Summer	17	S35	S36	0.055	1.256	11.241	0.059	OK

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.004	30 min Summer	17	S36	S37	0.062	1.266	13.217	0.095	OK
1.005	30 min Summer	17	S37	S38	0.070	1.072	16.881	0.058	OK
1.006	30 min Summer	17	S38	S39	0.064	1.360	18.638	0.048	OK
1.007	30 min Summer	17	S39	S40	0.066	1.274	18.600	0.040	OK
1.008	30 min Summer	17	S40	S9	0.082	1.256	24.876	0.059	OK
3.000	30 min Summer	16	S1	S2	0.034	1.158	5.132	0.028	OK
3.001	30 min Summer	16	S2	S3	0.035	1.088	5.127	0.027	OK
3.002	30 min Summer	16	S3	S4	0.042	1.025	6.235	0.034	OK
3.003	30 min Summer	16	S4	S5	0.048	1.205	8.684	0.055	OK
3.004	30 min Summer	16	S5	S6	0.053	0.824	8.582	0.025	OK
3.005	30 min Summer	16	S6	S7	0.059	1.386	17.022	0.037	OK
3.006	30 min Summer	16	S7	S8	0.059	1.381	16.890	0.038	OK
3.007	30 min Summer	17	S8	S9	0.075	1.079	18.593	0.037	OK
1.009	30 min Summer	17	S9	S10	0.090	2.135	48.191	0.093	OK
1.010	30 min Summer	17	S10	S11	0.114	1.522	48.075	0.087	OK
1.011	30 min Summer	18	S11	S12	0.139	1.147	47.722	0.216	OK
1.012	30 min Summer	18	S12	S13	0.147	0.976	52.496	0.121	OK
4.000	30 min Summer	16	S27	S28	0.064	0.607	8.492	0.046	OK
4.001	30 min Summer	17	S28	S29	0.070	0.520	8.239	0.044	OK
5.000	30 min Winter	0	S57	S58	0.000	0.000	0.000	0.000	OK
5.001	30 min Winter	0	S58	S59	0.000	0.000	0.000	0.000	OK
5.002	30 min Winter	0	S59	S29	0.000	0.000	0.000	0.000	OK
4.002	30 min Summer	17	S29	S30	0.079	0.617	11.531	0.062	OK
4.003	30 min Summer	17	S30	S31	0.081	0.731	14.312	0.077	OK
4.004	30 min Summer	18	S31	S25	0.080	0.831	15.890	0.072	OK
6.000	30 min Summer	16	S23	S24	0.047	0.374	2.660	0.038	OK
6.001	30 min Summer	16	S24	S25	0.054	0.603	5.251	0.075	OK
4.005	30 min Summer	18	S25	S26	0.083	0.811	21.769	0.028	OK
4.006	30 min Summer	18	S26	S13	0.120	0.475	21.811	0.028	OK
1.013	30 min Summer	18	S13	S14	0.174	1.036	80.155	0.103	OK
1.014	30 min Summer	19	S14	S15	0.187	0.998	82.019	0.153	OK
7.000	30 min Summer	18	S17	S18	0.040	0.043	0.203	0.003	OK
7.001	30 min Summer	16	S18	S19	0.062	0.647	6.839	0.098	OK
7.002	30 min Summer	17	S19	S20	0.062	0.643	6.785	0.097	OK
7.003	30 min Summer	17	S20	S21	0.065	0.598	6.749	0.097	OK
7.004	30 min Summer	17	S21	S22	0.062	0.886	9.319	0.116	OK
7.005	30 min Summer	17	S22	S15	0.056	1.028	9.268	0.077	OK
1.015	960 min Winter	751	S15	S43	0.289	0.182	16.251	0.013	OK
1.016	960 min Winter	751	S43	S16	0.024	0.990	3.740	0.011	OK

Return Period Yrs: 30.0

Climate Change %: 45

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S32	30 min Summer	16	52.781	0.173	34.966		OK
S33	30 min Summer	16	52.733	0.223	86.499		OK
S34	30 min Summer	16	52.488	0.148	86.075		OK
S42	30 min Summer	16	53.450	0.103	42.738		OK
S41	30 min Summer	16	52.835	0.086	42.738		OK
S35	30 min Summer	16	52.302	0.182	128.675		OK
S36	30 min Summer	16	52.045	0.275	151.452		OK
S37	30 min Summer	16	51.683	0.263	194.574		OK
S38	30 min Summer	16	51.436	0.235	213.887		OK
S39	30 min Summer	17	50.852	0.240	208.843		OK
S40	30 min Summer	17	50.787	0.304	279.424		OK
S1	30 min Summer	16	53.849	0.115	57.555		OK
S2	30 min Summer	16	53.161	0.113	57.557		OK
S3	30 min Summer	16	52.808	0.126	70.207		OK
S4	30 min Summer	16	52.293	0.170	98.168		OK
S5	30 min Summer	16	51.913	0.162	98.156		OK
S6	30 min Summer	16	51.733	0.200	194.182		OK
S7	30 min Summer	16	51.410	0.206	194.322		OK
S8	30 min Summer	16	50.969	0.202	214.610		OK
S9	30 min Summer	18	50.415	0.775	478.794		Surcharged
S10	30 min Summer	18	50.006	0.846	500.056		Surcharged
S11	30 min Summer	18	49.525	0.985	503.426		Surcharged
S12	30 min Summer	18	49.089	0.790	551.733		Surcharged
S27	30 min Summer	16	49.134	0.222	95.129		OK
S28	30 min Summer	16	48.993	0.278	95.012		OK
S57	-	0	50.990	0.000	0.000		OK
S58	-	0	49.960	0.000	0.000		OK
S59	-	0	49.640	0.000	0.000		OK
S29	30 min Summer	16	48.988	0.293	133.240		OK
S30	30 min Summer	17	48.944	0.322	162.112		OK
S31	1440 min Winter	1404	48.891	0.391	0.613		OK
S23	1440 min Winter	1404	48.891	0.391	0.092		Surcharged
S24	1440 min Winter	1404	48.891	0.452	0.184		Surcharged
S25	2160 min Winter	2164	48.892	0.656	0.000		OK
S26	1440 min Winter	1454	48.899	0.730	0.000		OK
S13	1440 min Winter	1404	48.891	0.793	3.246		Surcharged
S14	1440 min Winter	1404	48.891	1.020	3.246		Surcharged
S17	1440 min Winter	1405	48.891	0.471	0.000		Surcharged
S18	1440 min Winter	1405	48.891	0.515	0.232		Surcharged
S19	1440 min Winter	1405	48.891	0.638	0.231		Surcharged
S20	1440 min Winter	1405	48.891	0.706	0.231		Surcharged
S21	1440 min Winter	1404	48.891	0.775	0.336		Surcharged
S22	1440 min Winter	1404	48.891	0.852	0.336		Surcharged
S15	1440 min Winter	1404	48.891	1.241	3.694		Surcharged
S43	1440 min Winter	1404	48.891	1.091	3.694		Surcharged
S16	7200 min Summer	9623	47.185	0.025	4.081		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	30 min Summer	16	S32	S33	0.198	0.703	34.781	0.628	OK
1.001	30 min Summer	16	S33	S34	0.185	1.877	86.075	0.929	OK
1.002	30 min Summer	16	S34	S35	0.165	2.176	85.939	0.489	OK
2.000	30 min Summer	16	S42	S41	0.095	2.238	42.738	0.249	OK
2.001	30 min Summer	16	S41	S35	0.134	1.429	42.736	0.182	OK
1.003	30 min Summer	16	S35	S36	0.229	2.299	128.532	0.680	OK
1.004	30 min Summer	16	S36	S37	0.278	2.311	151.258	1.084	OK
1.005	30 min Summer	16	S37	S38	0.249	2.152	194.110	0.670	OK
1.006	30 min Summer	17	S38	S39	0.235	2.588	212.002	0.550	OK
1.007	30 min Summer	17	S39	S40	0.272	2.333	208.950	0.445	OK

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.008	30 min Summer	17	S40	S9	0.377	2.263	277.505	0.655	OK
3.000	30 min Summer	16	S1	S2	0.114	2.345	57.557	0.316	OK
3.001	30 min Summer	16	S2	S3	0.120	2.191	57.554	0.307	OK
3.002	30 min Summer	16	S3	S4	0.148	2.018	70.204	0.379	OK
3.003	30 min Summer	16	S4	S5	0.166	2.450	98.156	0.626	OK
3.004	30 min Summer	16	S5	S6	0.181	1.643	98.336	0.282	OK
3.005	30 min Summer	16	S6	S7	0.203	2.790	194.322	0.424	OK
3.006	30 min Summer	16	S7	S8	0.204	2.783	194.738	0.444	OK
3.007	30 min Summer	16	S8	S9	0.326	1.955	214.189	0.430	OK
1.009	30 min Winter	17	S9	S10	0.450	3.555	495.062	0.953	OK
1.010	30 min Winter	18	S10	S11	0.450	3.112	494.999	0.900	OK
1.011	30 min Winter	18	S11	S12	0.450	3.111	494.848	2.236	OK
1.012	30 min Winter	18	S12	S13	0.600	1.933	546.680	1.260	Surcharged
4.000	30 min Summer	16	S27	S28	0.250	1.065	95.012	0.512	OK
4.001	30 min Summer	16	S28	S29	0.286	0.880	93.209	0.502	OK
5.000	30 min Summer	0	S57	S58	0.000	0.000	0.000	0.000	OK
5.001	30 min Summer	0	S58	S59	0.000	0.000	0.000	0.000	OK
5.002	30 min Summer	16	S59	S29	0.072	0.000	0.000	0.000	OK
4.002	30 min Summer	16	S29	S30	0.307	1.142	132.116	0.712	OK
4.003	30 min Summer	17	S30	S31	0.331	1.346	164.027	0.884	OK
4.004	1440 min Winter	1404	S31	S25	0.421	0.718	9.693	0.044	OK
6.000	30 min Winter	17	S23	S24	0.300	0.648	26.387	0.378	Surcharged
6.001	30 min Winter	17	S24	S25	0.300	1.058	52.293	0.749	Surcharged
4.005	1440 min Winter	1404	S25	S26	0.689	0.666	13.602	0.017	OK
4.006	1440 min Winter	1454	S26	S13	0.741	0.391	13.129	0.017	OK
1.013	720 min Winter	645	S13	S14	0.750	0.793	85.287	0.109	Surcharged
1.014	240 min Summer	225	S14	S15	0.750	0.955	292.870	0.546	Surcharged
7.000	30 min Winter	21	S17	S18	0.300	0.091	3.670	0.053	Surcharged
7.001	30 min Winter	17	S18	S19	0.300	1.135	68.024	0.974	Surcharged
7.002	30 min Winter	17	S19	S20	0.300	1.069	67.191	0.962	Surcharged
7.003	30 min Winter	18	S20	S21	0.300	0.948	67.010	0.959	Surcharged
7.004	30 min Winter	17	S21	S22	0.300	1.335	94.380	1.179	Surcharged
7.005	30 min Winter	17	S22	S15	0.300	1.326	93.707	0.778	Surcharged
1.015	180 min Summer	147	S15	S43	0.750	1.168	410.460	0.318	Surcharged
1.016	7200 min Summer	9623	S43	S16	0.025	1.013	4.081	0.012	OK

Return Period Yrs: 100.0

Climate Change %: 45

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S32	30 min Summer	16	52.827	0.219	45.257		OK
S33	30 min Summer	16	52.776	0.266	112.332		OK
S34	30 min Summer	17	52.555	0.215	107.046		OK
S42	30 min Summer	16	53.465	0.118	55.317		OK
S41	30 min Summer	16	52.848	0.098	55.319		OK
S35	30 min Summer	17	52.471	0.351	160.344		Surcharged
S36	30 min Summer	17	52.224	0.454	189.738		Surcharged
S37	30 min Winter	19	51.755	0.335	197.352		OK
S38	30 min Winter	19	51.701	0.499	219.357		Surcharged
S39	30 min Winter	19	51.520	0.908	222.979		Surcharged
S40	30 min Winter	19	51.493	1.009	294.036		Surcharged
S1	30 min Summer	15	53.867	0.132	74.354		OK
S2	30 min Summer	16	53.178	0.130	74.500		OK
S3	30 min Summer	16	52.828	0.146	90.872		OK
S4	30 min Summer	16	52.324	0.202	127.061		OK
S5	30 min Summer	16	51.939	0.188	127.040		OK
S6	30 min Summer	16	51.766	0.233	251.290		OK
S7	30 min Summer	16	51.444	0.240	251.607		OK
S8	30 min Winter	19	51.303	0.536	210.528		Surcharged
S9	30 min Winter	19	51.112	1.472	564.910		Surcharged
S10	30 min Winter	19	50.581	1.421	567.758		Surcharged
S11	30 min Winter	19	49.967	1.427	567.951		Surcharged
S12	30 min Winter	19	49.415	1.116	625.759		Surcharged
S27	30 min Winter	18	49.293	0.381	100.314		OK
S28	30 min Winter	19	49.254	0.539	89.722		Surcharged
S57	-	0	50.990	0.000	0.000		OK
S58	-	0	49.960	0.000	0.000		OK
S59	-	0	49.640	0.000	0.000		OK
S29	30 min Winter	19	49.250	0.554	129.748		Surcharged
S30	30 min Winter	19	49.215	0.594	164.078		Surcharged
S31	30 min Winter	19	49.128	0.628	187.999		Surcharged
S23	1440 min Winter	1406	49.119	0.619	0.107		Surcharged
S24	1440 min Winter	1406	49.119	0.680	0.213		Surcharged
S25	2880 min Winter	2898	49.168	0.933	0.000		Surcharged
S26	2880 min Winter	2912	49.187	1.018	0.000		Surcharged
S13	1440 min Winter	1406	49.119	1.022	3.759		Surcharged
S14	1440 min Winter	1407	49.120	1.248	3.671		Flood Risk
S17	1440 min Winter	1409	49.120	0.699	0.000		Surcharged
S18	30 min Summer	17	49.121	0.745	91.617		Surcharged
S19	1440 min Winter	1409	49.120	0.866	0.253		Surcharged
S20	1440 min Winter	1408	49.120	0.934	0.260		Surcharged
S21	1440 min Winter	1408	49.120	1.003	0.367		Surcharged
S22	1440 min Winter	1408	49.120	1.080	0.367		Surcharged
S15	1440 min Winter	1407	49.120	1.470	4.179		Surcharged
S43	1440 min Winter	1408	49.120	1.320	4.063		Flood Risk
S16	8640 min Summer	4027	47.185	0.025	4.081		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	30 min Summer	16	S32	S33	0.243	0.741	45.393	0.820	OK
1.001	30 min Summer	16	S33	S34	0.239	1.964	110.589	1.193	OK
1.002	30 min Summer	17	S34	S35	0.257	2.139	108.831	0.619	OK
2.000	30 min Summer	16	S42	S41	0.108	2.406	55.319	0.322	OK
2.001	30 min Summer	16	S41	S35	0.199	1.475	55.316	0.236	OK
1.003	30 min Summer	17	S35	S36	0.300	2.301	162.669	0.860	Surcharged
1.004	30 min Winter	16	S36	S37	0.300	2.609	184.451	1.322	Surcharged
1.005	30 min Winter	19	S37	S38	0.392	2.236	236.721	0.818	OK
1.006	30 min Winter	18	S38	S39	0.450	2.566	247.165	0.641	OK
1.007	30 min Winter	16	S39	S40	0.450	2.326	238.382	0.507	OK

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.008	30 min Winter	18	S40	S9	0.450	2.278	297.589	0.703	OK
3.000	30 min Summer	16	S1	S2	0.131	2.513	74.500	0.408	OK
3.001	30 min Summer	16	S2	S3	0.138	2.345	74.495	0.397	OK
3.002	30 min Summer	16	S3	S4	0.174	2.138	90.867	0.490	OK
3.003	30 min Summer	16	S4	S5	0.195	2.617	127.040	0.811	OK
3.004	30 min Summer	16	S5	S6	0.210	1.747	127.235	0.365	OK
3.005	30 min Summer	16	S6	S7	0.236	2.976	251.607	0.550	OK
3.006	30 min Winter	18	S7	S8	0.341	2.849	236.938	0.540	OK
3.007	30 min Winter	18	S8	S9	0.450	1.947	247.344	0.496	OK
1.009	30 min Winter	18	S9	S10	0.450	3.573	568.221	1.094	OK
1.010	30 min Winter	19	S10	S11	0.450	3.571	567.951	1.033	OK
1.011	30 min Winter	19	S11	S12	0.450	3.571	567.872	2.566	OK
1.012	30 min Winter	19	S12	S13	0.600	2.215	626.363	1.444	Surcharged
4.000	30 min Winter	18	S27	S28	0.416	1.086	115.843	0.624	OK
4.001	30 min Winter	17	S28	S29	0.450	0.869	108.085	0.582	OK
5.000	30 min Summer	0	S57	S58	0.000	0.000	0.000	0.000	OK
5.001	30 min Summer	0	S58	S59	0.000	0.000	0.000	0.000	OK
5.002	30 min Summer	17	S59	S29	0.150	0.000	0.000	0.000	OK
4.002	30 min Winter	17	S29	S30	0.450	1.146	153.478	0.827	OK
4.003	30 min Winter	16	S30	S31	0.450	1.342	188.121	1.014	OK
4.004	30 min Winter	16	S31	S25	0.450	1.486	192.188	0.872	OK
6.000	30 min Winter	16	S23	S24	0.300	0.655	34.057	0.488	Surcharged
6.001	30 min Winter	16	S24	S25	0.300	1.044	67.520	0.967	Surcharged
4.005	30 min Winter	17	S25	S26	0.750	0.921	264.975	0.340	Surcharged
4.006	30 min Winter	19	S26	S13	0.750	0.660	260.423	0.334	Surcharged
1.013	30 min Winter	18	S13	S14	0.750	2.177	961.620	1.234	Surcharged
1.014	60 min Winter	35	S14	S15	0.750	1.858	735.524	1.372	Surcharged
7.000	30 min Winter	21	S17	S18	0.300	0.107	3.860	0.055	Surcharged
7.001	30 min Winter	16	S18	S19	0.300	1.233	87.190	1.248	Surcharged
7.002	30 min Winter	18	S19	S20	0.300	1.191	84.207	1.205	Surcharged
7.003	30 min Winter	18	S20	S21	0.300	1.191	84.196	1.205	Surcharged
7.004	30 min Winter	17	S21	S22	0.300	1.672	118.190	1.476	Surcharged
7.005	30 min Winter	18	S22	S15	0.300	1.661	117.431	0.974	Surcharged
1.015	60 min Winter	42	S15	S43	0.750	2.383	831.855	0.645	Surcharged
1.016	8640 min Summer	4027	S43	S16	0.025	1.013	4.081	0.012	OK

Appendix (F)

Wokingham Borough Council (Lead Local Flood Authority) Drainage Consultation

Date: 11 December 2024
Application: 243099

WOKINGHAM BOROUGH COUNCIL

WBC Drainage

Development Management & Compliance
P.O. Box 157
Shute End, Wokingham
Berkshire, RG40 1BN
Tel: (0118) 974 6000
Minicom No: (0118) 974 6991

Dear WBC Drainage,

Outline Planning Approval Consultation
Application Number: 243099
Applicant: The Owner and/or Occupier
Site Address: Land North Of Reading Road, Arborfield
Parish: Arborfield and Newland
Grid Reference: Easting - 475510, Northing - 167508
Type of Development: Major Dwellings (10+)
Proposal: Outline application for the proposed erection of up to 111 no. dwellings with associated works, parking, landscaping, publicly accessible open space and access from Reading Road. (All matters reserved except for means of access.)
Case Officer: Mark Croucher

Development Management has received the above application and we require your comments on the proposal using the recommended memorandum below. The documents associated with this are available to view in NEC DM using the application number 243099. Alternatively, public documents are available to view on the Council's planning application search page: Wokingham Borough Council Online Planning.

Please index your response into NEC DM against the application. If you are recommending conditions, you should give a reason with reference to relevant policies. A list of standard conditions can be found on the Z Drive at: Z:\Standard Planning Conditions.

Your observations are required in respect of this application within **10 working days** of the above date or **15 working days** if the development type is classed as a major development.

Yours sincerely,
Development Management & Compliance

Public: Information that can be seen and used by everyone inside and outside the Council.

M E M O R A N D U M

From:	Boniface Ngu Flood Risk & Drainage		
Service	WBC Drainage	**App No:**	243099
Address:	Land North Of Reading Road, Arborfield.		
Proposal:	Outline application for the proposed erection of up to 111 no. dwellings with associated works, parking, landscaping, publicly accessible open space and access from Reading Road. (All matters reserved except for means of access.)		
Type of Development:	Major Dwellings (10+)		
Site Visit Made:	No		

Summary Of Recommendations

☐ No comment
☐ No objection
☒ No objection subject to conditions (and reasons) **stated below**
☐ Request further information before determination as **stated below**
☐ Objection due to the reason(s) **stated below**

Comments On Proposal

The site is within flood zone 1 and we would have no objection to the principle of the development.

We have reviewed **issue 2 of RCP flood risk assessment and drainage strategy report DANS-E254-274 dated 29/11/2024**, together with its appendices and have the following comments to make:

The 6.45ha greenfield site is within flood zone 1 and generally falls from east (57.51mAOD) to west (47.22mAOD), with watercourses along western and southern boundaries.

Infiltration is not achievable due to the London clay subbase of the site.

The development proposes swales, attenuation basins and bioretention areas, to cater for events up to and including the 1 in 100-year flood event with a 45% allowance for climate change, with flows controlled at the determined Q_{Bar} rate of 1.67l/s/ha (based on 4.04l/s for the anticipated 2.44ha impermeable area).

Maintenance to be carried out by a management company with details to be provided at detail design stage.

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We note from the **illustrative master plan drawing 052402-DAN-MP01 dated 22/11/2024** that some of the dwellings are proposed along surface water flow routes.

While we note that a detailed surface water drainage strategy will be provided at reserved matter stage, we will caution that existing blue corridors are maintained and attenuation basins be shallow enough to allow useability of public open spaces.

Drainage simulation results using EPA SWMM dated 27/11/2024 indicates that there will be no flooding of pipes for events up to and including the 1 in 100-year flood event with a 45% allowance for climate change.

Based on the above, we would recommend the condition below:

Conditions & Reasons (if required)

No development shall take place until full details of the drainage system for the site have been submitted to and approved in writing by the LPA. The details shall include:

1. Full calculations demonstrating the performance of soakaways or capacity of attenuation features to cater for 1 in 100-year flood event with a 40% allowance for climate change and runoff controlled at 1.67l/s/ha, or preferably better.
2. Separate drainage systems for any proposed adopted highways and residential dwellings.
3. A demonstration of how surface water runoff is going to be catered for, given that parts of the development site already suffer from surface water flooding.
4. A description of how the proposed development will deal with surface water overland flows.
5. Groundwater monitoring confirming seasonal high groundwater levels in the area.
6. A drainage strategy plan indicating the location and sizing of SuDS features, with the base of any SuDS features located at least 1m above the seasonal high water table level or demonstrate how attenuation features will be lined to ensure that they continue to function optimally.
7. Details demonstrating how any SuDS for this development would be managed throughout the lifespan of the development and who will be responsible for maintenance.

The approved scheme shall be implemented prior to the first occupation of the development and shall be maintained in the approved form for as long as the development remains on the site.

This is to prevent increased flood risk from surface water run-off. Relevant policy: NPPF (2023) Section 14 (Meeting the Challenge of Climate Change, Flooding and Coastal Change), Core Strategy policy CP1 and Managing Development Delivery Local Plan policies CC09 and CC10.

Date:	12/12/2024	**Signed:**	Boniface Ngu

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Appendix (G)

Thames Water Consultation and Correspondence

3rd Party Planning Application – 243099

Wokingham District Council
P.O Box 157
Shute End
WOKINGHAM
Berks
RG40 1WR

Our DTS Ref: 78332

Your Ref: 243099

16 December 2024

Dear Sir/Madam

Re: LAND NORTH OF, READING ROAD, -, ARBORFIELD, -, RG2 9HR

Waste Comments

Thames Water would advise that with regard to FOUL WATER sewerage network infrastructure capacity, we would not have any objection to the above planning application, based on the information provided.

The application indicates that SURFACE WATER will NOT be discharged to the public network and as such Thames Water has no objection, however approval should be sought from the Lead Local Flood Authority. Should the applicant subsequently seek a connection to discharge surface water into the public network in the future then we would consider this to be a material change to the proposal, which would require an amendment to the application at which point we would need to review our position.

Water Comments

Public: Information that can be seen and used by everyone inside and outside the Council.

Following initial investigations, Thames Water has identified an inability of the existing water network infrastructure to accommodate the needs of this development proposal. As such Thames Water request that the following condition be added to any planning permission. No development shall be occupied until confirmation has been provided that either:- all water network upgrades required to accommodate the additional demand to serve the development have been completed; or - a development and infrastructure phasing plan has been agreed with Thames Water to allow development to be occupied. Where a development and infrastructure phasing plan is agreed no occupation shall take place other than in accordance with the agreed development and infrastructure phasing plan. Reason - The development may lead to no / low water pressure and network reinforcement works are anticipated to be necessary to ensure that sufficient capacity is made available to accommodate additional demand anticipated from the new development" The developer can request information to support the discharge of this condition by visiting the Thames Water website at thameswater.co.uk/preplanning. Should the Local Planning Authority consider the above recommendation inappropriate or are unable to include it in the decision notice, it is important that the Local Planning Authority liaises with Thames Water Development Planning Department (e-mail: devcon.team@thameswater.co.uk) prior to the planning application approval.

The proposed development is located within 5m of a strategic water main. Thames Water do NOT permit the building over or construction within 5m, of strategic water mains. Thames Water request that the following condition be added to any planning permission. No construction shall take place within 5m of the water main. Information detailing how the developer intends to divert the asset / align the development, so as to prevent the potential for damage to subsurface potable water infrastructure, must be submitted to and approved in writing by the local planning authority in consultation with Thames Water. Any construction must be undertaken in accordance with the terms of the approved information. Unrestricted access must be available at all times for the maintenance and repair of the asset during and after the construction works. Reason: The proposed works will be in close proximity to underground strategic water main, utility infrastructure. The works has the potential to impact on local underground water utility infrastructure. Please read our guide 'working near our assets' to ensure your workings will be in line with the necessary processes you need to follow if you're considering working above or near our pipes or other structures. https://eur03.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.thameswater.co.uk%2Fdevelopers%2Flarger-scale-developments%2Fplanning-your-development%2Fworking-near-our-pipes&data=05%7C02%7Cplanning.enquiries%40wokingham.gov.uk%7C1462dfec72d14e921bc708dd1de165f7%7C996ee15c0b3e4a6f8e65120a9a51821a%7C0%7C0%7C638699576121717012%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=i73aw3nxyPinjaGYY4nB0mvq5cn%2FNRGCT8FXD%2F8N%2F8I%3D&reserved=0 Should you require further information please contact Thames Water. Email: developer.services@thameswater.co.uk.

Supplementary Comments

Public: Information that can be seen and used by everyone inside and outside the Council.

Comments based on the assumption that foul flows will connect to the public network via gravity.

Yours faithfully

Development Planning Department

Development Planning,

Thames Water,

Maple Lodge STW,

Denham Way,

Rickmansworth,

WD3 9SQ

Tel:020 3577 9998

Email: devcon.team@thameswater.co.uk

Public: Information that can be seen and used by everyone inside and outside the Council.

Sarah Burrow

From: Brigid Taylor <b.taylor@woolfbond.co.uk>
Sent: 13 March 2025 09:57
To: danielbradbury@elstreeland.co.uk
Subject: FW: 243099 - Land North of Reading Road.

Re: EA

Brigid Taylor MRTPI MIENvS PIEMA
Woolf Bond Planning Ltd.
The Mitfords
Basingstoke Road
Three Mile Cross
RG7 1AT
Tel: 01189 884923
Mobile: 07551 365 585

www.woolfbond.co.uk



From: Brigid Taylor
Sent: 07 March 2025 09:57
To: Mark Croucher <Mark.Croucher@wokingham.gov.uk>
Cc: Adam Constantinou <A.Constantinou@woolfbond.co.uk>; Steven Brown <S.brown@woolfbond.co.uk>
Subject: 243099 - Land North of Reading Road.

Mark

Thanks for your time yesterday. As discussed, we have now had a response from Thames Water, in response to the points raised by the EA re: foul capacity.

As confirmed below, the Arborfield STW is compliant with its permit, and the business plan for 2025 - 2030 includes upgrades which will extend treatment capacity to accommodate projected growth and maintain STW compliance.

On that basis, Thames Water state that they disagree with the EA's response, and do not consider the development would contribute to unacceptable levels of water pollution (para 187 NPPF) or adversely affect water quality.

I also confirm we are in agreement to an extension of time until 10 April, the date following the 9 April committee. We would be grateful if you can send over the ecology response as soon as available so that any points raised can reviewed before the target determination date.

Kind regards

Brigid

---------- Forwarded message ---------
From: **lauren underwood** <lauren.underwood@thameswater.co.uk>
Date: Wed, 5 Mar 2025 at 11:56
Subject: RE: Developer Services Enquiry: General Enquiry
To: terry@rcpengineers.co.uk <terry@rcpengineers.co.uk>

Good Afternoon Terry,

I do apologise for the delay in coming back to you.

Arborfield STW is currently compliant and is forecast to remain compliant with its DWF permit throughout the period of 2025 - 2030. We do not therefore agree that this development would contribute to unacceptable levels of water pollution (para 187 NPPF) or adversely affect water quality.

Our business plan for 2025 - 2030 includes upgrades for Arborfield STW which will be delivered during the period and will extend treatment capacity to accommodate projected growth and maintain STW compliance beyond 2030.

We will continue to monitor the performance of the STW and its permit compliance to determine the appropriate timing of any additional future investment, whilst mitigating against investing in assets ahead of need and thus creating superfluous capacity/headroom.

Lauren Underwood
Regional Development Manager (London)

Asset Management & Engineering

lauren.underwood@thameswater.co.uk

Maple Lodge Sewage Treatment Works, Denham Way, Rickmansworth, WD3 9SQ

Thames Water
It's everyone's water

Working schedule: Mon, Tues Fri 8am-5:30pm. Wed & Thurs 9:30am - 2:30pm

From: lauren underwood
Sent: 25 February 2025 14:26
To: terry@rcpengineers.co.uk
Subject: RE: Developer Services Enquiry: General Enquiry

Good Afternoon Terry,

I sincerely apologise for the delay in coming back to you on your enquiry.

We are looking into this and as soon as I have some information I will come back to you.

Kind regards,

Lauren Underwood
Regional Development Manager (London)

Asset Management & Engineering

lauren.underwood@thameswater.co.uk

Maple Lodge Sewage Treatment Works, Denham Way, Rickmansworth, WD3 9SQ

Working schedule: Mon, Tues Fri 8am-5:30pm. Wed & Thurs 9:30am - 2:30pm

From: DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
Sent: 31 January 2025 11:16
To: Devcon Team <devcon.team@thameswater.co.uk>
Cc: lauren underwood <lauren.underwood@thameswater.co.uk>
Subject: FW: Developer Services Enquiry: General Enquiry

Original Text

From:	Thames Water Website
To:	developer.services@thameswater.co.u
CC:	
Sent:	29.01.25 11:50:19
Subject:	Developer Services Enquiry: General Enquiry

Enquiry Details

Subject: Wastewater services

Web reference number: 100013453DS

Customer details

Company name: RCP Consulting Engineers Limited

Name: Mr Terry Seymour

Telephone: 07462134576

Alt Telephone: N/A

Email: terry@rcpengineers.co.uk

Site Address

Site postcode: RG2 9HN

Site address 1: land north of reading road

Site address 2:

Site town: arborfield

Site county:

Message: We have submitted a planning application to Wokingham borough council for the development of up to 111 no. dwellings. Planning application reference 243099. The EA has raised an objection relative to capacity at Arborfield STW.

Reference exists: False

Customer ref:

File name: EA-100013453DS.pdf

Visit us online www.thameswater.co.uk , follow us on twitter www.twitter.com/thameswater or find us on www.facebook.com/thameswater. We're happy to help you 24/7.

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INFRA ENGINEERING PRACTICE LIMITED

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